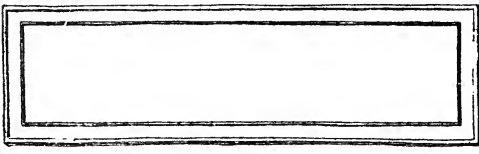


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WALTER DOUGLAS
President of The American Mining Congress
1917

Report of Proceedings

OF THE

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JOHN T. CONNERY. D. W. BUCHANAN.
JAMES DUNCAN. WILLIAM J. KELLY.
F. C. HONNOLD.

Reception.

WALTER S. BOGLE, Chairman.
CHARLES W. JACKSON. FRANK P. BLAIR.
F. K. COPELAND. HENRY L. HOLLIS.
CHARLES I. PIERCE. A. B. CONOVER.
LYMAN A. SISLEY. J. A. EDE.
CHARLES McDOWELL. CHARLES PIEZ.
S. W. McCUNE, JR. JOHN ERICSON.
ROBERT G. JEFFREY. JAMES NEEDHAM.
F. VON SCHLEGEL. H. H. SMALL.
CHARLES L. DERING. ELMER MARTIN.
H. H. TAYLOR. JACOB M. DICKINSON.
FRED H. HARWOOD. SAMUEL O. DUNN.
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OFFICERS AND DIRECTORS, 1917

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REPORT OF THE PROCEEDINGS

OF THE

Nineteenth Annual Session of the American Mining Congress

HOTEL LA SALLE, CHICAGO,
NOVEMBER 13-16, 1916.

TUESDAY, NOVEMBER 13, 1916.

Opening Session.

2:30 O'clock, P. M.

The Nineteenth Annual Session of the American Mining Congress was called to order in the Grand Ball Room of the La Salle Hotel, Chicago, at 2:30 p. m., November 13, 1916, by Mr. Harry C. Adams, Chairman of the Executive Committee.

CHAIRMAN ADAMS. Gentlemen of the Convention: As Chairman of the Executive Committee it is my pleasure and privilege to call to order this, the Nineteenth Annual Session of the American Mining Congress.

The first gentleman on the program is Governor Dunne. We have not seen the Governor here and we do not know whether there is a representative of the Governor present in the room. If there is we will be glad to see him and glad to hear from him.

Apparently there is no one here representing the Governor. Therefore, we will make the welcome local and I will call on Mr. Harry Atwood, attorney for the Board of Local Improvements of the City of Chicago, who will represent Mayor William Hale Thompson. (Applause.)

MR. HARRY F. ATWOOD: Mr. Chairman and Gentlemen of the American Mining Congress: I know that it is a great disappointment to you not to have Mayor Thompson here in person, and it is a great disappointment for him not to be here. It is a difficult matter to take his place, because he always has a smile that makes you feel welcome and cheerful and he has a personality that radiates hospitality and that we want Chicago to stand for, because we feel that Chicago should be the home office of the Universe, as it is the center of this country, and in many ways the center of the Universe.

I do not know very much about mining. There has been a disposition during recent years on the part of many of our public men to give a great deal of advice on things that they do not know very much about; so I am not going to say anything about mining. We feel about Mayor Thompson's absence and my presence, so far as you are concerned, a keen disappointment, a good deal as the second husband of a certain Irish woman felt about his presence, and the absence of the first husband. She came out one morning and noticed some black cloth on his arm and she said, "Mike, what in the name of hivins are you doing

with that black crepe on your arm?" He said, "Sure, Mary, I'm in mourning for your first husband; I'm sorry he's dead." (Laughter.) And so we are all sorry that Mayor Thompson is not here.

I note in your program that there is to be a discussion on uniform legislation, and I hope that you will all favor uniform legislation, and also favor as little legislation as possible. During the five years from 1909 to 1913, inclusive, in this country, we enacted over sixty-two thousand new laws and during those same five years we had over sixty-five thousand decisions of courts of last resort and compiled six hundred and thirty-one new large volumes of decisions. If we should keep up that process for a hundred years there would not be room in all the public buildings that have been erected to store the printed matter, and no one would have the faintest conception of where they were at or what they were doing, or what they ought to do. I think that is a mighty important thing for business men to think about. Legislation, excessive and half-baked and superficial, in my judgment has been the curse of the last ten or fifteen years. (Applause.)

I note also that you are going to discuss the question of co-operation in the mining world; and I take it that the spirit of your meeting here is team-work, for the purpose of exchanging ideas, of helping one another. It is essential that business men work together and catch the spirit of team-work. Co-operation, in my judgment, will be the keynote of the Twentieth Century.

Whenever I appear before an audience of business men I frequently think of a book that an old friend of mine wrote some time ago. He called on me with his manuscript before he had his book published and wanted me to glance it over and tell him what I thought of it. I had known him as a farmer and a business man, but not as a writer. I had all the work that I felt I could do and tried to evade the issue, but he was very persistent and insisted that I look over his manuscript. So finally he journeyed homeward leaving the manuscript with me. I sat down to glance it over and it proved so interesting that before I retired I had read the entire book. He had it very carefully divided into topics and chapters, and when I came to what he called his chapter on Justice I was curious to know how he treated that subject, because so many wise men had already written upon it. He handled the subject in a rather original way. The opening sentence was something like this: He said the modern business man and farmer was rapidly passing the judge and the lawyer in intelligence and in knowledge. I thought that was a pretty strong statement to make, inasmuch as the lawyers and judges were supposed to be about as intelligent as any class of people. But he said he would show his method of reasoning by which he arrived at that conclusion. He said the judge is today sitting in the same quiet, closed room that the judges sat in ten, fifty, a hundred and more years ago, away from the modern trends of achievement, away from inventions and achievements in steam, gas and electricity, away from the creative genius, and is guided in his day's work by the precedents of the past. He said that the lawyer sat or stood before the judge with a few dust covered law books before him and he argued on either side of any question from precedents of the past. But he said the farmer had to do with the problems of today, with the problem of intensive cultivation, with the problem of soil culture, had to study out the various problems connected with his farming in order to meet the competition current all over the country, studying the needs of his farm and the relation of his farm to the rest of the world. He said that the modern business man had to be a general because he was constantly organizing industrial forces, had to be a diplomat, because he was constantly negotiating important transactions, had to be a genius because he is always working out engineering problems and overcoming difficulties and establishing new precedents. I know there is no field of endeavor where that is more true than in the mining world. It takes a genius to get along in the mining world. They can even sell stock. I have stock in

several companies myself, much to my regret. But he said that those two classes of men were doing most of the work of today and establishing the precedents of tomorrow. I know that the lawyer who is going to make himself valuable and a success has got to be as good a business man as the client he is trying to represent or he has to live on money that he either married or inherited.

It reminds me of a young fellow who was admitted to the bar down in Louisville and who was going through what they call the starvation period and from any evidence he gave it looked like the starvation period would be a long one. He liked Louisville and he didn't want to leave town. So he fell in love with the daughter of one of the richest men in Louisville and he went to her father and told him that he was in love with his daughter and asked for his consent to marry her. Her father said: "That is not what I am interested in, whether you are in love with her or not, but the thing that I am interested in is whether or not my daughter is in love with you." "Well," the young man replied, "she says she is." "Well," the old gentleman said, "if upon investigation I find that to be true you can have her upon just one condition." The young fellow said, "I want her pretty badly. What is that condition?" "The condition is that, after you are married, you come to live with us." The young man said, "Will you please put that in writing?" (Laughter.)

As an illustration of the difference between co-operation and competition, I think that the safest test of a principle or a law is, where will it take you if you carry it to the extremes. I am glad to see co-operation on your program twice. I heard a story that illustrates just how far competition will take you when carried to the extreme. A man was working in a factory located on a river. One day he fell in. He couldn't swim very well and he was struggling about in the water and tried to keep above the surface. He finally spied an acquaintance on the shore by the name of Mike and he said: "Mike! Mike! I'm drowning; run down to the factory and get a rope and throw it to me!" Mike ran down to the factory and ran up to where the foreman was, almost out of breath and he said: "Murphy is drowning down here. Can I have his job?" (Laughter.) The foreman said: "No; you are too late. We gave it to the man who pushed him in." (Laughter.)

But I ran across a poem a little while ago on co-operation that, while it might sound simple to you, I believe it is worthy of repetition. It was called "Co-operation in Nature," and that little poem ran something like this:

"Help one another," the snowflake said,
 As they nestled down in their fleecy bed,
 "One of us here would not be felt,
 One of us here would quickly melt,
 But I'll help you and you help me,
 And then what a great white drift there'll be."

"Help one another," a maple spray said
 To its fellow leaves one day.
 "The sun would wither me here alone,
 Long enough 'ere the day is gone,
 But I'll help you and you help me,
 And then what a splendid shade there'll be."

"Help one another," a dewdrop cried,
 Seeing another drop close to its side,
 "The warm south breeze might dry me away,
 And I would be gone 'ere noon today,
 But I'll help you and you help me
 And we'll make a brook run to the sea."

"Help one another," a grain of sand
 Said to another grain just at hand.
 "The wind might blow me over the sea,
 And then, oh, what would become of me?
 But come my brother, give me your hand,
 We'll build a mountain and there we'll stand."

So the snowflakes grew to drifts,
 The grains of sands to mountains,
 The leaves became a pleasant shade
 And the dew drops fed the fountains.

Now, just one of the lines in that little poem, "But I'll help you and you help me," applied to the nations of the world today would establish instantly international peace; applied in any business between the employer and the employe with a mutual understanding of conditions will make that business a success; and applied between members in the same line of business, working together and exchanging ideas in convention will work to splendid results, and it is in that splendid spirit of teamwork that we welcome you to our city.

I thank you. (Applause.)

CHAIRMAN ADAMS: Gentlemen, you all know more or less about the Chicago Association of Commerce, an association of which all Chicago people are proud. It is an association that does wonders for the good of Chicago. Mr. O'Leary, the President, is here today. He is going to say a few words of welcome to you.

MR. J. W. O'LEARY. Mr. Chairman and Gentlemen: I am very glad indeed, on behalf of the commercial interests of Chicago to welcome this Congress. You have come to a city that ought to make you feel at home. Chicago consumes something like twenty-five million tons of coal, and, of course, in our manufactures, tons and tons of metals. You are in a state that, as you know, produces something like sixty million tons of coal a year. And so, as I say, you ought to feel thoroughly at home.

Yours is rather a wonderful industry. Your product began forming before history began. It is the greatest commercial necessity, including the metals, the greatest commercial necessity of today. It is absolutely essential to our industrial progress and Chicago particularly is under obligations to you for what your mines have produced, for we are fundamentally a manufacturing and industrial center. That is the basis of Chicago's greatness today.

Mr. Atwood has touched upon some of the subjects you are going to study. You have great problems before you. Legislation? Yes. I think we all agree that there has been too much of it. I think the time is coming faster and faster, as business organizes more and more and appreciates that there is a necessity for ethical practices, when we shall agree that we could get along just about as well under the ten commandments as under the sixty or seventy thousand existing laws.

You are in the limelight today, particularly you coal men. It seems to me I hardly read a paper in which I do not see how these robbers are absolutely taking away from the poor people their last dollar and their last cent. I am wondering whether you cannot develop by means of your sessions an appreciation on the part of the people that always, everywhere, the law of supply and demand must control; that we cannot have scarcity of labor, that we cannot have inefficiency on the part of such labor as still remains, that we cannot have scarcity of transportation facilities without necessarily increasing the price of our product.

I note you are going to talk about co-operation in marketing, possibly in producing. I remember at the time the Clayton bill was being considered by Congress, and trust legislation also, that Dr. Van Hise, President of the University of Wisconsin, always cited the coal industry as one of the reasons for some sort of co-operative organization in industry, and in all of his addresses he pointed to the tremendous waste

and extravagance which we incurred through competition, how we were stripping only the richest veins and putting a mortgage on the future which it would be impossible to pay off. I have been impressed with that constantly. I think the Mining Congress should work out some scheme which could almost be placed by demand upon our statute books which would permit co-operation in this field.

Safety first, like lots of our slogans, is getting rather weather-worn, but it is just as essential as it was when it was a popular word. Conservation in human life is, of course, the most important element that we must consider.

But I am not here to discuss the problems of your convention. I only hope that from them will come some constructive action. I hope that while you are here you will have an opportunity to acquaint yourself with Chicago.

We are proud of Chicago. Some folks say we boast of it. I prefer to say we boost it. We are proud of our parks and boulevards, and we invite your attention to our development of the small park idea. We think we are leaders in it. You will enjoy it. We are proud of our art institutions, our educational institutions. You may have noted through the papers within the last few days that Chicago is to be the medical center of the United States, and we hope for the co-operation of the rest of our nation and of the world. We are proud of our manufacturing establishments; and I am sure that you will find it well worth your while to visit our great manufacturing institutions. You will find that the open door policy prevails towards such men as you. We are proud of our mercantile establishments. You will find them ready to receive you, whether you spend money or not.

And so we hope that you will study your problems and bring from them constructive action; and not only this, but that you will take time to get acquainted with Chicago and to realize, as I hope you will before you go, that there is a real warmth in this great big city of ours.

I thank you. (Applause.)

CHAIRMAN ADAMS: I think you will all appreciate the hearty welcome that Mr. O'Leary and Mr. Atwood have given you.

The year closing in the metal and mining business has been a remarkable year in many respects. It has been a very prosperous year in a great many of the metal industries. We have had a good deal of bad and a good deal of good in the coal business. We do not know how long the good is going to last in the coal business. Usually it does not last very long. The attention of this Congress, in my judgment, should be given largely or at least a large part of it should be given to consideration of the standardization of cost accounting, both as to mineral and to coal mining. This matter has been brought to the attention of almost everybody in the last few months by the Federal Trade Commission. Mr. Hurley has advocated it from one end of the country to the other. After we pass through the abnormal conditions that are surrounding us now we certainly will be in bad shape, so far as marketing coal is concerned, or marketing metals is concerned, unless we know, all of us, what our product is going to cost and what it does cost. Some progress has been made, so far as coal companies are concerned, along the lines of standardization, and we are getting some very good results from the effort. I think the time will come in the very near future when we will have to go farther than the standardization of costs. We will have to standardize the method of production. We will have to standardize the sizing of coal. That matter has been given some attention. Probably later on it can be carried to a success.

The program as outlined here is a pretty long one. It is going to take lots of work to get through. Your committees have made some efforts along the lines of entertainment and we hope that you will have a pleasant time and a profitable time while you stay in Chicago.

I think the Association is fortunate in having the guidance of so expert a mining man as Mr. Carl Scholz, your President, to whom I now turn over the convention. (Applause.)

THE PRESIDENT. Ladies and Gentlemen, and Fellow Members of the American Mining Congress: I am sure I express the sentiment of this meeting when I thank the City of Chicago and the Chicago committee for the kind and generous reception they have given us. Personally, I feel that I occupy the position of the prophet who is usually of not much account in his own country. Nevertheless, the attendance at this meeting today convinces me that many believe in our work and agree that we are doing something for the mining industry.

You will note on our program this year that the President's address has been omitted, for the very good and sufficient reason that I only make one speech and I have already made that speech twice, this being the third time I have presided. Besides, there are a good many gentlemen here who have given much time and a good deal of thought to the subjects which they are going to present, and, therefore, I am going to leave out any remarks which might be expected in the usual course of procedure from the President. I will say, however, that my speeches regularly appear in the Mining Congress Journal and have appeared there every month during the past year. Therefore, I am going to proceed with the regular program, and I hereby declare the Nineteenth Session of the American Mining Congress open. Mr. Secretary, what have you to come up as the first item of the program?

SECRETARY CALLBREATH: Mr. Chairman, it has been customary at these conventions to take up a short time after the opening addresses of welcome by responses from the various states. This year the request has been made that each state in making its response shall present in the form of a resolution or a concise statement that thing which in the opinion of the mining men of that state shall be considered of the most importance to it; in other words, if you wish to ask this convention to endorse any propaganda which your people think is most important to you, that you let that fact be known either in the form of resolution or short statement. I think, therefore, Mr. Chairman, if we may call the roll of states and let those who are present respond, that we will accomplish that purpose.

THE PRESIDENT: Mr. John H. Robinson, Secretary of the Arizona Chapter of the American Mining Congress, will speak for Arizona.

MR. ROBINSON: As a representative of the mining industry of Arizona, we came before your convention asking for nothing.

Arizona this year will produce over five hundred million pounds of copper, and the mining industry in general is flourishing.

The last three or four years we have been troubled to a great extent with a lot of laws that have been more or less detrimental to the mining industry. We believe that we have overcome this difficulty.

We come before your convention today hoping that the meeting will be productive of good results to the industry and also see that we are given saner laws in mining.

I thank you. (Applause.)

THE PRESIDENT: Mr. Robinson has fitly described the situation which applies to the entire mining industry today. And as we go along I want to point out to you that, as in time of peace we must prepare for war, in time of war we should prepare for peace. I am glad that Arizona is in its happy condition, as I hope many of the other states are. I only want you to bear in mind that we should get ready for what is coming.

MR. ROBINSON (Arizona): Arizona would like to co-operate with you in all matters, though. If we can be of any assistance, do not hesitate in calling on us.

THE PRESIDENT: Thank you. We will now call for Arkansas, Dr. Purdue.

DR. PURDUE: I beg your pardon, Mr. Chairman. I at present represent Tennessee. Formerly Arkansas, but now Tennessee.

THE PRESIDENT: We will next hear from ex-Governor Gillett of California.

MR. GILLETT: Mr. President, I haven't anything at this time that I desire to say. The oil situation in California is taking up most of the thought of our people there, and before this convention is over I expect to have a resolution to introduce to secure whatever co-operation we can from this Congress. I have no resolution to introduce at the present time. The oil situation in California is the one that is most impressing us.

THE PRESIDENT: Mr. E. H. Weitzel of Colorado.

MR. WEITZEL: This is the first convention of the American Mining Congress I have attended. I did not know of the custom of calling on states and really have nothing to say. I am glad to hear our neighboring state, Arizona, is in such good condition and doing so much business. I think we will ask the convention to help us get a better price for our coal. That is all I would ask for.

THE PRESIDENT: Mr. Van H. Manning, the director of the Bureau of Mines, will represent the District of Columbia. Come to the front, Mr. Manning.

MR. MANNING. Mr. Chairman and Gentlemen: I did not know until a few moments ago that I was expected to respond for the District of Columbia. I didn't know I was accredited from that part of the country, although it is an honor to accept the assignment. I can only say to you in behalf of the Department of the Interior and the Bureau of Mines that we are always glad to be represented at the American Mining Congress. The Bureau of Mines feels that the American Mining Congress was responsible in a very large measure for its creation, and, therefore, it affords me genuine pleasure to stand before you today and make that statement. I am sorry that the Secretary of the Interior will not be able to be present. He was invited to attend, but on account of his duties at Atlantic City with the Mexican Commission he will be unable to attend.

I thank you. (Applause.)

THE PRESIDENT: Is there a representative from Georgia in the room? Idaho.

MR. EUGENE THOMAS (Idaho): I am from Idaho, Mr. President, and I am very glad to report to you that the litigation in the Coeur d'Alene mining district over the extra-lateral law, or the apex law, as some people call it, has been overcome to a great extent. The people are getting wise enough to quit lawing and go to arbitrating. The law is still in existence. Now, we settled that by just simply coming together and agreeing on certain things. Suits that were started twenty or twenty-five years ago have recently been settled by agreement. We hope to get some legislation along these lines, however, which will forever put a stop to such litigation, because the mining industry can't stand it.

THE PRESIDENT: I will now call on Mr. Walter S. Bogle to represent Indiana.

MR. BOGLE: Well, Mr. President, this is rather a surprise to me. I did not expect to represent anything here today. As far as Indiana is concerned, at the present time she feels the need of cars. The market has taken the bit in its teeth and it running away with itself. Whether it will come down after a while or not is a question, but what it has accomplished in that direction is simply a fair example of what can be accomplished by co-operation among business men. As far as Indiana is concerned, I believe that she would favor and would call for a standard method of computing costs, and such modification of the Sherman anti-trust law as would permit of limited co-operation among business men, not only in the coal business but in other businesses.

Once in a while there is a genius born into the world. Some thirty years ago or so I sat within four or five feet of Governor Altgeld, since

dead. He made this statement: "Large aggregations of capital have come to stay in this country. They are a necessity to meet modern business conditions. They will prove a benefit to all classes of communities; but they must be controlled." I think in view of later developments, in the efforts of the powers that were at Washington who tried to crush out big business in this country, that his words sound almost prophetic. I believe that the crying need in this country at the present time, and will be when present international conditions are changed, is that the business men of this country should be allowed to have limited co-operation for the purpose not only of cheapening costs, but in arranging their affairs so that they can meet competition, no matter from whence it comes. It is a large subject. I am glad to see that the Federal Trade Commission, through its chairman, Mr. Hurley, has taken a very broad view on this subject. It seems thoroughly disposed to aid the business men of this country in that direction, but he insists, and I think properly, that they shall be able to present a correct statement of costs of their different products. When that is done and the proper computations arrived at, when the proper computation is made as to overhead costs that should go in that statement, then those who are engaged in the coal business or in any other business where the competition has become very fierce will receive the assistance that they have required for a number of years past. It, in my opinion, is going to lead, if enforced, to the commercial supremacy of this country over all other countries in the world. The American Mining Congress, in my opinion, and in the opinion of the people of Indiana, and in the opinion of all men who have given this subject any study, I believe is one of the most important organizations before the business interests in this country today. I believe that the American Mining Congress should give its thought and its best assistance toward working out the problem of limited co-operation among business men, as endorsed by the Federal Trade Commission. (Applause.)

THE PRESIDENT: I will now call on Mr. Bent to respond for Illinois.

MR. E. T. BENT (Illinois). Mr. President and Gentlemen: Not until this minute did I know that I was to be called upon. Illinois has from the beginning, I think, shown its interest in the work of the American Mining Congress, and has believed that it was the medium through which a united mining industry could most effectively speak. The experience of the past few years is showing that to be true increasingly. Illinois desires to see the other mining states identified with the Congress and co-operating. I agree with the former speakers, Illinois agrees with the former speakers, that uniform accounting is of vital importance. A large proportion of the coal producing men of the country have not known what their product has cost and have been deceiving themselves and ruining both themselves and others. I believe that public opinion has changed. We know that the authorities have changed their point of view. Within the limits of what can be shown to be right and just to the people, I believe that the things of which Mr. Bogle speaks are going to come about. Illinois wishes to co-operate to that end.

MR. PRESIDENT: I will call on Mr. John P. Reece to respond for the state of Iowa.

MR. REECE: Mr. President, being a resident of Illinois and being only a representative of Iowa, I wish to decline in favor of Senator John T. Clarkson, who represents the Governor of Iowa. (Applause.)

THE PRESIDENT: Senator Clarkson, we will be glad to hear from you.

SENATOR CLARKSON: Mr. Chairman, I regret that Mr. Reece suggested my name, as he is so much better qualified to speak on this subject than I am, notwithstanding that he now claims Illinois as his place of residence, for Iowa claims a prior right because of his former

residence and present interest as Superintendent of Iowa Mines. I know but very little that I can add to what has been suggested by the gentleman from Indiana. It seems to me that one of the essential features of this Congress is that we need to unify our action along the line of business affairs so as to eliminate as far as reasonably may be what I would be pleased to call cut-throat competition. It occurs to me that, while the conditions will vary somewhat in the various states, yet after all there is a commonality of interest to such an extent that we can well afford to pool our efforts with a view of arriving at some common basis of action for uniformity of purposes to obtain the desired results. Along that line might be suggested reasonable uniformity of legislation. Some may say that federal legislation would be impracticable as a standard for uniformity. The same objections might be suggested in opposition to state legislation, for the reason that conditions vary within that state. After all, legislation should establish standards, leaving the details to be worked out to conform thereto.

Iowa, as far as mining interests are concerned, is largely interested in the coal mining, there being very little, if any, other mining in Iowa. We have felt for some time the absolute necessity of co-operating with the surrounding states to work out some plan by which may be eliminated, as far as may be, what might be said to be cut-throat competition; in other words, the catch-as-catch-can methods.

Uniformity of accounting and uniformity of public welfare legislation are some of the things that seem to me would very materially help the industries represented in this Congress.

THE PRESIDENT: We will call on Mr. W. B. Shackelford to represent Missouri.

MR. SCHACKELFORD: Mr. Chairman and Gentlemen: I do not know that our state has any particular resolution to present. The metal industry in Missouri has prospered exceedingly in the past two years. Our former cry has always been for a tariff to protect us on zinc ore down there against the heavy importations of Mexican ore. This year we have had ore from everywhere—Australia, Mexico, Spain, British Columbia, China and Japan. I do not know but that a tariff would be a good thing for us when the time comes when we will need a tariff. Our people down there at this time did not seem to think so. They did not elect anybody that stood for it. (Laughter and applause.) Therefore, we are probably in a poor position to appear before the powers that be to ask for anything of that kind; but as long as there is a demand for our product and we are getting the prices that we are now getting we are having a little money to spend down there outside of our actual business needs.

We have spent a great deal of money there in the last year or two in matters of mine sanitation, the prevention of accidents, public health service, and we are doing quite a good work in our district along these lines, with the aid of Mr. Higgens of the Bureau of Mines and Dr. Lonza of the Public Health Service. They started off a work there that has brought results to us, and started us along right lines of work. We are paying considerably more down there now for our supplies and for our coal. Our coal is about 60 per cent over what it was a year or so ago, but as we are getting a hundred per cent more for our product we are not kicking. We think the coal men should enjoy a little of the good things, too. The only thing we would like to get is a little better quality of coal if we could get it. We get Kansas dirt, and we would like a little of this good Illinois coal if we could get it. (Laughter.) I think the next legislature in our state will agree on the passage of a workmen's compensation law. That is something that we want, that we need.

I know of nothing else that our state needs, except more of what we have. (Applause.)

THE PRESIDENT: We will now ask Mr. John Needham to speak for Montana.

MR. NEEDHAM (Montana): Mr. President, Montana is a very small coal-producing state. I represent that branch of the business. I rather think there ought to be somebody here from Montana representing the great mining industry of the state, copper. As far as the coal business of the state is concerned, Montana is doing very well and is not under the same difficulties that some of the other states are under. The coal business is going along satisfactorily. Perhaps probably the hardest blow that hit the state was hit about the 7th of this month, when the state went dry. (Laughter.) And I imagine that we will want some help in about another year. (Laughter and applause.)

THE PRESIDENT: All the states seem well pleased with their present attitudes. There is one, the next on our list, Nevada, where all the gold is mined, where they feel, I presume, better than anybody else. I will ask Mr. Codd to respond for Nevada.

MR. GEORGE H. CROSBY (Duluth): Mr. President, I am surprised that the important State of Minnesota has been left out.

THE PRESIDENT: I will be very glad to have you speak for Minnesota since the gentleman from Nevada has not responded.

MR. CROSBY. Mr. President, Ladies and Gentlemen: I am very proud of the state which I represent, Minnesota. It is, as you know, the most important factor in the production of raw material for the steel industry in this country. Without Minnesota we would not be able to take the place that we do in that important industry. Minnesota is producing a very large per cent of the iron ore that is consumed throughout the United States in the manufacture of pig iron and steel. The Lake Superior District, part of which lies in Minnesota, produced this year more than sixty per cent of all the iron ore produced in the United States of America. We are very well satisfied with the tonnage of production, but we have just a little bit of kick coming on the unfair proportion of the profit derived from the industry. Minnesota sends raw material to the east and south and the central west, to Chicago, and it does so sometimes at a loss and sometimes at a meager profit. It seems to me that the men who represent this Congress, at this session, should see to it that the industry give Minnesota her fair share of profit. (Applause.)

THE PRESIDENT: With apologies to Minnesota, I think I should call on Florida. There are mines and mining interests in states that I did not know about myself. I know that Florida produces grapefruit, oranges and alligator pears and it might produce some mining. Is there anybody here from Florida? I also overlooked Maine. Is there anybody here from Maine? I didn't call on Maine because I didn't think there was anybody here from that state.

MR. A. H. SKIDMORE (Kansas): Mr. President, I would like to know why you passed over Kansas? Is it on account of the chameleon political complexion since the recent election, or is it on account of the Kansas dirt that the gentleman spoke of a while ago? I think Kansas is getting a good deal of knocking today, but notwithstanding that I am from Kansas and proud of it. (Applause.)

THE PRESIDENT: Mr. Skidmore will speak for Kansas.

MR. SKIDMORE: Mr. President, I consider it an honor to be allowed to speak for Kansas, although I know there are some men here who are much better qualified to so do than myself.

I wish to say for Kansas: We have a country that as far as I know produces as good coal as any state in the Union. I am informed that there is being shipped from Illinois to Kansas City coal that sells for fifty cents less a ton than we of Kansas can afford to sell it for in Kansas City, and yet that coal is shipped two hundred and fifty miles farther than our Kansas coal. The gentleman that represents any state which follows such a practice ought not to stand in this convention and refer to Kansas coal as dirt.

Kansas has more money per capita, more churches, more and better schools than any other state in the Union. At the last election we gave

our Republican Governor one hundred and twenty thousand majority, but we gave Wilson thirty-five thousand majority. I do not think any state in the Union can beat that. I do not know the politics of the Chairman, but simply from the fact that he omitted Kansas from the roll call does not indicate to my mind that he represents the party that controls in Kansas, so far as the presidential election is concerned.

We have had a compensation law in the State of Kansas for several years which, with a little polishing up, would be quite satisfactory indeed. I understand that this Mining Congress is going to take up some questions of law governing mining. I am like the speaker who referred to some six or seven or eight thousand laws with reference to mining. I believe that if the mine operators and the coal miners themselves would try to obey—will some of you gentlemen tell me which one of the commandments it is which refers to getting together? Is it the eighth? Well, if we would obey the eighth commandment (laughter and applause) we wouldn't need all of those laws. We wouldn't need to have five or six thousand laws on our statute books. The fact of the matter is, judging from my own observation, the more the operator tries to build up the business the more some of the miners try to tear it down, and the more the miners try to build up the business the more some of the operators try to tear it down, from a miner's standpoint. In other words, we can't agree. In Kansas today contracts are not yet closed that should have been signed up the last of July.

Now, if this convention can do anything to help us out along that line we would be pleased to have you do it. If you will do that, when I get back home I will tell them that a gray-haired friend of mine—I don't know his name, but he is a nice-looking gentleman—referred to our coal as dirt, but we won't care anything about that. When you know you are right you don't care what the other fellow says about you. I know when you come to get the coal from Kansas which is from three to four feet thick that it sells on the market quickly and at a greater price than some of the eastern coal.

Now, what is the uniformity that this convention wants? Is it in reference to laws? Are you not placing too much stress on the law? The law helps the lawyer, but I say to you as a business man as well as a lawyer that the law don't help make very much money down in the coal mine. Just get together. Let us have a fair market price for our coal. I do not think one state should ship into Kansas and sell coal for one dollar and fifty cents when we can sell it in the state for two dollars and two dollars and a half, if these people would not cross-cut. We all know what cross-cutting means. That is where we make a mistake. Too often one coal operator will cut the throat of another, and that is what this convention ought to see is not permitted hereafter so far as it can.

Now gentlemen, I am kind of an interloper here, although it is true I have a commission in my pocket, but I am neither a coal miner nor operator, so to speak. We have gentlemen here from Kansas who have prepared speeches for this occasion. I have not. I simply got a little mad at what the gentleman referred to about Kansas dirt and I thought Kansas should be heard from. I thank you for your patience in listening to my remarks.

THE PRESIDENT: To avoid being corrected again, I am going to call the list of every state, territory and nation under the sun. (Applause.) I will now call on Louisiana. There are mines in Louisiana. Somebody ought to be here. Is there anyone here from Maine? Will Maryland respond?

MR. JACKSON: The ex-President of the Western Kentucky Operators Association is here, Mr. Wright, and we would like to hear from him.

THE PRESIDENT: Mr. Wright, we would be glad to hear from you. Kentucky was called for once but there was no response.

MR. F. P. WRIGHT: I believe you called for some special name from Kentucky, didn't you?

THE PRESIDENT: Well, I am afraid I did. The Secretary gave me the name of a man who was supposed to be here but who did not respond.

MR. WRIGHT: I didn't know I was expected to rise, and you know Kentuckians are supposed to be orators, but after listening to the gentleman from Kansas I am afraid that we are very modest.

I tell my Kentucky friends down there once in a while that I lived in Chicago a great many years ago, before the fire. In those days we had occasion to boast about Chicago, but I tell them that we should not call Chicago the Windy City any more. The people from Chicago blow very well, but they haven't been obliged to blow so hard lately.

Kentucky, as you know, was originally more of an agricultural state than anything else, but it has taken its place in the mining industry of the country in late years. Kentucky is filled with all sorts of minerals, some to a large extent and some with only traces. We have clays, stones, lead, felspar and coal. I am not going to get into a discussion with my friend from Kansas about the coal, nor the quality of it. I represent the western portion of Kentucky and a few years ago, ten or less than that, that was the largest producing part of the state, but during the last four or five years the eastern part of Kentucky has made great strides. Kentucky coal is going all over the country now and in the L. & N. cars and other cars that don't come back. That is what we are suffering from now. At an investigation into the car shortage which was begun at Louisville last week the representative of one railroad stated that there was one road which had six hundred cars of the L. & N. on it and that the general manager of the L. & N. had written to the general manager of this road, pleading for the return of those cars, and the general manager of this road, the western road, wrote a very polite letter and said they had lost their own cars down east and didn't know where they were, that they had been using those six hundred cars belonging to the L. & N. and that they were going to keep them. It was brought out in that investigation that the L. & N. Railroad Company had nineteen thousand coal cars, less than nine thousand of which were on its own road. This morning when I came in from my relatives' who live up on the north shore here, I counted eight or ten L. & N. cars between Glencoe and the city. None of them were empty. Some had gravel, some had broken stone and some had lumber in them, but I saw no coal in any of them, but they came here with coal.

I am not here to make a speech, and as all of these other gentlemen said, I am not prepared. I cannot speak against these gentlemen who are already prepared. I am very glad to speak for Kentucky. I want to tell you, gentlemen, about some of the things that we have done in reference to cost accounting. I am a representative of three different coal associations, every one of which is now compiling statistics on and discussing the question of uniform cost accounting. I am the chairman of one committee that has that matter in hand.

Uniformity in laws is another thing in which the people of Kentucky are interested. Every time the legislature of Kentucky feels they are a little hard up for money they tackle the mines and new bills are introduced taxing coal from one to five cents a ton. It has never been taxed. With reference to the compensation law, I asked the chairman of the State Board why it was that all the corporations were brought under the provisions of this law but not the agricultural industry or the agricultural interests. I remember once several years ago that there was a bill introduced in the legislature to appoint a state sealer of weights and measures which included among others the coal operators' scales that should be tested, and at the end of the bill it said, "Agricultural scales exempt." It seems to me that is going a little too far.

But Kentucky is going along pretty well, though we are short of cars. Some prices have gone up, but the rest of us who have contracts

made a year ago at low prices are not getting much of the benefit, but we are not complaining. (Applause.)

THE PRESIDENT: Is there anybody in the room to respond for Mississippi? Nebraska? New Hampshire? New Jersey? New Mexico? Mr. O'Brien is here, I know, for one, from New Mexico, and there may be others. New York? North Carolina? North Dakota?

MR. HANSEN EVSMITH (North Dakota): Mr. Chairman, North Dakota mines lignite coal. That is our problem. It is an industry that is comparatively new, but I think that today it saves probably five million dollars annually to the people of the state. The working out of the lignite problem is, of course, to find a way to make use of an inferior fuel. We have an excellent state mining school that is working out that problem. We have no local difficulties. The people are with us. Our principal trouble is to meet the competition of the better coals from the outside. (Applause.)

THE PRESIDENT: Ohio. Oklahoma. Oregon. Pennsylvania. Mr. S. A. Taylor will answer for Pennsylvania.

MR. S. A. TAYLOR (Pennsylvania): Mr. Chairman, Pennsylvania is going along about her usual way. She has in the past produced about half of the coal that has been produced in the United States, and is producing nearly that much now, although we have fallen back somewhat. She has some of the best iron mines in the country, with all due respect to my friend from Minnesota, who thinks they have pretty nearly a cinch on that.

There are several things that Pennsylvania, I think, might need, although I am not charged with producing any resolutions here. Pennsylvania, I think, probably might introduce a resolution, although I judge the Congress might do in a measure what I heard described as a new dance that was instituted down in Washington recently, one step forward, two steps backward, hesitation and sidestep. I think that Pennsylvania could introduce a resolution here today to move to consider the election of last Tuesday and make it unanimous in the way Pennsylvania went. (Laughter and applause.) I think they would be very glad to introduce such a resolution, but I anticipate that this Congress might sidestep such an issue.

We have during the past year in Pennsylvania had put into effect a workmen's compensation law. Whether good or not remains to be seen. There are some things about it that are admirable. There are a lot of other things that have been forced upon the industries of Pennsylvania. At any rate, in the way it was passed it was not advocated nor insisted upon by the industries of the state. They were in favor of a compensation law, but not such a one as we got. In fact, as was suggested by a speaker a short time ago, the people of Pennsylvania might exist very well on the ten commandments, and even some of them could be done away with. I am sure that we have entirely too much legislation.

We have before this convention today the question of co-operation, and I am sure that Pennsylvania heartily joins in the question of co-operation along any lines to establish unification of laws and the repealing of as many as possible that have been enacted in the past, and in the future to bring the passage of laws relating to mining into as few in number and as concise in requirements as it is possible to do. I am sure that not only Pennsylvania but many other states in the Union would be benefited by such action.

One of the questions which is most prominent today in Pennsylvania is one that will be touched on more completely in this convention, and that is the matter of co-operation along the line of better conditions in the mining industry, better reports, a uniform system of cost accounting, which has already been started and which we hope will be carried into effect during the present year. (Applause.)

THE PRESIDENT: Mr. Taylor has evidently covered mining in Pennsylvania in a general way, but perhaps we should call on Dr. Parker

of the anthracite region, who is here, to tell us something about anthracite.

MR. E. W. PARKER. Mr. President and Gentlemen of the Convention: There is only one thing that I can say offhand regarding the situation in the anthracite field at present, something about which you have possibly already heard through the newspapers; that there is a coal famine in the east, that the anthracite operators are unable to supply the demand, that prices have been advanced abnormally, and that conditions are of a very tense nature. The fact of the matter is that most of this is newspaper sensationalism, and if I were going to offer a resolution for consideration by this convention I think it would be to have the Congress go on record as favoring a plan to have the newspapers muzzled occasionally.

The anthracite mines have produced this year something over half a million tons more than they did last year. There has not been any more coal consumed domestically during this past summer than in previous years. In addition to the fact that the anthracite mines have produced a half million tons more this year than before, there was at the beginning of the present season somewhere between five or seven million, or possibly eight million, tons of coal in the anthracite storage yards, located between the mines and the markets. There is probably not a half a million tons of that coal in storage today. It has been taken to the markets. I am inclined to believe that the consumers have taken warning of past experience and have been buying their supplies early in the season. There are a few who have found as the season of cold weather advanced that they were short of coal. I do not believe there is really any serious shortage, and if the consumer is willing to take only what is necessary for immediate needs the situation will soon be entirely relieved and retail prices restored to their normal level.

.That is all I can tell you at the present time. (Applause.)

THE PRESIDENT: We will ask Dr. Chance to speak for the eastern part of Pennsylvania. He has just come into the room and we would like to hear from him.

DR. CHANCE (Pennsylvania): Mr. President, as I am not here as a representative of Pennsylvania, I therefore, am unprepared to speak on any subject specifically relating to that state, but from remarks made by a number of gentlemen who are prominently connected with the coal industry it has occurred to me that legislation connected with the taxation of industries, and especially of mining properties, is a subject of importance for an organization such as this is to take into consideration.

There seems to be a growing tendency to levy taxation upon mines by taxing the product or by a tax on the net profits. These modes of levying tax seem to be coming into use in the west more commonly than in the east. Indirectly, however, the principle is applied in the east, and has been employed by the national government. The federal taxation of corporations upon the profits of the corporations, that is the federal income tax, is levied by the national government upon "profits" of the industry. In many cases, it works injustice to mining corporations, for the reason that a mining company is not permitted to deduct from its apparent profit for the year the interest which it has been compelled to pay upon its bonds. In many cases the interest paid out upon bonds of a mining corporation is the equivalent of a royalty; thus we may have two operating companies, operating on adjoining properties one paying a royalty and the other paying interest on its bond. Referring to the anthracite regions the company operating under these may be paying thirty or forty cents a ton royalty upon the coal mined and are permitted to deduct that thirty or forty cents to determine the profit on which tax is to be paid. The company on the adjoining property may have purchased its property upon a bond issue on which it pays an interest charge which may amount to thirty or forty cents a ton, the practical equivalent of the royalty payment of its competitor. The mining company operating its own property is not permitted to make such a corre-

sponding deduction from its earnings for the purpose of determining the tax. This is unjust not only because it gives lessees an advantage over owners of coal property but also because it fails to take into account that when a mining company takes from the ground ore or coal or whatever product it may be working and markets it, it is converting its assets into cash and distributing those assets as dividends, a portion at least of all such dividends being converted assets and not operative profit.

Perhaps the Mining Congress cannot at present do anything to change this condition, excepting in an educational way, by letting the public know that mining companies are inequitably and unequally taxed, and that in many cases this must tend to retard the development of our resources and increase the cost of such products to the consuming public.

It seems to me that the Congress should aim to show the public that a proper charge for depreciation due to the exhaustion of the property should be made in all mine accounting, that the distribution of dividends is in reality a distribution of assets and includes a distribution of profits only when there is an operating profit, and that the Congress should urge the importance of these truths until they are accepted by our lawmakers. (Applause.)

THE PRESIDENT: We will call for response from the state of Rhode Island. South Carolina. Is Mr. Chambers in the room? South Dakota.

MR. STEVENS (South Dakota): Mr. President, I can't allow the state of South Dakota to be not represented in this meeting. It is the home of the great gold mines, the Homestead and produced last year probably eight million dollars of gold. Gold is the principal product of the mining industry of South Dakota, but we are laboring under a tremendous disadvantage as against those who are mining copper, lead and zinc, the gentlemen who are getting very high prices for their product. Gold has depreciated about thirty-five per cent in its purchasing power, if not more. We of South Dakota, and especially of the Black Hills section, have been earnestly pleading with the Almighty to put a dollar and quarter more gold in a ton of ground or change the standard so that about eight ounces will represent a pound and we will get equality by that method. (Applause.)

THE PRESIDENT: Tennessee.

DR. A. H. PURDUE (Tennessee): Mr. President, inasmuch as I was called some time ago to represent Arkansas, and inasmuch as I was in that state a good many years, I should like to take the opportunity of saying just a word about the greatest need of the mining industry in Arkansas. That is the repeal of the mine-run law. The mine-run law has put the operators out of business, practically, down in Arkansas, unless it be for the last two years, concerning which I am not informed. Previous to that time all the mine operators who were not financially able to withstand the evils of the mine run law went to the wall, and those who were able to stand it were simply holding their heads above water. It is not necessary for me to go into the reasons, and state to this body of men why the mine run law should not obtain.

There is another reason why I take this opportunity of speaking for Arkansas, and that is I think probably that I can settle the controversy between the gentleman from Missouri and the gentleman from Kansas. I think I can settle it in this way. When the gentleman from Missouri spoke about the dirt that they were receiving from the Kansas coal mines he meant the dirt that they were receiving from the Ar-Kansas mines. (Applause.) That comes from the mine run law.

When the Secretary of this Congress suggested to me by letter that he would like to have me prepare a resolution to present before the Congress relating to the greatest needs of the mining industry in Tennessee I took the matter pretty seriously and addressed letters to most of the mine operators of the State and asked each man what he considered the greatest need of the mining industry in Tennessee. The

mining industry in Tennessee is very varied. We produce perhaps as big a variety of mineral products as any other State in the Union, but the greatest single industry is the coal mining industry and it is from the coal mine operators that I received nearly all of the responses. It was from those responses that I have prepared this very brief resolution. To let you know that the opinions expressed in this resolution were not borrowed from those that have been expressed heretofore in this meeting, I wish to say that I prepared the resolution before I left Nashville. The opinions expressed in the resolution being in accordance with those that have been expressed heretofore in this meeting only indicate the uniformity of opinion relating to the necessity of co-operation among coal miners.

We have in Tennessee a condition that perhaps does not obtain in other states in that the State owns coal mines and operates those mines with the convicts from the State prison. The output of those mines comes into competition, of course, with the output of mines where men have invested their capital.

"Resolved, that the greatest needs of the mining industry in Tennessee are: Co-operation among coal mining operators under proper control, for the purpose of securing reasonable prices; the removal of the state convicts from the mines or the state becoming a party to the proposed co-operation; a uniform system of cost accounting for the operators; improved railroad facilities into the coal field, and the area to the south and southeast, including the seaboard; and the development of the state's manufacturing industries to provide a home market for its mineral resources." (Applause.)

THE PRESIDENT: We will now call for a response from Texas. No one seems to be here from Texas. Utah is ably represented by a number of gentlemen. Dr. Talmage, will you respond for Utah, please?

DR. JAMES E. TALMAGE: Mr. President, I am not informed as to the number of my colleagues who are present from Utah; but I have the honor to say that Utah sends greetings to the American Mining Congress, and is pleased to express satisfaction and full appreciation for the splendid reception accorded us here. The city by the Great Salt Sea felicitates the city by the Great Lakes.

The mines in Utah are working overtime. There is very general prosperity in mining circles. Utah, together with other Rocky Mountain states, is becoming more and more important as a source of non-metalliferous products, aside from coal, and as a producer of some of the rare metals, and of elements not usually classed as metals in the market. Utah stands with her sister states ready to further every effort in promoting the development of the mining industry. If she has any specific resolution to present, or determination to express, it is that she asks for just taxation of mines and mining products; and, in that respect, she feels that she is in accord with all other states interested in mining.

Utah is proud of the work already accomplished, and that now being carried on, by our local Chapter of this great organization. We heartily commend the establishment of chapters in the several states.

We have nothing to complain of; and we are looking for a continuation of prosperity with the feeling that if there has been or is to be any upsetting of ordinary conditions, we can blame all that upon the war.

THE PRESIDENT: Is there anyone here from Vermont? Virginia?

MR. LONG (Virginia): Mr. President, we have no troubles particularly. We stand ready to co-operate with the gentlemen generally with reference to things which will benefit us, particularly in any which will result in the establishment of better prices for our product. We are interested particularly at this time also in the subject of workmen's compensation. Our Governor recently appointed a Commission whose duty it will be to submit a bill to the next general assembly which is to convene in January, 1918, and we hope by the time that this general assembly meets that we will have the benefit of the experience of other states which have recently passed workmen's compensation legislation.

I have not had the pleasure of meeting you gentlemen before and it affords me great pleasure to be with you on this occasion. (Applause.)

THE PRESIDENT: We shall now hear from the State of Washington, Mr. Sidney Norman.

Mr. NORMAN: Mr. President and gentlemen of the convention—I have a resolution to present to this convention from the Northwest Mining Association, which endeavors to represent the mining interests of the Northwest. The resolution was adopted at the regular weekly meeting last Thursday.

“Delegates from Spokane, bearing credentials of the State of Washington, City of Spokane, and Northwest Mining Association, the latter representing allied mining interests of Northwestern States and British Columbia, bring to this convention a tale of great prosperity.

“Dividends for 1916, from mines of Idaho and British Columbia, will closely approximate \$14,000,000, of which the Coeur d’Alene district, greatest producer of lead-silver-zinc on the continent, contributes over \$10,500,000, and British Columbia \$3,000,000. Since records have been kept, the Coeur d’Alene district has paid \$61,558,714 in dividends and British Columbia \$16,578,911. Gross output for 1916 is estimated at \$70,000,000, while the total gross output since discovery has approximated \$500,000,000.

“This area stands today as one of the greatest producers of diversified metals in the world and, in the opinion of your delegates, the high-water mark has not yet been reached. New mines are being developed and old ones revived. Wages are high and prosperity visible in every direction.

“The most important development during the past year is the fact that electrolytic smelting of zinc ores has passed the experimental stage and is now upon a commercial basis. Plans are now in operation at Trail, B. C., and at Great Falls, Mont., thus providing a greatly increased market and insuring even greater prosperity in Northwestern districts for many years to come.

“Knowing the great part played by the American Mining Congress in the successful fight for recognition of the mining industry by the establishment of the Bureau of Mines, your delegates call attention to the adverse criticism aroused in the Northwest by some unfortunate circumstances concerning location of the Northwest Mine Station. We believe that this is a subject that might properly be discussed at length, in order that conclusions may be drawn that would tend to remove prevalent friction and thus restore the high opinion formed of the Bureau under the ideals that have governed its conduct in the past.

“Spokane does not appear here as a contender for that honor. It does, however, ask the aid of this convention in furthering any legitimate plan that will insure location of that site at some point in close touch with the great Coeur d’Alene and other districts in Northern Idaho, Western Montana and Eastern Washington. The isolation of the station at a point far removed from these districts would defeat the very object it is intended to attain and would at the same time destroy the growing value and influence of the Bureau.”

I thank you. (Applause.)

THE PRESIDENT: I will now call my native State by adoption, West Virginia. Dr. I. C. White.

DR. WHITE: Mr. President, I am not the official delegate from West Virginia, but I will say that West Virginia wants cars. She is long on coal but short on cars. My friend Dr. Parker here has criticized West Virginia for not consuming more of her own coal. In fact, we have so much natural gas there in use for fuel that as Dr. Parker has recently said the most of the coal that we burn in West Virginia is consumed by the locomotives hauling its coal out of the State. I presume West Virginia sends coal to more States than any other State in the Union, more than does Pennsylvania, and by the way, in about five years at the present rate of increase we will produce more bituminous

coal than Pennsylvania. We will this year produce, Mr. President, somewhere in the nineties of millions, whether it be ninety million or a few more will not be known until the statistics are all in. But we are forging to the front. As you well know, Illinois, which has more coal than any other State, formerly alternated with West Virginia, one year Illinois being second and the next year West Virginia, but about four or five years ago we apparently left Illinois far in the rear and it will be many years before Illinois will catch up with us.

I hear many of you speak about cost accounting. West Virginia had the honor of presenting that matter to the national body. As you all know, there is such a thing as the United States Chamber of Commerce. One of its most important committees is headed by a gentleman from Chicago, the Hon. Harry A. Wheeler, one of the first presidents of the Chamber of Commerce of the United States of America. When the Federal Trade Commission was appointed, it was realized that the commission needed a steering committee and hence the United States Chamber of Commerce appointed the Federal Trade Committee from its members. There are two of those members residing in Chicago, Mr. Wheeler and Mr. R. C. Butler, four in New York City, one in West Virginia, one in Virginia, and I think another in Georgia. Through Mr. Wheeler that committee was enabled to meet the Federal Trade Commission in Washington at its first regular session. The Federal Trade Commission requested suggestions from this committee. Your speaker had the honor of presenting what all seem now to recognize as one of the necessities in the coal business. I know that in West Virginia not one operator out of a hundred knew within fifty cents a ton what his coal was costing him, and it occurred to your speaker that that would be a good subject for the Federal Trade Commission to take up. They have the power there, just as much as the Interstate Commerce Commission have the power to compel the railways to adopt a uniform system of accounting, and it was suggested by myself to this Federal Trade Commission at the joint meeting referred to, where Mr. Hurley was a very eager and attentive listener, that this subject of proper cost accounting was one of the things that would benefit the great coal industry especially, and I am glad to say that the seed fell upon fertile soil. Therefore, you see that West Virginia, although one of the smaller States, but one of the largest in the coal industry, has been doing something for the benefit of the coal industry.

I thank you. (Applause.)

THE PRESIDENT: Is there any other state that has not been called or who has a representative here? Is there? If not, the Secretary has some announcements to make.

MR. H. O. GRANBERG (Oshkosh, Wisconsin): Mr. President, I am here from Wisconsin, but that state has not been called.

THE PRESIDENT: Wisconsin is called now and I will ask that you speak for Wisconsin.

MR. GRANBERG: Mr. President and members of the American Mining Congress—I will just say this in regard to Wisconsin that it will co-operate with full knowledge and enthusiasm with the Mining Congress to do that which the Congress may find necessary in the adoption of uniform laws and better conditions in the mining industry. Wisconsin has some considerable mining. In the southern part we have lead and zinc. Along the Mississippi river we find pearls. Along the northern waters we have iron, the same as our sister States of Michigan and Minnesota.

I have nothing further to say, except that we will join in a hearty co-operation with the Mining Congress in any measures that will improve and better the conditions of the mining industry generally. We have no grievances. We are prosperous in our state, as far as the mining business is concerned. We have one of the best workmen's compensation laws in force in any of the states. In fact, Wisconsin was one of the first states to adopt that principle, and some of the sister

states have seen fit to adopt Wisconsin's law or to take our compensation law as a model. So we are fair and well, living in prosperity and under good conditions, and trying to do better. (Applause.)

THE PRESIDENT: Is there anyone here from Wyoming? If not, that closes the list of the states.

I would like to add that at no meeting of the Mining Congress which I have attended heretofore have the responses been so gratifying because they speak of prosperity from every corner of the United States.

I will now call on the Secretary to make some announcements which will be of interest to all of you.

SECRETARY CALLBREATH: I desire first to call attention to the illustrated lecture this evening, to ask all of you to be present and bring your friends.

Please do not forget to visit the exhibitors on the seventeenth floor who are contributing in their way to the success of this convention.

The next thing in order is the selection of the Resolutions Committee. The Resolutions Committee is composed of one man from each state and selected by the delegates present from that state. The organization proper has no influence whatever in the selection of the Resolutions Committee. The Resolutions Committee does the most important work at the convention. I trust that in the selection of your members for that committee that you will select your best men and that the work of doing this will be as prompt as possible. Upon the program the resolutions are called for at the morning sessions, both tomorrow and the next day. We would like to have you prepare resolutions and have them introduced at that time. In the meantime select your members of the Resolutions Committee. The delegates from each state should meet for that purpose:

THE PRESIDENT: Will Alabama select her member of the Committee, or shall we take a few minutes' recess and ask each delegation to get together.

MR. W. W. BIXLEY: Mr. President, on behalf of Washington, I believe we are about ready to suggest our member of the Committee, Mr. Sidney Norman.

DR. J. E. TALMAGE: I see that provisions made on the program for the selection of a Committee on Resolutions at tomorrow morning's session and I think that representatives from many of the states may have taken the view, as I took the view, that the nominations would not be called for at this meeting. Moreover, there are very few comparatively at present in the room and I venture to suggest that the result may be more satisfactory if the selection of the Committee of Resolutions be deferred until the morning session, as the program announces to be the case.

THE PRESIDENT: Is there a motion, Dr. Talmage, that you wish to make?

DR. TALMAGE: If it be in order, Mr. President, I make it as a motion.

MR. EUGENE THOMAS (Idaho): I second the motion.

Upon the motion being put by the President it was declared carried.

THE PRESIDENT: Is there any further business before this session:

SECRETARY CALLBREATH: Mr. President, let me urge each state delegation to get together promptly and nominate its member of the Resolutions Committee and be ready to report at the session tomorrow morning.

THE PRESIDENT: I want to add to the Secretary's announcement that the illustrated lectures, including moving pictures, will be shown in this room tonight at 8 o'clock.

If there is no further business this meeting is herewith adjourned.

TUESDAY, NOVEMBER 14, 1916.

General (Morning) Session.

President Carl Scholz called the meeting to order at 10:20 a. m.

THE PRESIDENT: Gentlemen, the meeting will please come to order. If there are any resolutions that any gentlemen have to offer we will be glad to have them sent forward to be read by the Secretary.

THE SECRETARY: Mr. President, the program by mistake provides for the selection of the Resolutions Committee at the close of this meeting. It also provides for its selection at the close of the meeting held yesterday afternoon. I am the guilty party and I have to so plead. Whether it be better to take up the selection of the Resolutions Committee now or leave it to the close of this meeting is a matter for the convention to determine.

THE PRESIDENT: If it meets with your approval we will leave the selection of the Resolutions Committee to the end of the meeting.

Are there any other announcements you have to make now, Mr. Secretary, before we start in with the regular program?

SECRETARY CALLBREATH: Because of the fact that a smoker has been arranged by the Chicago Committee for this evening, it has been thought wise that the members meet at 7:30 o'clock tonight in accordance with the by-laws, select a Nominating Committee and adjourn until tomorrow night at 7:30. At the adjourned meeting tomorrow evening, the regular members' meeting will be held, at which time the report of the Nominating Committee can be brought in and the election follow.

I might also say that we have had printed a volume as a memorial to the late Dr. Joseph A. Holmes. The samples of that will be here sometime today. This was printed as a result of a number of private subscriptions but not quite enough to cover the expense of publication. There will be four classes of books, one bound in leather, and it is thought wise that we shall ask six dollars a volume from those of you who may desire to have it, with your name on the front cover in gold letters. Without the name it will be five dollars. Bound in cloth with the name it will be four dollars, and bound in cloth without the name three dollars. Any of you gentlemen who desire to get this volume will have an opportunity of these terms. I am sure that many of you will be glad to get it. It is a rather elaborate volume and I am sure it is a nice appreciation of this organization to Dr. Holmes.

May I say in reference to the smoker this evening that the official program fixed it at 6:30. The banquet is at 6:30 on Thursday night but the smoker tonight will be at 8 o'clock in this room. Please remember that.

Let me say about the banquet on Thursday night that Colonel George Pope of Connecticut, President of the National Manufacturers' Association, will be one of the principal speakers and will discuss the questions of labor and capital, one of the most vital questions before the people of this country today. The plan is that it shall be discussed from an absolutely fair standpoint, discussing and criticising both capital and labor wherever they may be wrong, giving opportunity to both sides to be heard. The desire is to find the points of contact and not points of difference and to bring into closer co-operation the real forces of production in the mining industries. I am sure you will all be interested in Col. Pope's address. Another address will be by Judge Short of California upon the question of the oil situation and the public lands question of the west. I know you will all enjoy that address. There is another address that we have in mind which I do not care to announce at this time but in which you will be particularly interested. Those of you who desire banquet tickets will kindly arrange for them as soon as possible in order that we may know what seating capacity will be required.

Heretofore we have sent the annual proceedings to all delegates, whether members of the Congress or not. This year the proceedings

will be sent to all the members of the Mining Congress without additional charge. Those of you who are not members and who desire the proceedings, may obtain them by paying about the cost of the printing which we have estimated to be one dollar. Those of you who are not members, who desire the proceedings, may order from the clerk at the desk.

Let me call attention to the exhibits on the seventeenth floor. Those gentlemen have hired rooms and are contributing towards the expense of this convention. The La Salle Hotel contributed those rooms to the Chicago Committee and the rental of the rooms is going into the general convention fund. Therefore, I hope that you will consider them as friends of the Mining Congress and that you will go down and view their exhibits. Among other things there will be a moving picture exhibit of core drilling. The University of Arizona will have a splendid exhibit of safety appliances and the other exhibits of a commercial nature are such as ought to interest you all. I hope you will make it your business to go down and view the exhibits.

THE PRESIDENT: Gentlemen, when I assumed the chair yesterday I told you that I felt that a prophet is not of much account in his own country and I applied that remark entirely to myself. There is a man with us today who has proven that he is of great deal of account to his country and to the nation as a whole. The speaker of the morning does not require any introduction to you because he is a Chicago product and without any further announcement I am going to take pleasure in calling on Mr. E. N. Hurley, the Chairman of the Federal Trade Commission, to deliver his address. Mr. Hurley. (Applause.)

Mr. Hurley's address will be found on page 442 of this report.

THE PRESIDENT: Mr. Hurley is in a great hurry to leave and as he leaves the room I want him to know that every member here appreciates fully just what he has said. A number of the coal operators have had very intimate relations with him and I only know that I speak the truth when I say that he has followed out in practice what he has spoken of in his address this morning.

While he has been looking ahead in what we ought to do, the Congress takes great anticipation in looking back at what it has done in connection with the establishment of the Bureau of Mines and I am going to call on Mr. Albert H. Fay, of the United States Bureau of Mines, to give us an outline of the work and a summary of the records of the mine safety work conducted by the Bureau. (Applause.)

MR. ALBERT H. FAY: Mr. President, gentlemen of the American Mining Congress—Mr. Callbreath, your Secretary, asked me to prepare a paper on "The Past and the Future of Mine Safety," a rather large subject. I notice he has changed the title on the program to "The Record of Mine Safety Work."

Your President has stated that the subject of my paper is "Mine Safety Work as Conducted by the Bureau of Mines." I have gone back to the beginning of the mine inspection service in the United States, so I shall cover a broader field than has been covered by the bureau.

The United States occupies the unique position of producing more coal than any other country in the world; uses more mining machines and produces a larger percentage of coal by mining machines; produces more coal per man employed than does any other country and also produces more coal per fatality. But, unfortunately, we produce more fatalities per thousand men employed than does any other country, except possibly British Columbia.

The Iroquois Theater disaster, the burning of the Brooklyn Theater, the fire in the Triangle factory in New York, have given us better and more efficient fire departments, laws and regulations. Steamboat inspection service is improved as a result of the burning of the General Slocum and the overturning of the Eastland. The railroads

today are made safer by reason of derailments and collisions that occurred five or ten years ago.

It often requires some terrible disaster, as a fire, flood, pestilence, or a disastrous explosion in a coal mine to awaken public sentiment to the realization of the hazards in certain industries and the perils that beset us in every walk of life.

Mr. Fay's address will be found on page 413 of this report.

THE PRESIDENT: Gentlemen, I am sure you are interested in Mr. Fay's most instructive paper. It will all appear in the proceedings. The Mining Congress is proud to have within its confines today Mr. Hurley and Mr. Fay, men who represent the height of their respective callings. Illinois is proud of its undertaking in having established the first mine rescue station. We have with us today Dr. H. H. Stoek, who is going to tell us what he has accomplished. Dr. Stoek needs no introduction. You all know him. He has been with us so long that I am just going to ask him to come forward and address us.

MR. H. H. STOEK: The Chairman also is giving me a title to which I am not entitled. I am nothing but a plain professor.

THE PRESIDENT: I referred to the program.

MR. H. H. STOEK: That is Mr. Callbreath's fault also.

Mr. Stoek's paper will be found on page 275 of this report.

THE PRESIDENT: If this does not result in the establishment of mine rescue stations in other states I shall be very much surprised. It has always been the policy of the Mining Congress to recognize the view of different parties interested in connection with any problem and with this in view we will proceed to discuss the Responsibilities and Duties in Mine Safety Work, as devolving upon the operator, the miner and the public. The first speaker on the program will speak for the operator. I will call on Mr. Thomas M. Gann from Knoxville, to speak on that subject.

MR. THOMAS M. GANN: Mr. Chairman, I received an invitation from the Secretary to prepare an address on this subject at a very recent date and having only a short time in which to prepare an address, what I may say will be brief.

Before getting down to the subject as I prepared it, permit me to say that I am pleased to be in this convention. This is the second time in the history of the American Mining Congress that a representative of the miners of Tennessee has been in the convention. I am gratified to see the spirit which I had anticipated before coming here, the spirit of co-operation in this work, in conservation, safety and efficiency in mining. It takes co-operation to bring about the best results and to place the coal mining industry in that position in the industrial world that it should occupy. I can see even from the address of welcome right down to the present time that spirit of co-operation.

It is going to be my purpose in talking on the responsibilities and duties of the operator in the mine safety work to point out some of the greater things, the greater duties and responsibilities that rest upon the operator, and in doing this I do not propose to do it in a spirit of antagonism or criticism, but more from the point of view and for the purpose that the best results may be obtained. Two very vital points that I want to mention, and will mention, in the address which I have is co-operation and cheap coal.

Mr. Gann's paper will be found on page 334 of this report.

THE PRESIDENT: When this program was first written we had the thought that there would be with us today a man who had devoted the major portion of his life to compiling statistical information in connection with the accidents in the coal industry of Illinois, but a superior power has intervened and Dave Ross is no longer with us. He was buried a fortnight ago. Mr. Ross had taken such an active interest in this work that I am going to ask this audience to rise as a token of respect.

(An expression of respect was given to the memory of David Ross, signified by the audience rising.)

THE PRESIDENT: There is with us today a gentleman who has been through the various stages of the industry, as a miner in Ohio, as an official of the miners' organization he occupied the highest place available, and now is connected with the other side of the industry. I will ask Mr. T. L. Lewis to talk on the responsibilities and duties of the miner in mine safety work. Mr. Lewis. (Applause.)

Thos. L. Lewis' address will be found on page 559.

THE PRESIDENT: Many of us knew Mr. Lewis when he was on the other side of the fence, when he made some powerful arguments, but I do not think any of us ever heard an argument presented by him any better than he has today, and one that we may well heed. I want to take the responsibility on behalf of this audience of thanking Mr. Lewis for what he said this morning. Now, we have heard what the miner believes the coal operator should do. We have heard what the operator thinks the miner should do in this work of safety and now are going to hear from the third party, as to what the public thinks of this undertaking. I am going to call on Dr. F. W. McNair, of the Michigan School of Mining, to represent the people. Dr. McNair. (Applause.)

Dr. McNair's address will be found on page 557 of this report.

THE PRESIDENT: It is to be regretted that the hour has advanced so far that we will not be able to have any further discussion on this subject, but it is hoped at some future sessions this topic can be discussed again.

The Secretary will call the states and I will ask that you respond for your respective state as to your selection of a member to serve on the Resolutions Committee.

On call of the states by the Secretary the following names were presented as members of the

Committee on Resolutions.

Alabama.....	W. E. Henley
Alaska.....	Col. B. F. Millard
Arizona.....	J. H. Robinsone
Arkansas.....	A. H. Purdue
California.....	James N. Gillett
Colorado.....	Geo. E. Collins
Idaho.....	Eugene Thomas
Indiana.....	W. S. Bogle
Illinois.....	F. C. Honnold
Iowa.....	Joshua Norwood
Kansas.....	W. H. Skidmore
Kentucky.....	F. P. Wyatt
Michigan.....	F. W. McNair
Minnesota.....	J. E. Hodge
Missouri.....	W. B. Shackelford
Montana.....	James Needham
Nevada.....	A. A. Codd
New Mexico.....	T. H. O'Brien
New York.....	A. Cressy Morrison
North Carolina.....	H. E. E. Smith
Ohio.....	W. R. Woodford
Oregon.....	F. Wallace White
Pennsylvania.....	E. W. Parker, S. A. Taylor
South Carolina.....	F. W. Chambers
South Dakota.....	Martin H. Brede
Tennessee.....	J. E. McCoy
Utah.....	Jas. E. Talmage
Virginia.....	J. S. Grasty
Washington.....	Sidney Norman
West Virginia.....	T. L. Lewis

SECRETARY CALLBREATH: The Resolutions Committee has been assigned to room 1809. It will be advisable for the Committee to get together in that room between this and the opening of the afternoon session and organize by the election of a chairman and secretary. There are some resolutions in hand which should be referred immediately to that Committee.

Resolutions presented and referred to the Committee on Resolutions:

Resolution No. 1, Introduced by Geo. E. Collins of Colorado.

Whereas, The Federal Income Tax Law, as it applies to the output of mines, has been so construed by the Internal Revenue Department of the Federal Government as to work a grave injustice to operators, in that the deductions allowed from the gross income on account of depletion are not based on the gross value, but on what is virtually the net value of the ore produced.

Whereas, Congress, by a later amendment to the Act, has shown its intention to permit more conservative deductions to be made on account of depletion of mines than was permitted under the Law of 1913. Now, therefore, be it

Resolved, That this Congress expresses appreciation of the intent of the Congress to be fair to the mining industry. And be it further

Resolved, That this question be referred to the regular Mining Taxation Committee of this Congress for investigation and recommendation. And be it further

Resolved, That such Committee be instructed to take proper means to see that the construction placed upon this law by the Internal Revenue Department shall be in accordance with the plain intention of Congress in enacting the Act.

Resolution No. 2, Introduced by the Denver Civic and Commercial Association.

Whereas, The public domain in the eleven states situated to the west of Kansas comprises 471,000,000 acres of land, amounting to about 62 per cent of these states, and the policy of the Federal Government as to the disposal and utilization of this area, and the natural resources therein contained, is of vital importance to the people, and the local governments of these eleven states; and,

Whereas, The basic principle of the so-called Ferris Bills before Congress is the permanent retention of title to certain of the natural resources upon this public domain in the Federal Government, and this principle may, and we fear will, be extended to cover all the natural resources and the land itself; and,

Whereas, Under this principle the future population occupying these lands and developing the resources thereupon cannot be other than a tenantry; and,

Whereas, The members of a desirable citizenry should possess the laudable ambition to become owners of those properties and industries, to the development of which their lives and fortunes are devoted; and,

Whereas, Only by the conversion of these lands and resources to private ownership can they be directly subjected to the taxing powers of the states, and made to contribute their fair proportion of the cost of the benefits of local government, and it is manifestly unfair that the states should forever bear the expense of local government over an area of which less than 40 per cent is subject to their taxing powers; and,

Whereas, Throughout the civilized world the impossibility of successfully establishing and maintaining a prosperous and contented population in districts where great tracts of the country are held in private ownership by one or a few owners, has repeatedly been shown, and when the ownership of such great tracts of land is

by an entity holding itself superior to and beyond the laws and customs of the community wherein the land is located, it is even more obnoxious; and,

Whereas, The claims of the Federal Government, already made, that easements over the public domain, for uses devoted entirely to the public service of the citizens of the state, can be acquired only upon compliance with conditions prescribed by the Federal Government, are inherently antagonistic to the power of this state to enforce its own policies with respect to its own internal development, in accordance with its own eminent domain; and,

Whereas, The plan to retain ownership in these resources, and permit their utilization only upon a leasing basis, has heretofore on several occasions unsuccessfully been attempted by the Federal Government and resulted in each instance in almost complete cessation of development of such resources; therefore, be it

Resolved, That the American Mining Congress is squarely opposed to any policy with respect to the public domain designed to retain perpetually in the Federal Government title to these lands, and their resources, and can only support a policy whereby the title to these lands and resources ultimately will pass to those who devote their lives and efforts to the conversion of these resources from the mere potentialities which they now are into actual factors of production of the wealth of the country; and, be it further

Resolved, That while the American Mining Congress does not at this time say that there should be no change in the terms and conditions upon which the Federal Government shall convey these lands and resources to the people and will not oppose such changes in the existing laws and departmental regulations, as may reasonably assure to the Government a fair compensation, and the actual and proper development and utilization of these lands and resources within a reasonable time, we desire nevertheless to point out, with emphasis, that the cost of these lands to the United States was, on the average, considerably less than 50 cents per acre thereof, with no further consideration for deposits of oils and minerals, growths of timber, waterpower sites and other so-called resources, and we also desire to point out that any increment in the value of these lands and resources is largely the result of economic and industrial growth of the territory within which this public domain is located, and that this growth has been brought about by the citizens of these western states, and the hardships, efforts and risks that they and their forbears have undergone in removing their homes and activities from the more settled districts in the eastern states to a new and strange country, and we cannot believe the people of the eastern states can mean by their support of the so-called conservation movement now consciously to deny to the people of the western states the benefits of successful pioneering and colonization. Be it further

Resolved, That we are firmly of the opinion that in denying to the western states the right to develop these lands and resources, to settle thereupon a prosperous and contented community of property owners, the Federal Government denies us our constitutional right of equality in all respects with the older states forming part of that Government.

Resolution No. 3, Introduced by the Denver Civic and Commercial Association.

Whereas, As the Federal mining laws now in force have resulted in controversy, litigation and expense, together with the retardation of mining development during long periods of litigation, as exemplified in all mining districts where these laws are enforced; and

Whereas, A notable effort has been made by the American Institute of Mining Engineers and the Mining and Metallurgical Society of America and the American Mining Congress, to secure comprehensive, intelligent investigation of the conditions that have arisen from evils in the existing federal statutes; and

Whereas, The situation is one so complicated that a thorough and intelligent investigation is an essential preliminary to the modification of the mining laws; therefore, be it

Resolved, That the American Mining Congress heartily concur in and subscribe to the movement to bring about such an investigation by a competent, non-political commission, to be appointed by the President of the United States, and to consist of three men, all of whom shall serve without pay; one of the commission to be a mining attorney, another a mining engineer, and the third a prominent mine owner; all of whom shall be thoroughly familiar with the defects in and the operation of the present mining laws. This commission, after thoroughly investigating the defects of the present law, shall formulate the necessary remedial legislation for the benefit of Congress, and hold itself an advisory body during the consideration of such legislation by Congress.

SECRETARY CALLBREATH: I have some letters of invitation here, and there are some that I have received that are not here. We have a very earnest invitation from Carson Pirie Scott & Company to visit their plant some distance out of town. They will provide luncheon and transportation. I told them that the convention would not be able to devote a half day to that purpose. I have also an invitation from the Ford Motor Company by which the members of the organization are invited out to visit their plant. I have one here that I will read in its entirety, because it is of interest to all the members of the organization. This is a letter from the Powdered Coal & Engineering Company.

Will the gentlemen who desire to go kindly hand in their cards so that we can turn them over to their representative in order that he may provide the necessary automobiles for transportation.

I have a telegram from the Governor of Nevada addressed to one of our members, Mr. L. A. Friedman, who is one of our directors and who very unfortunately before he arrived in Chicago on Friday last was taken ill and is now in the hotel but very much improved. He hopes that he may be able to attend the session tomorrow. Mr. Friedman has been of very great service in the work of the Mining Congress and I am sure we all sympathize with him in his sickness.

The telegram is as follows:

Carson, Nev., Nov. 13, 1916.

Mr. L. A. Friedman,
Care American Mining Congress, Hotel La Salle,
Chicago, Illinois.

Please convey to the American Mining Congress the best wishes of the people of the State of Nevada for a pleasant and profitable meeting. Nevada is a State in which mining is and has been the paramount industry, and the intelligent interchange of views on mining subjects made possible by the Congress unquestionably makes for the promotion of our leading industry here. In particular Nevadans will take the liveliest interest in your discussions and recommendations on amendments or changes in the Federal Mining laws and will, I believe, welcome changes calculated to reduce the litigation growing out of the extralateral right theory.

(Signed) EMMET D. BOYLE,

*Governor.

You may not know that Governor Boyle is a mining engineer of high standing in the profession and in the mining industry of his state.

I have also a telegram from the Manufacturers' Record of Baltimore. Baltimore, Md., Nov. 14, 1916.

J. F. Callbreath,

Secretary American Mining Congress,
Care Hotel La Salle, Chicago, Illinois.

The Manufacturers' Record would strongly urge that the American Mining Congress hold its next meeting in the South which is the richest undeveloped mineral region of the United States. The ablest experts in the country testify as to the vast potentialities of the South for mining and kindred operations. As yet these resources are only in the infancy of development as compared with what the future will show. Nowhere else in the United States could the members of the American Mining Congress find more of interest and of value in their work than in the South if the Congress will agree to hold its next meeting. At some Central Southern point it will have a great effect in concentrating the attention of the nation to the vast mineral resources of this section, the development of which would add enormously to national wealth and open limitless opportunities for mining engineers and all others connected with the development of the industrial potentialities of the South. Such a meeting would be certain to arouse a widespread interest in the South and largely increase your Southern membership. In behalf of this section and not speaking for any particular city I would press upon the attention of the Mining Congress the desirability from individual and from the national standpoint of holding your next meeting in the South.

(Signed) RICHARD H. EDMONDS,
Editor Manufacturers' Record.

May I make one or two announcements? The members' meeting scheduled for this evening will be in session long enough to select a Nominating Committee and will then adjourn until tomorrow evening, when the members' meeting will be held. We hope that all members who are present, that everybody who is interested in the work of the Mining Congress will attend this meeting. The members only can vote but everybody is invited to attend the meeting.

Do not forget the exhibitors on the seventeenth floor. They are contributing toward the convention fund. They are your friends and they will be glad to see you.

MR. HENLEY: Mr. Chairman, I would suggest, inasmuch as my name is first on the Resolutions Committee, as being from Alabama, that the Committee on Resolutions meet immediately before any other business is started in room 1809. I just make that as a suggestion.

SECRETARY CALLBREATH: It is requested that the Committee on Resolutions shall meet immediately in room 1809 for organization purposes.

THE PRESIDENT: If there is no further business a motion to adjourn will be in order.

Motion to adjourn was made, seconded and carried.

WEDNESDAY, NOVEMBER 15, 1916.

General (Morning) Session.

Dr. James E. Talmage, of Salt Lake City, Utah, presided as Chairman, and called the meeting to order at 10:15 o'clock.

CHAIRMAN TALMAGE: Ladies and gentlemen, the time for the opening of this session has arrived. Technically speaking, it has already passed. But we will say, however, it is 10 o'clock, whatever may be the real time of day.

I regret to announce the absence of Mr. L. A. Friedman of Lovelock, Nevada, who if present would have been your presiding officer this morning. Mr. Friedman is indisposed and while considerably improved

it has been thought to be indiscreet for him to be here on this occasion.

The first thing in order this morning will be the introduction of resolutions. If no resolutions are to be presented, we will pass to the next order of business.

SECRETARY CALLBREATH: There are some resolutions to be presented but they have not been handed to me.

CHAIRMAN TALMAGE: Is there any report of progress to be made by the Resolutions Committee?

E. W. PARKER: Mr. Chairman, we just had two or three resolutions referred to us by the Secretary but the Committee has not taken any action on them. We didn't get them until a few moments ago. There were some handed in yesterday but I didn't think it would be worth while bringing them up before this meeting on account of the short time that we have had for consideration of these resolutions.

CHAIRMAN TALMAGE: The Secretary has some announcements to make.

SECRETARY CALLBREATH: I wish to announce that the members' meeting this evening will be in the red room at the other end of this floor. I want to call your attention again to the banquet to be held on Thursday night and to say that two of the most important problems which confront the American people will be the special subjects for discussion. The first will be the public lands question of the West by Judge Short of California, who has made a special study of these problems, is a very able lawyer and will deliver an address that is worth hearing. The second is an address by Colonel George Pope, the President of the National Manufacturers' Association, upon the relation of labor and capital, one of the most important questions before the American public today. The plan of this discussion is not to create antagonism but to bring in closer co-operation the various productive forces; not with the idea of seeking points of difference, but of seeking points of contact. I am sure you will be greatly delighted and pleased, and the cause will be served by the address of Colonel Pope on Thursday evening.

We have a special invitation from the University of Illinois to those of our members who desire to go to Champaign, together with the statement that it is only one hundred and twenty-five miles away. The Department of Mining Engineering requests everybody to visit the University.

I want to again call attention to the exhibits upon the seventeenth floor and to state that the people who have paid their money for the use of those rooms have paid it into the convention fund of the local committee, thereby supporting and helping this work.

CHAIRMAN TALMAGE: One of the committees of this Congress is known as the Joseph A. Holmes Memorial Committee. Dr. David T. Day is Chairman of that Committee and he is also the Secretary of the Joseph A. Holmes Safety Association. We are to be favored with a report of that Committee by Dr. David T. Day of Washington. (Applause.)

DR. DAVID T. DAY (Washington, D. C.): Mr. Chairman and ladies and gentlemen: At the meeting of this Congress a year ago you appointed a committee which conferred with a similar committee of the American Institute of Mining Engineers to organize a suitable memorial for Dr. Joseph A. Holmes, first Director of the Bureau of Mines.

The two committees agreed that the most suitable memorial would consist in perpetuating Dr. Holmes' work of benefiting mining by an organization having such a purpose, and we found all the national societies glad to join in a national safety movement. The year has been spent in bringing them into an organization. They are now joined in the Joseph A. Holmes Safety Association.

In the November 4th issue of the Mining and Engineering World you will find Dr. Holmes' own recognition of what the Bureau of Mines owes to the Mining Congress in the organization of that Bureau:

"This movement for appropriate recognition and aid for the mining industry from the National Government has been under way for many years. Among its early and most active supporters have been the California Miners' Association and the American Mining Congress. It is, therefore, eminently appropriate that at the first session of the American Mining Congress, following the creation of the Bureau of Mines, at a session held in California, something should be said of the policy and purposes of the new Bureau."

I believe that the American Mining Congress by the way that it stood for the Federal recognition of mining from the beginning of the Congress really is more the father of the Bureau of Mines than any other organization in the United States and can point to that magnificent Bureau as more its child than that of any other organization.

We found that all national societies were glad to come into a co-operative movement which would benefit mining in the same way that Dr. Holmes had undertaken to make that his life work. That was very gratifying. We got representatives of these societies together, altogether twenty-two of them. The representatives of these different national societies were chosen with a great deal of care, forming a magnificent body as the foundation of this organization. From that body they chose as officers the director of the Bureau of Mines as president and thereby secured at once the co-operation of that great bureau in our work, and also made it easy to avoid any duplication of work which could be carried out through the instrumentality of the Bureau of Mines. As vice-presidents they chose Dr. Charles D. Walcott, the former director of the United States Geological Survey, and now the secretary of the Smithsonian Institute, and Mr. Gompers, president of the American Federation of Labor. Thereby, we laid the possibility at once for such co-operation in this work with labor itself as would enable us to begin right at the bottom of the difficulties of safeguarding mining. The miner's greatest enemy, as we all must admit, as the miner himself will admit, is the miner; and we have gone to these miners in a very practical way. The Federation of Labor is going to them and getting each miner in the country to contribute something toward the fund of this association, a permanent fund, the interest from which is to carry on the work of the organization. Now, so soon as a miner has invested fifty cents or a dollar in something and has received a statement, a certificate of membership, he is not going to forget to inquire what became of that money and where he gets something back; and just as soon as he does that his education in safety has begun, and we have a means of getting at that man to keep up his education. If this association could succeed simply in making each miner a little safer to his fellow miner, then what a great step forward this national movement would have accomplished. And then when we think that by the appointment of this committee last year this association becomes the father of this new movement, you can recognize that only second to the formation of the Bureau of Mines itself is the initiative taken by this body in forming the Joseph A. Holmes Safety Association. We have here, in other words, an association by the name of which we honor Dr. Holmes, by the purposes of which we are going ahead to make mining safer.

How are we going to do it? That is a matter which is shown very well in an announcement which all of you will receive, a copy of which I hold in my hand. It is an announcement of the membership, the officers and such purposes as have been decided upon at the present time as the work of this association. We propose to make mining safer by bestowing on any man or any number of men a prize for anything contributed in the way of safety in mining. I have an example in mind, without mentioning any names, of a man in Illinois who was formerly a coal miner and has become the superintendent of a mine. That man posted a notice in letters about six inches in height, at the mouth of the mine, that a certain man had been injured. It stated

the injury and it stated the way it happened. Next it stated that the man would be compensated in due course, his illness would be taken care of, his family would be taken care of as best they could and the man would return to work in as fit condition as they could make him; but nothing they could do would compensate him for the pain he had actually suffered, for the shock to his family and for the permanent loss of efficiency when he went back to work with one arm. That was all. There was not a word of moral. There wasn't any preaching. There wasn't any scolding. But that notice has been talked about by the miners on the street cars and elsewhere in that town more than anything else that has been posted of that sort for a long time. The idea of posting such a notice is to my notion something well worthy of a prize as being a contribution to safety in mining. It does not mean that a man has to get up a new safety cage or some device for stopping a cage if it happens to get loose going down the shaft.

We propose also to give a medal to any man or any hundreds of men where one man **contributes to the safety of another miner at the risk of his own safety**, and we are giving that a definition of a hero for the purposes of this organization; and we believe that when such a man has received some recognition of that sort and his fellow workers recognize it that we can also take that man (as has been suggested in California, where this association was discussed a few days ago) and send him around to his fellows in his own part of the country and by his own talks—we hope that he will not be a good lecturer; we believe that he will be just a plain talker, and heroes are not usually very much on talking—we believe by his own talks that he will further the movement of safety in mining. Now, we propose that that man shall spread the ideas of safety that he has received by a visit to us in Washington to receive this medal. In beginning that way we can really get at the miners themselves.

So far has the association gone. This is no more than equivalent to the announcement which you will receive, and is the report of your committee at the present time. To this report I wish to add this statement: The purposes as far as they have gone have been set forth. The further purposes, what shall be done by this association, are in the hands of those who compose it, the members of the American Mining Congress, the mining engineers and the other composing bodies. We will carry out, and I believe these men who are certainly well chosen as national officers will carry out well the work that you entrust to them.

To carry it out, it must be supported. There must be a fund, and here is where we come to that question. What that fund shall be, how much it shall be, how little it shall be. That is to be measured by your idea of what a national organization to represent the great mining interests of the United States shall have. You can make it large or small, according to what you think it should do. To do that, in the first place, our primary fund will be obtained by the personal contribution of the members of the American Institute of Mining Engineers, the members of the American Mining Congress and others, and there will come to you in due course a small blank with the announcement on it that we want your personal subscription for whatever you think you should give. Now, how much will the people give? Everybody will give something. Now, how much? I can't give you any tip as to how much you should give. This matter is in your hands, to make this association large or small, as you please, but in measuring your subscriptions, of course, you must think of the many calls that are made on you in other directions and as to that matter you must think of what it means to you, perhaps a slight deprivation of a few dinner parties and a few theatre parties, and then you will be as well off as you were before. That is all that is necessary in this subscription, but in giving, in making up your mind as to what you should give, I ask only one point of view and that is to do just as Dr. Holmes would have done. Dr. Holmes

gave all the money he had and he gave his life for this kind of work to which you are giving and you are asked to give such money as you feel the cause worth. Think of what he would have done under the same circumstances.

There is another part of the fund which will follow this. We will have three kinds of subscriptions, from the miners, from you professional men and operators as individuals and as an investment in increasing safety the mining companies of the United States, the metallurgical companies and chemical industries will be asked to give. A careful canvass of that matter has shown that it is wise for us to give ourselves to this fund; then on the basis of that will the operators as companies aid this work. If it is going to be large, their subscriptions will be large. Therefore, we leave the matter with you, with the full belief that this Mining Congress will by this means give as great a gain, as great a benefit, will have as big a monument to itself as it would get in any other way.

I thank you. (Applause.)

CHAIRMAN TALMAGE: The subject of Dr. Day's report is one I am sure that will appeal to the deep interests of all of us. What is your wish as to the disposal of this report?

MR. RICE: Mr. Chairman, I move you that this report be accepted.

DR. E. W. PARKER: I second the motion.

CHAIRMAN TALMAGE: It is moved and seconded that this report be accepted, and doubtless that means adopted and made the sense of the Congress.

I think, in view of the importance of this subject, opportunity should be given for discussion. Remarks, therefore, bearing upon the report of this Committee will be in order.

DR. DAY: Mr. Chairman, may I add one word to what I have already inflicted upon you?

CHAIRMAN TALMAGE: Certainly.

DR. DAY: Possibly there is a little confusion arising as regards the multiplicity of memorials which are being erected to Dr. Holmes. In the first place, the Bureau of Mines is preparing a tablet for the new building in Pittsburgh and another tablet for the new building in Washington, a matter largely in the Bureau of Mines, and the intimate friends of Dr. Holmes. Mr. Callbreath, with his usual indefatigable energy, has prepared a volume memorial to Dr. Holmes to which many of you have contributed. Then comes the final and the permanent memorial in the form of this association. I hope the distinction of these three will be clear.

CHAIRMAN TALMAGE: Mr. Callbreath, may we hear from you on this subject?

SECRETARY CALLBREATH: Mr. Chairman and gentlemen: I am glad that Dr. Day has pointed out to you the distinction between the different efforts which have been made in recognition of the life work of Dr. Holmes. The effort to create a memorial volume is a trifling affair. It is a matter of sentiment and has no far-reaching effect other than that we may make a record of the sentiments of a few of his closest friends and those who were able to attend the memorial services at San Francisco last year. I had hoped that volume would be ready this morning. Its publication is rather an elaborate work. Its publication was made possible by the generous subscription of a few of the friends of Dr. Holmes, but has cost perhaps a hundred or two hundred dollars more than the contributions have amounted to. The book will be bound in leather with the name of Dr. Holmes upon the front cover in gold. It will have an insert with a photograph of Dr. Holmes. It will have in the center a photo-engraving of those who were present at the San Francisco service last year. It is a handsome volume and we think in order to make up the cost that we should ask those who care to have a copy of the volume to contribute something toward

the cost of it. The subscriber who wants to have his name in gold on the front of the copy, bound in leather, can have it for six dollars; in leather without gold lettering five dollars; and bound in cloth with gold lettering four dollars; and bound in cloth without lettering three dollars. The principal public libraries will be supplied with copies of this volume without charge.

The great work which we hope may be accomplished through the new Joseph A. Holmes Safety Association is not to pay tribute to Dr. Holmes. Dr. Holmes' work is finished. It speaks for itself. But in order to make effective that work to which he devoted his life we believe that the work should be carried on continuously and that in order to do that there should be an association through which effort may be made to bring home to every individual in the country and particularly to those interested in the mining industry that safety in mining operations is a matter of vital importance. This question appeals to every humanitarian instinct within our hearts. We must not, however, entirely forget that this has an industrial side. If you should undertake to compute the difference between the number of lives which were being lost in coal mining alone in this country at the time this work was begun and the saving up to this time and put that in dollars and cents at the lowest price which any jury will fix as the value of a man's life, \$5,000, and put that money at interest you would have enough to support the work of the Joseph A. Holmes Safety Association a thousand times over. (Applause.) Now, it is to insure this work that this Association has been formed and I feel that the Mining Congress should exert every possible effort to forward that work, not only in raising the fund but in supervising and following up that work in order that the value of its effort should be brought home to every miner and to every operator, to everyone who has anything to do with the business of mining, appealing to the humanitarian side first, but if that fails let us appeal to the industrial side and show that this is an economic question, show that it makes for efficiency, that it makes for cheaper production, that it makes for everything for which the American Mining Congress stands. I hope that everyone of you will put your shoulder to the wheel and back up this Association and push it just as far as you possibly can.

MR. H. M. WILSON: Mr. Chairman, it is a fact that two of the great relative purposes and forms of the Joseph A. Holmes Memorials have been fully and ably stated here and will thus go before all of the members of the Congress through your transactions. It seems to me almost essential that you should have an equally full statement regarding the third, of which Dr. Day spoke, the memorial tablets to be erected by the Bureau of Mines. I, therefore, suggest that you call upon the Director of the Bureau of Mines, who is here present, to tell those members assembled here and delegates, and those who will receive your transactions, something of the wonderful architectural sentiments which those tables are to present to the citizens of Washington and Pittsburgh. It is not inappropriate to say that those architectural monuments were in a large measure conceived by Dr. Holmes himself.

CHAIRMAN TALMAGE: I am sure the Congress will feel highly favored if Mr. Manning will act upon the suggestion and request of Mr. Wilson.

MR. MANNING: Mr. Chairman, ladies and gentlemen, it will be of interest, I think, to the members of the American Mining Congress to know a little something of the history of this new building in which it is proposed to place this tablet in honor of Dr. Holmes. It is not necessary for me to tell you what Dr. Holmes accomplished in connection with this work for the Bureau of Mines. When he was looking for a site for the buildings in Pittsburgh, it happened that the grounds which we now occupy, some twenty odd acres, were owned by the War Department. After several ineffectual attempts to get Congress to authorize an exchange of that property for property contiguous to the Carnegie Technical School, Dr. Holmes went to the President of the

United States and asked him to lend his influence toward effecting that exchange. After President Taft had taken up the matter with the Secretary of the Interior and the War Department and had been unsuccessful, upon the further insistence of Dr. Holmes, President Taft again called the Secretary of the Interior and the Secretary of War into conference, and said, "You might as well give this land to Holmes. He will get it sooner or later." A short time later a transfer of thirteen acres of the property owned by the War Department was authorized for an equivalent tract of ground contiguous to the Carnegie Technical School. Dr. Holmes did not stop his efforts there. After he had secured the grounds he wanted the buildings. Before getting those buildings he went to the Legislature of Pennsylvania and asked for an appropriation to prepare the architectural designs for these buildings. The State Legislature of Pennsylvania responded very cheerfully and appropriated \$25,000 to prepare the designs and appointed a commission and paid the expenses of the architect. Dr. Holmes then went to Congress and that body appropriated \$500,000 for the buildings. Considering the valuation of the ground and the buildings themselves, the property which will be the home of the Pittsburgh station will have a value of about a million dollars.

After Dr. Holmes' untimely death, the idea was conceived by his associates in the Bureau of Mines at Pittsburgh that they should erect a tablet to his memory. Notices were sent out and opportunity given to every employe and official to subscribe his mite for this purpose. The total of that subscription will be in the neighborhood of \$800, which is to be the cost of the tablet to be erected there.

Congress some years ago appropriated money for a building to house in part the Bureau of Mines in Washington, taking in several other branches of the Interior Department. And while the idea for a tablet originated in Pittsburgh, we felt that there should also be a tablet in the new building in Washington, and we endeavored to raise a similar amount for that purpose. To that end letters were sent out to all employes of the Bureau, including the consulting engineers who are not continuously in the employ of the bureau. There is nothing more that I can add.

Gentlemen, it is not necessary for me to speak of Dr. Holmes and his work in connection with the Bureau of Mines. His great efforts are known to all of you. I feel that it is my duty to make my report to the American Mining Congress from time to time of the work that has been done since his death, which I will do when I deliver the address I am scheduled to make. I hope that Dr. Holmes' work may succeed and serve the purpose of the Mining Congress. We need the entire industry back of us and I am quite sure we have it. Constructive criticism of the work is appreciated. It is the man who tries to destroy the ideal that we are building up that I do not want to come in contact with, but criticism in a constructive way, will always be appreciated.

I want to thank you for this opportunity of saying something about the memorial to be erected to Dr. Holmes. I want to ask in behalf of the Association of which I am President, that you give it your support and make it worth while as an association of this kind.

I thank you. (Applause.)

CHAIRMAN TALMAGE: Are there further remarks or are you ready for the question?

MR. HENRY I. SEEMAN (Colorado): I want to ask what this embraces, the coal mining section or all of the mining industry, metal mining as well as the oil section?

DR. DAY: All mining, coal mining, metal mining, metallurgy and the chemical industries.

MR. SEEMAN: I thank you very much.

DR. DAY: Mining in its most general sense.

CHAIRMAN TALMAGE: It is moved and seconded that the report made by Dr. Day as chairman of the Committee be adopted.

Upon the motion being put by the Chairman it was carried unanimsously.

CHAIRMAN TALMAGE: The report is adopted. At the opening session of this Congress we were impressed with the statements made that among our principal topics to be considered at the several general sessions and the sectional meetings the subject of efficiency and the subject of co-operation would receive adequate treatment. The particular subject for this session, to the elucidation of which the several papers arranged are all directed, combines these two important topics and, as you read upon your program, it is expressed as follows: "Efficiency in Mining Operations Through Co-operation." We are, therefore, confronted this morning with a splendid correlation of the main topics, and the first paper under this general heading is entitled, "Federal Aid to Mining Efficiency," which is to be delivered by the gentleman to whom we just had the pleasure of listening, Mr. Van H. Manning, director of the Bureau of Mines. He is not to be introduced but simply announced. (Applause.)

Mr. Manning's paper will be found on page 339 of this report.

CHAIRMAN TALMAGE: The discussion of this interesting and instructive paper is now in order.

MR. W. R. DE ARMIT: Mr. Chairman, I move you that this report be accepted.

CHAIRMAN TALMAGE: This was not in the nature of a report from a committee but is a paper presented according to program. Therefore, it will be incorporated in the proceedings without motion.

A related subject, "Co-operation, Conservation and Competition in Coal," by E. W. Parker, of Wilkes-Barre, Pennsylvania. Mr. Parker is Secretary of the Anthracite Bureau of Statistics. Mr. Parker. (Applause.)

Mr. Parker's paper will be found on page 241 of this report.

CHAIRMAN TALMAGE: I am sure we all consider ourselves indebted to Mr. Parker for this very impartial and interesting treatment of a very important subject and I am inclined to think that the thanks are due to our Secretary for his several letters, as a result of which the paper was made more comprehensive than it otherwise would have been.

The program this morning provides for a paper dealing with the subject of the Sherman law and its relation to mining, which should have been presented by Mr. Glenn W. Traer of this city.

SECRETARY CALLBREATH: I would say, Mr. Chairman, that Mr. Traer telephoned me just before the meeting that because of a severe cold it was impossible for him to come to the meeting. His paper has been printed in pamphlet form. Those of you who desire it can get it and it will be printed in the proceedings later.

I might also say that Mr. H. E. Willard of Cleveland, Ohio, who was to speak on the subject of "Co-operation in the Mining Industry," wired me yesterday morning that a matter had come up which prevented him from being present. I wired back to him that he had no business more important than being here, but my wire did not seem to have the proper pulling power. His paper will be in the proceedings.

CHAIRMAN TALMAGE: Shall it be understood that those papers are read by title and they will be published in the printed transactions? If there is no objection that will be the understanding.

The introduction of resolutions is now in order.

SECRETARY CALLBREATH: I have resolution number 4, introduced by Thomas L. Lewis; resolution number 5, introduced by Frank H. Short; resolution number 6, introduced by James N. Gillett, and resolution number 7, introduced by Carl Scholz.

Resolution No. 4, Introduced by T. L. Lewis of West Virginia.

Whereas, In mine safety work, one of the most serious problems encountered is the lack of personal co-operation on the part of some operators and also on the part of some miners, thus preventing the success of the work of promoting mine safety and reducing the number of accidents and fatalities in the mining industry; and

Whereas, While much has been accomplished, it is believed to be vastly important that every possible agency looking to greater safety in mining operation shall be enlisted and that efforts should be made to secure the active co-operation of those agencies which thus far have not voluntarily given their best support to the movement. Now, therefore, be it

Resolved, That a committee of seven be appointed, which shall investigate this important subject and report its findings and recommendations to the next annual convention of the American Mining Congress.

Resolution No. 5, Introduced by Frank H. Short of California.

Whereas, The mining industry in common with all industries is interested in the prompt, free and economic development of hydro-electric power. This power whether developed on or off the public land should be subject to regulation by the states as are all public utilities and service, not only as to rates, but as to service, so that there can exist no monopolization of or connected with this essential public use; and

Whereas, Any division of authority in the regulation of the different kinds of public service within a state is bound to breed confusion, dissatisfaction and result in injury to the public service and public welfare; and

Whereas, Many of the states now have in operation adequate and effective laws under which the development, distribution and sale of electric power and other public service is controlled and effectively regulated. Therefore, be it

Resolved, That all states not having laws regulating and controlling its public services shall promptly enact and put in force similar laws properly safeguarding the rights of the public and the consumer; and be it

Resolved, That the Government of the United States shall not in states, wherein there are public lands, undertake to impose any charges upon the development and enjoyment of this or any other industry or public use; nor should it in any manner interfere with the complete, free, unrestrained and economic development of any of the industries of such states to the end that all such industries shall be freely and economically developed and operated under the laws of the respective states wherein they are situated and under the general applicable laws of the United States operating equally and uniformly within the public land states and all other states.

Resolution No. 6, Introduced by J. N. Gillett of California.

Whereas, This Congress is deeply interested in the just operation of the mining laws; and

Whereas, As a result of certain land withdrawal orders by the President of the United States and of legislation by Congress, many persons who at great expense, and, as adjudged by the courts, in good faith have developed the oil lands of the country, are threatened with ejectment and forfeiture of their developed lands and their investments. Therefore, be it

Resolved, That in all such cases we urge prompt and appropriate legislation relief so that those who have in good faith developed such lands shall be protected.

Resolution No. 7, Introduced by Carl Scholz of Illinois.

Whereas, The information which the Federal Trade Commission has acquired within the time of its existence, has placed it in possession of data and other information on costs which will enable it to do much toward the improvement in conditions of the employes, aid the mine owners and at the same time subserve the interests of the public; and

Whereas, The American Mining Congress recognizes the many difficulties which confront the mining industry and believes the conservation of life and mineral resources are vital to the welfare of the nation. Therefore, be it

Resolved, That we recommend that the Congress of the United States be requested to enact such legislation as will require all mine owners and operators to adopt uniform accounting methods under the direction of the Federal Trade Commission.

CHAIRMAN TALMAGE: These resolutions will be referred to the Resolutions Committee without debate at this time.

According to the program, when we adjourn we adjourn to meet again in regular session tomorrow afternoon.

Is there any further business to come before this meeting? If not, we will stand adjourned to meet again tomorrow afternoon.

THURSDAY, NOVEMBER 16, 1916.

General (Afternoon) Session.

Mr. Samuel A. Taylor, Pittsburgh, Pennsylvania, presided as chairman and called the meeting to order at 2:20 o'clock.

CHAIRMAN TAYLOR: The meeting will please come to order. This is the last meeting of the general sessions of the Congress. We have quite a large program for the afternoon. Some of the gentlemen on the program, I understand, are not here, so that the first number on the program is the report of the Committee on Forest Relations, by Mr. Carney Hartley. Is Mr. Hartley in the room?

SECRETARY CALLBREATH: Mr. Hartley is not here, Mr. Chairman, but we have the report of his committee. This report has been printed and is ready for distribution to the members. I would suggest that it be read by title and be included in the proceedings.

CHAIRMAN TAYLOR: It is so ordered.

This report of the Forestry Committee will be found on page 261 of this report.

CHAIRMAN TAYLOR: The next is an address on "Conservation; Its Purpose and Effect," by Hon. F. H. Short, of Fresno, California. Mr. Short. (Applause.)

Judge Short's paper will be found on page 631 of this report.

CHAIRMAN TAYLOR: I am sure we are all very appreciative of the address that Judge Short has delivered on conservation. I thank him very much for the efforts that he has put forth for us in that behalf.

CHAIRMAN TAYLOR: The next paper on the program is by Dr. Purdue, the State Geologist of Tennessee, on the subject, "The State Geologist and Conservation."

Dr. Purdue's paper will be found on page 193 of this report.

CHAIRMAN TAYLOR: I think the clear and concise way that Dr. Purdue has presented this subject will put him in the class of those geologists who can serve a State.

We are going to change the program just a little here and ask that the Resolutions Committee make a partial report at this time, as there are a number of resolutions which may need some discussion. It is more important that the resolutions be thoroughly discussed, if need be, than to hear the remainder of the papers. Mr. Parker, the Chairman of the Resolutions Committee, I understand, will be here in a moment. There is a subject here which is open for general discussion by which we can occupy the time until Mr. Parker comes in. We can be considering the

subject of "Waste in the Mining Industry—in Mining, in Distribution, and in Use—and the Relation of These Wastes to the Operator, the Consumer and the Public." Now, if there is any person present who desires to speak to this question we will be glad to hear from them.

I might say a word or two while we are waiting for Mr. Parker. In the district from which I come, the Pittsburgh district, in the mining of coal the statement has been frequently made that the loss of coal in the Pittsburgh seam probably is fifty per cent. When this statement is made the operators in that district usually make objection to it. The difference arises from the fact that a large part of the seam is not merchantable. The upper portion of the seam is filled with laminations, small seams of slate and impurities that under present conditions render it impossible of mining and preparing in a way that would make the coal marketable at a price that would be secured for it. We have a dividing line, what is called or known as draw slate, in many cases about the middle of the seam, in some others near the top of the seam, running in some sections from nothing until in other places it runs in the middle of the seam. So that when the entire district is covered and you speak of the recovery of the coal from what is known as the Pittsburgh seam probably fifty per cent of the entire seam is all that can be recovered. While if you speak of the recovery as of that part of the seam which is merchantable and minable the recovery would be well toward ninety per cent. This is not a waste that would necessarily accrue under all conditions. The Bureau of Mines has made some tests in connection with this upper or wasted portion of the seam and they have shown that the heat units contained in that portion of the seam are almost identical with those of the main seam, that is the portion of the seam which is marketed at the present time. But, on account of those impurities and on account of the cost of taking them out, the cost of production is rendered so high and would be so high on the entire seam that it would be almost impossible to sell it and make a profit above the cost of production. Consequently, it is wasted. The Bureau of Mines has also determined and shown by tests that this same coal which is wasted, if used in a gas producer, will produce almost as much gas as will the main body of the seam.

Conservation as it is taught is not right when conditions of that kind are permitted or are possible, and some condition should exist, some remedy should be worked out whereby the future generations could have that coal. If the present conditions continue there will come a time when Pittsburgh and vicinity will have to ship its fuel in from other portions of the country. In the years gone by when Pittsburgh achieved its great name as "The Workshop of the World," it was largely because fuel was cheap and they had it practically at their door. If this waste continues to exist there may come a time in the not distant future when this waste will mean added freight rates on account of shipping coal in that district. I mention this not so much to fill in the time as to bring to your attention such conditions. These conditions do not exist alone in the Pittsburgh district. I have mentioned the Pittsburgh district because that is the one with which I am more familiar. I know of other districts where conditions similar to these exist. I hope that sometime through the assistance of the Trade Commission some sort of an economic policy can be worked out, so that sufficient profit can be given to those who operate these mines as to pay them to mine all of this coal. When such a condition as that arises we believe we will then be practicing true conservation and that we are preaching true conservation in advocating something of that sort.

Is there any other person who desires to make any remarks on this subject?

MR. W. J. SNYDER: Mr. Chairman, probably in the most vital sense the two paramount issues before the American people are conservation and preparedness. Now, to my way of thinking, we have heard of conservation for the past fifteen years. That is about right, isn't it?

CHAIRMAN TAYLOR: Just about that.

MR. SNYDER: But we have heard of preparedness only very recently. Now, the first time I heard of conservation was when I was a school boy and in the study of physics, where conservation was said to be a correlation of forces. I believe there is a solution right in the thought that we talked about as school boys. The scientists know a great deal more about it than I do, but what I am trying to get at is—why are we hesitating concerning a practical solution, both as to conservation and as to preparedness? It is the price. It is the cost. Isn't that the fact?

CHAIRMAN TAYLOR: I think it is.

MR. SNYDER: We have heard a great deal about conservation during these meetings. I have been reading and hearing a good deal in the past few years about conservation. I know some of it has been expounded during these meetings at various times. I have heard of it with reference to forestry and with reference to the timber lands of the West. I have heard the farmer speak of it. It was just spoken about here regarding the waste of the soil. We heard Dr. Purdue here talking about the conservation of timber and the conservation of the soil. I have heard it with reference to coal. I think it is necessary for us to conserve coal. If we do not, it is going to cost our children and our grandchildren immensely. We seem to be living as though we were the only generation and that we were going to pass away and leave no descendants. Now, some of us have children and some of us have grandchildren, and if we are at all concerned in the future of our own blood, I think we should do something right now with regard to the conservation of our natural resources. I think that conservation and preparedness are related. To conserve ourselves, we must be prepared, and to prepare ourselves we must conserve ourselves. All things along this line seem to be interrelated. As school boys we learned that conservation was a correlation of forces. Now, how can we apply the correlation of forces to what we are talking about? My notion is, paraphrasing what might be a scientific expression, that the solution lies in the correlation of industrial forces, social forces and political forces of which we are all a part. Do you see my thought? What I mean, Mr. Chairman, is that the solution of this conservation program about which we are talking and discussing and hearing so much about in these United States and which we are thinking about, and which we ought to think about, lies in the correlation of social, political and industrial forces. I am sure that every patriotic American believes in preparedness in spite of the Bryanistic ideas. But we don't get together. We allow politicians to go along in their own way and that is why we do not prepare. The chief reason is, we do not want to pay the cost. I am speaking of the American public. If we expect to protect our blood, as we should protect it, we ought to be willing to pay the cost. We ought to be just as interested in the welfare of our children and their children and their grandchildren, and the future generation to come, as we are in our own welfare, to see that they have fuel and timber and a fertile soil, just as we should conserve them for our own time. If we are made of the right kind of stuff, if we are red blooded American citizens, we will be just as much concerned in our posterity as we are today about our own conditions. That means that we must pay the price and the way to do this is to make known to the American public the price of conservation and the cost of preparedness. And unless we are willing to meet these prices, the cost of these things that we are talking about, is going to be much higher in the future.

As to the percentage of the coal mined, which question the Chairman brought up, Mr. Prendergast asked me a few moments ago as to what percentage we conserve in Indiana. I said about sixty-five per cent. In many mines located in the Pittsburgh district I understand they only conserve fifty per cent. I heard Mr. Scholz make the statement here at one of the meetings that in Germany they conserved ninety per cent.

Some of you know the exact figures, but in Germany they conserve about ninety per cent. Why shouldn't we here and now conserve ninety per cent of our mineral wealth, of our soil wealth? What is going to be the solution of this new conservation thought and this new preparedness thought? I remember the problem, the idea that I got, but which I didn't understand as a boy, that conservation is a correlation of forces. To paraphrase, it would be the correlation of forces in the industrial, social and political fields.

That is why I think that these discussions and such conventions are of great benefit. There should be a great many more of them. We should get these discussions and this thought before the American people so that they shall be convinced, in order that they will pay the price that will enable us to get ninety per cent of the coal instead of fifty, sixty or sixty-five. We ought to get ninety or a hundred per cent or as nearly as possible of the wealth of our forests. We ought to get ninety or as close to a hundred per cent as is practical of the energy in the coal and the water power in this country of ours. These things mean much. Conservation and preparedness are the two, great, practical thoughts before the American people. Their solution lies in the correlation, in the conservation and the preparing of our social and our industrial and our political forces and not letting blind prejudice keep us apart with reference to the great idea of preparedness. Let all men set aside their political and social prejudices and meet squarely upon the subject, in order that proper conservation may be carried forward for the protection of the generations unborn. (Applause.)

CHAIRMAN TAYLOR: The Secretary has an announcement to make.

SECRETARY CALLBREATH: I desire to announce that at the meeting of the members last night the following members were elected as Directors to serve a term of three years: Mr. W. J. Richards of Pennsylvania, Mr. M. S. Kemmerer of New York, Mr. George H. Crosby of Minnesota, and Mr. Irving T. Snyder of Colorado. At the Directors' meeting held this morning the following officers were elected: President, Walter Douglas; First Vice President, Charles M. Moderwell; Second Vice President, George H. Crosby; Third Vice-President, L. A. Friedman. Executive Committee, Walter Douglas, Carl Scholz and C. M. Moderwell.

CHAIRMAN TAYLOR: We will now suspend the discussion before the house and take up the report of the Resolutions Committee.

MR. E. W. PARKER: Gentlemen, before presenting the detailed report of the Resolutions Committee, the Chairman would like to express his thanks to the individual members of that Committee for the earnest, conscientious manner in which they have tried to work out the matters that have been submitted to them. It has been a great pleasure to work with the members of that Committee.

Resolution number 1, introduced by Mr. George E. Collins, the Committee begs to recommend that it pass.

SECRETARY CALLBREATH: Do you desire to have the resolution read, Mr. Chairman?

CHAIRMAN TAYLOR: Yes.

**Resolution No. 1, Introduced by George E. Collins of Colorado
(as Amended by Committee).**

"Whereas, The Federal Income Tax Law, as it applies to the output of mines, has been so construed by the International Revenue Department of the Federal Government as to work a grave injustice to operators, in that the deductions allowed from the gross income on account of depletion are not based on the gross value but on what is virtually the net value of the ore produced; and

Whereas, Congress by a later amendment of the Act has shown its intention to permit more conservative deductions to be made on

account of depletion of mines than was permitted under the Law of 1913. Now, therefore, be it

Resolved, That this Congress expresses appreciation of the intent of the Congress to be fair to the mining industry. And be it further

Resolved, That this question be referred to the regular Mining Taxation Committee of this Congress for investigation and recommendation. And be it further

Resolved, That such Committee be instructed to take proper means to see that the construction placed upon this law by the Internal Revenue Department shall be in accordance with the plain intention of Congress in enacting the Act."

CHAIRMAN TAYLOR: You have heard the resolution read. What is your wish?

DR. CHANCE: I move the adoption of the report of the Committee.

MR. W. J. KELLY: I second the motion.

Upon motion being put by the Chairman it was declared carried.

MR. PARKER: Gentlemen, resolution number 2, introduced by the Denver Civic and Commercial Association. It is recommended by the Committee that this resolution do not pass, as the sense of this resolution is contained in much better and simpler form in another resolution, which will be known as number 10.

I move the adoption of the Committee report.

CHAIRMAN TAYLOR: Is there a second to the motion?

MR. KELLY: If it has not passed or met the approbation of the Committee, I move that it be laid aside.

CHAIRMAN TAYLOR: And the report of the Committee adopted?

MR. KELLY: The report of the Committee adopted.

MR. H. EVSMITH: I second that motion.

The motion was carried unanimously.

MR. PARKER: Resolution number 3 is also from the Denver Civic and Commercial Association and it is of very much the same import as other resolutions which have been passed by the Congress. The Committee, therefore, recommends that as the previous sessions of the Mining Congress have passed resolutions of similar import that we affirm the previous recommendations.

CHAIRMAN TAYLOR: The recommendation of the Committee is that inasmuch as the congress has passed almost a similar resolution to this that they reaffirm their former action.

MR. EVSMITH: I move that the report be adopted.

MR. KELLY: I second it.

The motion was carried unanimously.

CHAIRMAN TAYLOR: The next.

MR. E. W. PARKER: The next resolution, number 4, presented by T. L. Lewis, is recommended with a slight amendment. Mr. Lewis in his resolution recommends that a committee be designated to consider this matter. The Resolutions Committee recommends that there be a standing committee, which there does not seem to be at the present time, in the Congress for this purpose. It seems to me that inasmuch as the work of the Congress is very largely devoted to safety and welfare in the mining industry, there should be a committee to be known as the Committee on Mine Safety and Welfare, to be appointed by the President. The Committee recommends, therefore, the adoption of the resolution, with the amendment that this be made a standing committee of seven on Mine Safety and Welfare.

SECRETARY CALLBREATH: You recommend the adoption of the resolution with that amendment?

MR. PARKER: Yes.

**Resolution No. 4, Introduced by T. L. Lewis of West Virginia.
(As Amended by the Committee.)**

Whereas, In mine safety work, one of the most serious problems encountered is the lack of personal co-operation on the part of some operators and also on the part of some miners, thus preventing the success of the work of promoting mine safety and reducing the number of accidents and fatalities in the mining industry; and

Whereas, While much has been accomplished, it is believed to be vastly important that every possible agency looking to greater safety in mining operations shall be enlisted and that efforts should be made to secure the active co-operation of those agencies which thus far have not voluntarily given their best support to the movement. Now, therefore, be it

Resolved, That a committee of seven be appointed, which shall investigate this important subject and report its findings and recommendations to the next annual convention of the American Mining Congress.

SECRETARY CALLBREATH: The amendment is to the effect that the committee shall be made a permanent committee of the Congress.

MR. KELLY: I move, Mr. Chairman, that the report of the committee be accepted.

DR. CHANCE: I second the motion.

The motion was unanimously carried.

MR. PARKER: Resolution No. 5, introduced by Hon. Frank H. Short of California. The Committee has considered this resolution very carefully and in consultation with Mr. Short has prepared a substitute for the original resolution. The substitute, which has been accepted, after final amendment, by Judge Short, is as follows:

**Resolution No. 5, Introduced by Frank H. Short of California.
(As Amended by the Committee.)**

Whereas, Conflict of laws and jurisdiction covering the development of waterpowers in the United States makes the use of vast undeveloped waterpowers commercially difficult if not impossible, be it

Resolved, That it is the sense of the American Mining Congress in meeting assembled at Chicago, Illinois, November 18, 1916, that the Government of the United States of America and the several states be urged to enact such laws and regulations as shall facilitate to the greatest degree and safeguard the utilization of existing undeveloped waterpowers for industrial and domestic purposes, thus conserving and permitting the developing of our natural resources; and be it further

Resolved, That such laws should encourage and permit development of this resource and all of the other resources of the public land states without discrimination and under laws and conditions in all respects as favorable as those applicable in the states having no public lands; and be it further

Resolved, That copies of this resolution be transmitted to Congress, the legislatures of the states and the Government and State Departments having present jurisdiction.

CHAIRMAN TAYLOR: You have heard the Committee's report; what is your pleasure?

MR. KELLY: I move, Mr. Chairman, that the report of the Committee be accepted.

CHAIRMAN TAYLOR: Is that motion seconded?

MRS. EMILY F. WEEKES: I second the motion.

The motion was carried unanimously.

MR. PARKER: Resolution No. 6, introduced by Mr. J. N. Gillett, is recommended for adoption, with slight amendments. They are shown on the original copy in ink.

Resolution No. 6, Introduced by Mr. J. N. Gillett of California.

(As Amended by the Committee.)

Whereas, This Congress is deeply interested in the just operation of the mining laws; and

Whereas, As a result of certain land withdrawal orders by the President of the United States and of legislation by Congress, many persons who at great expense and, as adjudged by the courts, have in good faith developed the oil lands of the country, are threatened with ejection and forfeiture of their developed lands and their investments; therefore, be it

Resolved, That in all such cases we urge prompt and appropriate legislative relief so that those who have in good faith developed such lands shall be protected.

CHAIRMAN TAYLOR: Any remarks? What is your pleasure with regard to this resolution?

HON. FRANK H. SHORT: I move its adoption.

MR. KELLY: I second it.

Motion was unanimously carried.

MR. PARKER: Mr. Chairman, resolution No. 7, introduced by Mr. Carl Scholz, has been amended by the Committee. The amendments were submitted to Mr. Scholz and he has accepted them. It is recommended for passage in its amended form.

Resolution No. 7, Introduced by Carl Scholz.

(As Amended by the Committee.)

Whereas, The information which the Federal Trade Commission has acquired within the time of its existence has placed it in possession of data and other information on costs which will enable it to do much toward the improvement in conditions of the employees, aid the mine owners and at the same time conserve the interests of the public; and

Whereas, The American Mining Congress, recognizing the many difficulties which confront the mining industry and believes the conservation of life and mineral resources are vital to the welfare of the nation; therefore, be it

Resolved, That we recommend that the Congress of the United States be requested to enact such legislation and make such appropriation as will enable the Federal Trade Commission to devise uniform systems of accounting applicable to the different branches of the mining industry.

CHAIRMAN TAYLOR: You have heard the resolution; what is your wish?

MR. SNYDER: I move its adoption.

MR. KELLY: I second the motion.

The motion was unanimously carried.

MR. PARKER: Resolution No. 8, originally introduced by Mr. Shackleford, on behalf of the Missouri delegation, has been withdrawn.

Resolution No. 9 is a resolution of the Committee on Resolutions based upon the report of the Uniform Law Section.

The Secretary read the resolution.

CHAIRMAN TAYLOR: You have heard the resolution; a motion is in order.

MR. A. J. MOORSHEAD: Mr. Chairman, the resolution as you have framed it there would not be satisfactory to the organization that I represent. They framed it as they thought it should be, just as they want it, and if this Congress cannot adopt it as they sent it in, they will withdraw it, Mr. Chairman, and handle it themselves. As much of the Committee as is here now has no authority to permit any changes to be made.

CHAIRMAN TAYLOR: I believe that you are the chairman of that association, are you not?

MR. MOORSHEAD: Yes.

CHAIRMAN TAYLOR: I think the chairman has a right to withdraw it if he wishes to.

MR. MOORSHEAD: I am not the chairman, but I am the president of that association, because the president of it when it was made into a permanent organization.

CHAIRMAN TAYLOR: The president of the organization desires to withdraw his resolution.

MR. MOORSHEAD: We want the whole thing withdrawn in its entirety, and we will try to handle it ourselves, Mr. Chairman.

CHAIRMAN TAYLOR: Gentlemen, the matter is up to the convention, whether you are willing to have this resolution passed or to permit the resolution to be withdrawn and no action taken upon it. There is no motion before the house. A motion will be considered.

MR. MOORSHEAD: Mr. Chairman, we come in here as an entirely separate body from the American Mining Congress. We are thankful for the privileges and the opportunity of being here and undertaking this work here. It was expected that this would be the best place possibly to do it, but we, being an entirely separate body now, feel that if this Congress can't pass it as we have prepared it, that we should have the privilege of withdrawing it in its entirety and that the Congress take no action whatever.

CHAIRMAN TAYLOR: I think, Mr. Moorshead, that you have the privilege of withdrawing it. The question of whether the Congress would take action on such a matter is up to the Congress. If they wish to pass this resolution as amended and as drawn by their own Resolutions Committee, I think it would be perfectly proper for them to do so.

MR. KELLY: Mr. Chairman, it has been the purpose, as I understand it, to have committees here appointed to draw up such resolutions as we think necessary to point out the evils which we desire corrected. These committees are composed of the most intelligent men in the Congress. This Resolution Committee is organized for the purpose of passing on these resolutions and for the purpose of suggesting to the Congress in general whether or not they are recommended for passage. It would be impossible for the entire body to give the time and thought necessary to each of these matters. Therefore, this power has been delegated to a committee. We have placed this power in their hands. It is up to us to back up this committee. This committee is a part of the great American Mining Congress and, therefore, if it recommends that this resolution be passed in its present form or in its amended form, I think it is up to the Congress to act according to the suggestion and recommendation of the Committee. Therefore, I would move that this resolution take the same course as the other resolutions.

MR. MOORSHEAD: Mr. Chairman, the gentleman does not understand the matter at all, quite evidently. This Congress did not appoint any committee to frame this resolution. We merely came in here as a separate body authorized by the different states, met here as a separate body, and only by courtesy, Mr. Chairman, have asked you to support our resolution. If you cannot do it, that is all there is to it. If that was framed by a committee that you had appointed, it would be an entirely different thing, but this Congress had nothing whatever to do with it.

MR. PARKER: Mr. Chairman, I do not think that the Committee on Resolutions has any desire to pass a resolution which would be in disfavor with the parties in question who have presented it to the Committee for consideration. If it is the desire of Mr. Moorshead as chairman of that committee to withdraw the resolution, I do not think the Committee on Resolutions will enter any objection to the action of the Congress if it is withdrawn.

CHAIRMAN TAYLOR: There is no motion on the matter.

MR. MOORSHEAD: I would like to have it withdrawn, Mr. Chairman.

DR. CHANCE: I move that the permission to withdraw it be extended.

MR. KELLY: I do not think my motion was seconded. Consequently, if it meets with the approbation of the Chairman of this convention, I will withdraw my motion.

CHAIRMAN TAYLOR: Motion is withdrawn. What was your motion, Dr. Chance?

DR. CHANCE: That permission to withdraw be extended.

CHAIRMAN TAYLOR: Is that motion seconded?

MRS. WEEKES: I second that motion.

CHAIRMAN TAYLOR: You have heard the motion. The motion is that permission to withdraw be granted to the body which presented it. Any remarks?

DR. PURDUE: To make a motion, I think, is really unnecessary. I think the gentleman has a right to withdraw it if he wishes to, but I believe the Committee on Resolutions have not withdrawn their motion. I believe it is understood that the Committee on Resolutions have the right to modify resolutions and to introduce them as their own resolutions, if they wish to do so.

MR. PARKER: I was going to suggest, Mr. Chairman, that the Committee would be glad to have that resolution recommitted to them, its own resolution recommitted to them for further consideration.

CHAIRMAN TAYLOR: Before this motion is put, I think the whole matter should be referred back to the Resolutions Committee. If there is no objection, we will take that course with it, that the resolution be referred back to the Resolutions Committee.

SECRETARY CALLBREATH: There is a motion before the convention which has not been acted upon.

CHAIRMAN TAYLOR: I realize that the motion has not been acted upon, but the purpose of the motion might be better effected by the reference back to the Committee. If it is possible for the Committee to conform to the desires of the other committee, the motion could then be brought back for our consideration. The motion then would be unnecessary. For that reason I thought it would be wise to recommit without putting the motion.

SECRETARY CALLBREATH: Mr. Chairman, your Secretary is charged with making a correct record of this meeting. There will be doubt as to what to do with a resolution which has been offered before the Congress and referred to the Committee and then turned in with a report recommending the amended resolution, as to just what the record should show.

CHAIRMAN TAYLOR: My idea was that the reference might clarify that, that they might desire to make a new recommendation and this would clarify the record, to take the place of the one that has just been before the meeting.

SECRETARY CALLBREATH: There is a motion made and seconded and not withdrawn. I was going to suggest—

DR. CHANCE: Motion withdrawn.

SECRETARY CALLBREATH: This matter might be referred to the Committee with instructions to permit them to withdraw it if they see fit.

DR. CHANCE: I make a motion to that effect.

MR. KELLY: I second it.

CHAIRMAN TAYLOR: You have heard the motion. The motion is that the resolution be returned to the Committee, which shall have the power to permit the body to withdraw it.

The motion was carried unanimously.

MR. PARKER: The next resolution is one that the Committee reported as embodying the contents of resolution No. 2. This resolution is introduced by Mr. L. W. Trumbull and it is recommended that it pass with the slight amendment made to it by the Committee, which amendment has been accepted by Mr. Trumbull and which is embodied in the copy.

**Resolution No. 10, Introduced by L. W. Trumbull.
(As Amended by the Committee.)**

Whereas, the increasing expense of courts, schools, asylums, hospitals and other state institutions, the building and maintenance of roads, and the administration of law over its whole area, cannot be supported by a tax levied upon less than one-half of the area of the several states without undue and unfair burden; and

Whereas, the policy laid down by Abraham Lincoln that "The public lands are an impermanent national possession held in trust for the maturing states," and the liberal administration of laws framed to make such policy effective have worked great advantage to the West and to the nation; and

Whereas, The recent restrictive administration of the public land laws and the efforts to make more difficult the acquisition of title to mineral and other public lands in the West have been largely instrumental in preventing settlement, in restricting development and hampering the progress of the mining industry and preventing it from keeping pace with industrial advancement in other lines of effort; and

Whereas, The proposed policy for the Federal leasing of mineral and other lands will keep from the state taxing power valuable property which should contribute to the support of state institutions, will prevent investment, restrict development, foster monopoly in the hands of those who have already acquired title to the public domain and make necessary a system of Federal control and espionage subversive of free institutions, expensive of administration and repugnant to the feelings of a free people; therefore, be it

Resolved, That we urge upon the Department of Interior of the United States a more liberal administration of our public land laws, that we disfavor the adoption at this time of any system of Federal leasing of mineral and other lands, or the enactment by Congress of any laws relating to public lands having a tendency to restrict the development of the West.

CHAIRMAN TAYLOR: You have heard the resolution. What is your desire?

MR. KELLY: I move the adoption of this, because it is one of the most important subjects that we have before us. It is of the greatest importance to our country. I therefore move its adoption.

CHAIRMAN TAYLOR: Motion seconded?

DR. CHANCE: I second it.

The motion was carried unanimously.

MR. PARKER: Mr. Chairman, Resolution No. 11 has not received the approval of the Committee on Resolutions.

SECRETARY CALLBREATH: What is your recommendation?

MR. PARKER: We recommend that it do not pass.

Secretary Callbreath read Resolution Number 11.

CHAIRMAN TAYLOR: A motion is in order.

MR. MOORSHEAD: Mr. Chairman, might I ask upon what ground that resolution has been rejected?

CHAIRMAN TAYLOR: Yes sir; that question is perfectly proper, if you want to ask it.

MR. KELLY: That is a good question to ask. That is a good resolution.

CHAIRMAN TAYLOR: Mr. Parker, the question has been asked if the Committee would desire to make a statement as to why they don't approve of that resolution.

MR. PARKER: Mr. Chairman, it seemed as if it was a matter of placing the Mining Congress on record as to what might seem to be a political discussion. There was no particular objection to the fact that the Mine Inspection Departments should be kept out of politics. In some states they approve of the fact that the Mine Inspector should be elected rather than appointed. However, the final paragraph of that resolution, if it is passed at this time, "because of recent changes in administration," didn't seem to strike the Committee quite favorably and, therefore, could not recommend its passage to the Congress.

Of course, the committee does not expect at any time that what it recommends is an order to the Congress. If the Congress desires to pass a resolution over the committee's recommendation it certainly has a right to do so.

MR. MOORSHEAD: Mr. Chairman, I am not the framer of the resolution. I never thought of it or had anything whatever to do with it, excepting that I was president of the meeting and was one of those that approved of it. I don't know how it is in other states, but I do know in Illinois that with the change of every administration our mine inspectors are removed practically in a body. We have had a change from the Democratic to the Republican in the State of Illinois in this last election, and we know what is going to happen. We know, furthermore, that in an industry like ours that nothing could be more serious than the changing of mine examiners who have proven to be good men. That is the reason why I am in sympathy with the framer of that resolution. If it is felt by this Congress that they can't pass it, I would say that we should in some manner, if it can be done, voice our sentiments against political administrations making changes just as the political complexions of the different states change. There is nothing more harmful, nothing more disastrous, nothing in a business way, I would say, more insane.

MR. KELLY: Mr. Chairman, the gentleman has voiced my sentiments exactly. I think—

CHAIRMAN TAYLOR: If the gentleman will permit me, there is no motion before the house.

MR. KELLY: I am extremely sorry, Mr. Chairman, if I have violated your rules, but I would like to have the permission to discuss this question.

CHAIRMAN TAYLOR: But there is no motion before the house.

MR. KELLY: I understood you were discussing the question, Mr. Chairman.

MR. MOORSHEAD: There is a motion to reject it.

CHAIRMAN TAYLOR: Was there a motion? If there was I didn't hear it.

SECRETARY CALLBREATH: It is understood that the chairman moves the adoption of the committee's report.

CHAIRMAN TAYLOR: All right. I didn't understand there was a motion at all. Was the motion seconded?

SECRETARY CALLBREATH: The motion does not require a second.

CHAIRMAN TAYLOR: Well, it might be well to discuss it.

MR. KELLY: My only reasons for qualifying the remarks of my friend are that I have had considerable experience along this line. If this were left in the hands of the people of the various states, if the mine inspectors were elected at every election, it would involve this department of the service very deeply in politics. Some states are Republican and others are Democratic. The facts would be that no matter what party you had in power the inspectors would be just as crooked, or more so, than if appointed from Washington. I hope that this resolution will be passed, so that the mine inspectors may be appointed and not elected in the various states. That is the purpose of the resolution, as I take it. If the various states elected their own inspectors it would be very detrimental, I believe, to the mining interests of the country. I am in favor of having Washington appoint these men. We have other men appointed from Washington and I think it would be well to have our mine inspectors also appointed from Washington. We haven't always got a Democratic administration in Washington, nor is it always Republican, but either one of them is good enough to appoint such men. I presume they both work impartially. I presume they work for the general interests of the country. I would be in favor that that resolution pass.

SECRETARY CALLBREATH: Mr. Chairman, I do not like to talk upon a resolution, but I am afraid we are getting far afield in this matter. This resolution if passed in its present form would not do very much good. I believe that this convention is unanimously in favor of the real inward meaning of that resolution. That is to say, that proper mine inspectors who are experienced, competent and fair, should not be displaced because there has been a change in the administration of the state government. (Applause.) But, upon the other hand, I feel that it may be considered impertinent and certainly without effect if we should appeal to a dominant party who has succeeded in the election to not change the administration in the way of mine inspectors, if in their judgment the prior administration has filled its offices with Republicans and the next administration happens to be Democratic. They will say, now it is time for us to get some of our friends in office. The great dominant legislation in this country which was framed to prevent changes with every election is based upon civil service. Now, the real intent of this resolution is to have an immediate good performed, but, underlying that is that the mine inspection service should be placed under civil service, so that a man who is competent, who is experienced, who has done his duty well, may be kept in office without respect to the administration. And it seems to me that the sooner we get to the point whereby we will manage our state and our municipal affairs the same way as a great corporation manages its affairs so that a competent man in a position shall be continued in that position just as long as he performs his duty and just as soon as he fails to perform his duty he loses his job, the sooner we will get to efficiency in government. The civil service laws in this country have not always been what they ought to have been. They have kept in office many men who ought to have been removed and many men who would have been removed had they been in the employ of a business corporation. But the evil effects of that, while we should strive to prevent their continuance, if possible, have been more than offset by the good results which have been obtained in keeping good men in office without reference to political complexion of the administration. I believe that this resolution, instead of being worded in this form, should be to the effect that we make an effort to see to it that

the civil service laws of the several states shall apply to the mine inspection service. (Applause.)

MR. CHANCE: I move the adoption of the report of the Resolutions Committee,

MR. KELLY: I will second that, Mr. Chairman.

CHAIRMAN TAYLOR: You have heard the motion. That is not going to reach very far, though.

SECRETARY CALLBREATH: Yes; they say it shall not pass.

CHAIRMAN TAYLOR: I don't think that the mover understood it that way.

MR. KELLY: I would like to understand that motion. Will you put it again.

MR. DESOLLER: I move that the report of the Committee on Resolutions be accepted.

MR. KELLY: I withdraw my second. I move as an amendment that we refer it to the Congress to be passed on the basis of the civil service system.

CHAIRMAN TAYLOR: Well, that would hardly be in order, Mr. Kelly, because what this has reference to is the state mine inspector.

MR. KELLY: That is what I mean.

CHAIRMAN TAYLOR: Which is under the police powers of the state delegated by the constitution to the state.

MR. KELLY: Well, I would move that that be sent to the state legislature.

CHAIRMAN TAYLOR: So that it would not be quite in order to ask the government to do that.

MR. KELLY: Well, I mean to have the state legislature pass that bill, to have it referred to the state legislatures instead of to Congress to have the mine inspectors put under civil service.

CHAIRMAN TAYLOR: The substance, I take it, of your motion is that the Congress go on record that they favor civil service for the mine inspection departments?

MR. KELLY: Yes, sir.

CHAIRMAN TAYLOR: Is that acceptable to the convention?

MR. DESOLLER: That is acceptable.

SECRETARY CALLBREATH: I suggest that in order to meet the situation that this resolution should be recommitted to the committee, with instructions.

MR. W. J. SNYDER: I think that is the proper way to get at it, that we recommit this with instructions that they do just what you stated. There is a motion before the house, though.

MR. PARKER: Before the committee takes advantage of that, we would like to hear from the chairman of the Uniform Mining Legislation Section, whether it is to be passed exactly as worded, or whether the committee have a right to amend. (Laughter.)

MR. KELLY: Mr. Secretary, will you read that over again?

SECRETARY CALLBREATH: You mean read the resolution again?

MR. KELLY: Yes, so that we can see how much of it they can amend or will amend or that we will ask them to amend.

Secretary Callbreath re-read the resolution.

SECRETARY CALLBREATH: If you will pardon me, the motion that I think would embody that thought is that this resolution should be re-committed to the Committee on Resolutions, with instructions to make it provide that the mine inspection service of the several states shall be put under the civil service.

MR. KELLY: That was the sense of my amendment to the motion.

MR. SNYDER: That is what I wanted, too.

CHAIRMAN TAYLOR: There is a little confusion here. The motion was to re-commit.

MR. KELLY: I think we should vote on the amendment first.

CHAIRMAN TAYLOR: The amendment is that this be re-committed to the Committee with the understanding that they draw up a resolution recommending that the mine inspection service go under civil service rules. Is that the correct statement of it?

MR. KELLY: That is the sense of my amendment.

MR. STOEK: Mr. Chairman, I think in the minds of a good many of us here there is a great deal of difference between being taken out of politics and being put under civil service. Civil service in theory is a most excellent thing, but sometimes in practice it is a most abominable thing and leads to a great deal of loss in efficiency. It depends on what the civil service law is, but if you know what civil service it is going to be put under, well and good. But I would be very much adverse to saying that it goes under civil service. There are a great many kinds of civil service; some are very good and some are awful.

MR. MOORSHEAD: The gentleman intended to say most uncivil in Illinois.

MR. E. T. BENT: Mr. Chairman, I know that the gentlemen who have talked here know a great deal more about civil service law and its operation in connection with inspectors than I do. I think the real thing that some of us want to get at is the passage of this resolution as it was originally framed. I do not care whether it is passed in that form or not. But does the Congress wish to do anything at this time to prevent the removal of competent inspectors because they happen to belong to the party that is not dominant or is not to be dominant? I don't care whether we are in favor of civil service or not. I agree with Professor Stoek, if we get the real article that we are for it, but simply because competent Republican mine inspectors in Illinois went into the discard a few years ago is no reason why competent Democrats should now go into the discard. We are business men. We are not politicians. I think that this resolution, instead of being a political resolution, is an anti-political resolution. We want good inspectors in the service, to remain in the service, and the Congress could very well say yes or no to that question.

SECRETARY CALLBREATH: Mr. Chairman, may I ask Mr. Bent a question?

CHAIRMAN TAYLOR: Certainly.

SECRETARY CALLBREATH: Do you think that the passage of a resolution of this kind would alter the acts of the party that is about to come into power in this state?

MR. BENT: I have very little hope that it would. I have a little hope or I wouldn't want it presented, but it is a very little hope.

MR. JOHN DUNLAP: May I say a little word in regard to this matter? Now, Mr. Stoek knows something about the inspectors in Illinois. I used to be one myself. Now, just as soon as a state officer is elected and the new attorney-general takes office, especially if it is in Illinois, he at once removes the mine inspectors of Illinois who are of the opposite party and not under civil service. That is the first thing that will be done. Now, Mr. Stoek has said something about the matter of civil service which also is particularly true. The civil service is composed of two Democrats and one Republican. I don't care whether your Congress at this time passes the resolution or not. I do not believe it will have any effect in Illinois, because there are a number of the old men who are in the inspection service before who

have been working in politics for the last three months. The present inspectors as well have been working in politics for the last six months to retain their jobs. Now, that is a fact. So I do not think this resolution at this time will do any good. I would rather it would come perhaps a year later, but not at this time for the purpose of retaining the inspectors who are now in. I would rather that this resolution be re-committed to the Committee.

CHAIRMAN TAYLOR: I would like to ask Mr. Stoek whether the matter of how to keep it out of politics was discussed. Was there any move suggested?

MR. STOEK: No.

MR. SNYDER: As I understand this, we are not trying to single out any one state, but to correct the abuse in all states. My understanding is that this Congress is expressing an opinion as to how to conduct the inspection of our properties?

CHAIRMAN TAYLOR: Surely.

MR. SNYDER: And to get it away from politics as far as possible. Now, we are not going to cure it all. We are not going to cure the situation all at once, but we ought to be given the greatest latitude and not be afraid to express our opinions. As I understand it, that is the purpose of this resolution. We do not expect that this abuse, that this situation in Illinois or in any other state will be corrected by the passage of this resolution, but we do hope to express a conviction with reference to this matter of inspection, and we ought to be large enough to express that conviction, which is to take the inspection service out of politics as far as possible and make inspection what it ought to be.

CHAIRMAN TAYLOR: Are there any further remarks?

MR. STOEK: May I just offer a suggestion? I agree fully with what the gentleman has just said. It ought not to be thought of as a local matter. And as a suggestion, would it take away what seems to be a local flavor if we take out that last reference to the recent election, and simply state the principle that the Congress is not in favor of regulating mine inspection service in accordance with or as a reward for political doings. As Mr. Dunlap said, I do not think it will make any difference in Illinois one way or the other.

MR. DUNLAP: This will just get us on record.

MR. STOEK: Yes, this just gets us on record as being opposed to the spoils system as far as it affects mine inspection. I offer that as a suggestion, if that would take away any of the apparent local flavor. I would offer it as an amendment.

DR. CHANCE: I think if the stenographer has reported the remarks of the various gentlemen from Illinois, Illinois has gone on record and we know where she stands. The way in which it is confessed that this resolution was drawn I think was with reference to this specific instance which they have in mind of a possible change in efficient inspectors due to a result of this last election. Now, the deliberations of the Congress, it seems to me, should be confined, so far as possible, to matters of national interest and not those of local interest. In covering those matters of national interest it will eventually cover efficiently matters of local interest. And, for those reasons, it seems to me, especially as this resolution provides no efficient means for accomplishing the object sought to be done, that the report of the Committee ought to be concurred in. We are all of one mind in this regard. There is no question at all but that we all believe that inspectors should be retained in office so long as they perform their duties efficiently. But this resolution provides no efficient means for carrying that out and, therefore, it seems to me it would be without effect and the Resolutions Committee has confessedly made no attempt to revise or remodel this resolution. They reported with a negative recommendation. Therefore, it is not before us in a definite form and it seems to me that the

correct procedure in this case will be to refer it back to the Committee on Resolutions for possible action at some Congress in the future.

MR. KELLY: I second the motion.

CHAIRMAN TAYLOR: No, there is a motion to that effect.

Any further remarks?

MR. MOORSHEAD: There is an amendment to the motion.

CHAIRMAN TAYLOR: The amendment is before the house.

MR. MOORSHEAD: That should go as a motion.

CHAIRMAN TAYLOR: We will vote on the motion first.

MR. MOORSHEAD: The amendment should go as a substitute motion.

SECRETARY CALLBREATH: The motion has been withdrawn and the amendment remains.

CHAIRMAN TAYLOR: The amendment prevails now as a motion.

DR. CHANCE: The motion has been withdrawn.

CHAIRMAN TAYLOR: No, the motion that is now before the house is that this be referred back to the Committee on Resolutions.

DR. CHANCE: I call for the question.

The motion was carried unanimously.

CHAIRMAN TAYLOR: Are there any other resolutions, Mr. Chairman?

MR. PARKER: Finally, Mr. Chairman, the Committee on Resolutions desires to offer two resolutions of its own, one being to the following effect; that

Whereas, The Nineteenth Session of the American Mining Congress, one of the most successful in its history, is this day drawing to a close; therefore, be it

Resolved by the Congress in session, That we extend to the exhibitors and advertisers, who have come here to bring to our attention their respective products, our deep appreciation; to the La Salle Hotel our thanks for the uniform courtesy extended to all of our members; to the committees who have diligently labored for the best interest of the Congress our sincere appreciation; to the coal operators of this state our heartfelt esteem for the many and continued courtesies they have shown us.

I know from experience that this has been one of the most successful sessions in the history of the American Mining Congress. I know that from experience. I have been attending the sessions of the Congress for nineteen years and this is one of the most, if not the most, successful session the Congress has held.

The Chairman of the Committee desires to thank the members of the committees who have devoted so much of their time, not only their time, but to a considerable extent of their pocketbook for the entertainment of this Congress. We feel that there is a sincere appreciation of what they have done. We would like to extend this resolution a little bit and would like to have the action of the Congress unanimously on this resolution.

CHAIRMAN TAYLOR: You have heard the resolution, covering in a general way the thanks to the various bodies and persons. What is your desire?

MR. J. E. WILLIAMS: I move its adoption.

MR. KELLY: I second it.

CHAIRMAN TAYLOR: I would suggest when we take action on this that it be by a rising vote of thanks.

A rising vote of thanks was tendered to the parties participating in the success of the convention.

MR. PARKER: Mr. Chairman, the next resolution is one which we always dislike to have go out.

Whereas, During the past year several members of this Association have been called to the Great Beyond; therefore, be it

Resolved, That this Congress wishes to express, through its secretary, to the families of the deceased the condolence and sympathy of this Congress.

MR. MOORSHEAD: I move its adoption.

MR. KELLY: I second it.

The motion was carried unanimously.

MR. PARKER: The members of the Committee on Resolutions are requested to meet in Room 1809 at once to consider the two resolutions that have been re-committed to it.

CHAIRMAN TAYLOR: While the Committee on Resolutions is out reconsidering the resolutions referred to them, we are going to ask Mr. Callbreath to give us a brief résumé of Dr. Henry S. Drinker's paper, which is very lengthy, but a very able paper. There are some interesting statements made in there. The doctor was unable to be here.

SECRETARY CALLBREATH: As suggested by your Chairman, this is very lengthy, but a very able paper. There are two or three points in this paper which I think should be particularly referred to. Reference to the acreage now owned by the Federal Government in Western States will be astonishing to those of you who have not before considered them. In the State of Arizona ninety-two per cent of its total area is owned and controlled by the Federal Government, leaving eight per cent subject to the taxing power of the state. In California 52 per cent, Colorado 56 per cent, Idaho 83 per cent, Montana 65 per cent, Nevada 87 per cent, New Mexico 62 per cent, Oregon 51 per cent, Utah 80 per cent, Washington 40 per cent, and Wyoming 68 per cent. It will readily be seen why the people of the West believe, as is embodied in one of the resolutions which have been passed by this convention that that property should go under the state taxing power in order that these states might have the advantage of that in the support of their state institutions.

Dr. Drinker's paper will be found on page 371 of this report.

CHAIRMAN TAYLOR: We have another paper, but I understand that the author is not present. This is a paper on the "Practical Significance of Pure Research," by Dr. W. R. Whitney of Schenectady, New York. Is Dr. Whitney in the room?

SECRETARY CALLBREATH: Dr. Whitney is not here. He wired that he could not be here. His paper is here. I think we have it printed.

Dr. Whitney's paper will be found on page 205 of this report.

CHAIRMAN TAYLOR: While we are waiting for the Committee to come in we can continue the open discussion on this subject, "Waste in the Mining Industry—in Mining, in Distribution, and in Use—and the Relation of These Wastes to the Operator, the Consumers and the Public."

MR. WILLIAM J. KELLY. Mr. Chairman and Gentlemen: This is a very broad subject, which would require a great deal of time to discuss so properly and intelligently as to win the approbation of all of you, because it goes into the very roots of the mining industry. There are many points made by the previous speakers which are perfectly true. We have lost a great deal through dishonest mining. There are many things which we could say about the viciousness of certain fictitious mining schemes. We all know of the prospective miners who get up a company, go out and dig a small hole in the ground, and then incorporate themselves into large concerns and go through the cities of the country selling stock which is bogus from start to finish. As a

result of practices like this, mining, in the eyes of many people who could help it, is degraded.

There are many people who have mining stock in their safes and strong-boxes who, if you attempt to talk to them about valuable stock in a really safe and proper mine in which you desire them to invest, will say:

"No mining stock for me! I have got a lot of it in the last few years; the names of the companies I invested in are no longer in existence."

That may be true, but that is no reason why that same man who has the capital should not be interested in valuable mines, and help to carry them along. I hope that the men who are responsible for this condition of things can be made amenable to Federal law. I hope that the day will come when a penalty will be placed on the head of that man who will try to sell a stock that has no fundamental basis. I consider this a subject of the utmost importance, and one that the American Mining Congress could take up with advantage. There are men who live in cheap hotels in New York and sell mining stock in every city of the country—stock that has absolutely no merit. This does a great injury to legitimate miners. It is greatly to be hoped that the Mining Congress of America will see that those men who dare to delude the people and misrepresent what they have in order to sell bogus stock are put behind the bars, where the real miners of America can laugh at them.

We will increase the value of the mining industry by so doing. We will have men who will gladly purchase mining stock in the various mines of America which have a basis to them that is sound and good. They will be glad to invest their money. It will be an inspiration to the miners of the country, and will make many mines valuable; for it takes money to start a mine, and it takes capital to run it.

I hope that the day is not far distant when we will properly take this up before our National Congress at Washington, and that Federal laws will be passed by which these sellers of bogus mining stock will be put where they belong, and that is behind the bars of the Federal penitentiaries.

MR. PARKER. Gentlemen of the Congress: The Committee on Resolutions was waited upon by Mr. Moorshead and two other members of the Legislative Section who requested that the two reports that they had made to the Congress be withdrawn and that the matter be considered as not having been presented before the Congress. The Committee on Resolutions makes the recommendation that these reports be withdrawn and cut out of the records.

CHAIRMAN TAYLOR: You have heard the report of the Committee, that this matter be not considered.

MR. GRANBERG: I move that the report of the Committee be approved.

MR. DESOLLERS: I second the motion.

The motion was carried unanimously.

CHAIRMAN TAYLOR: That ends the work of the session. We will now stand adjourned.

COAL SECTION.

Tuesday, November 14, 1916.

AFTERNOON SESSION.

Mr. C. M. Moderwell, of Chicago, presided and Mr. Alexander Blair acted as secretary.

Chairman Moderwell called the meeting to order at 2:20 p. m.

CHAIRMAN MODERWELL: Gentlemen, I understand that you heard a very interesting address this morning from the chairman of the Federal Trades Commission. I unfortunately happened to be out of town and was unable to be here. I have no doubt that he told you a

great many things that were of interest and that you will remember for a long time. It seems as though a new era has dawned in the coal trade and as though we were at least on the doorstep of better times. I am not speaking now of today but of next year. The gentleman who is to speak first this afternoon regarding mining accounting is occupied in another committee just at present and I am going to take the liberty of changing the program somewhat and introduce to you another speaker. Those of you who are familiar with the coal trade know that one of the earliest efforts at co-operation among the coal trade was made in Franklin County in Southern Illinois. That came by reason of our having learned of something of this kind that had been done in other lines of industry. The gentleman who is familiar with the other lines of industry and who brought the good tidings to Franklin County is with us today, Mr. Ralph Crews. I take great pleasure in introducing Mr. Crews, who will speak to you. (Applause.) Before Mr. Crews speaks I would like to say that he will be very glad indeed to have you ask him any questions you desire and which he can answer after he has finished.

Mr. Crews' address will be found on page 184 of this report.

CHAIRMAN MODERWELL: If any of you have any questions to ask Mr. Crews will be very glad to answer them as far as he is able, and now is the time to ask. If you have any language stored up in you that you want to get rid of now is the opportunity.

The bituminous coal industry in which most of us are engaged has had no greater message given to it in my opinion than the one that has just been touched on by Mr. Crews. This subject of co-operation has a pleasant sound to the ears of bituminous coal operators and those who sell the product. We have had all that we want, I think, of competition, certainly of the kind of competition that has existed in the coal industry in the time that I have been connected with it. Now, we have with us today a number of gentlemen who have been connected with various associations which have been carrying out the principles referred to by Mr. Crews in their associations. There are a number of associations of coal operators over the country who have adopted this principle of intelligent co-operation and I notice that there are a number of gentlemen here today who are connected with those associations and we are going to allow them to take a little time to tell us, if they will, what in a practical way has been done along these lines. The first one on the list is Dr. Fred C. Honnold of Illinois, who is the secretary of the Franklin County, Illinois, Coal Operators' Association. Dr. Honnold. Applause.)

DR. HONNOLD. Mr. Chairman, Gentlemen of the Congress: It had not been my understanding that I was to speak to the Congress. I had expected that task would fall to the lot of my friend White and others of the coal trade secretaries. I had thought I made perfectly good arrangements with Mr. Callbreath to let me escape speech.

There is nothing I can talk to you about that would probably especially interest you, except the Franklin County Association. We sometimes feel we are entitled to claim that we are pioneers in association work, that is, coal trade association work, by reason of the fact that we started first. The notion, however, was well established in the minds of many groups of operators throughout the country long before we were organized.

It is very difficult to make clear to you in a few moments' talk, first, what we do, and next, what we accomplish. The essential purpose of a coal trade association, according to our notion, embraces three particular functions. First, the development of a more thorough, intimate and friendly relationship among the operators that make up the group; second, the careful daily, weekly and monthly compilation and publication of data, FACTS, for our guidance in determining our policy from day to day and from month to month. These reports cover not only the matter of sales and distribution of coal, but the operation of

our properties, including a joint study of costs. Our third function is of a general type or character, contemplating the extension of our markets, the improvement of our general conditions as to the recovery of coal from the acreage that we mine, sometimes called conservation, the protection of our workmen and the bettering of all conditions surrounding the production of coal. To attempt to go into detail with reference to our efforts in any of these departments would take quite a bit more than the ten minutes which I note we are allowed. The Shibboleth, if you will, which enables us to cross the ford and legally undertake co-operative effort which ultimately contemplates better returns for our product is cost determination, intelligent cost determination. Naturally, we have lived with that subject since we started. Whether we have lived righteously or not we are to be told later by the governmental agency which is established for the purpose of advising us in the premises—the Federal Trade Commission.

Franklin County early in its organization sought the assistance of Professor Stoek, who is in charge of the mining department of the University of Illinois. We placed at his disposal engineers who, under his direction, made a careful, physical survey of every property in our group. All of the data with reference to that investigation we expect ultimately to publish and make available to other groups of operators that may like to see what we have done. From that investigation we determined various facts and from those facts we arrived at certain averages and the determination of certain arbitrary factors to make up intelligently, as we believed, the so-called overhead charges, the neglect of which has been the open door through which competition has become abusive and destructive. I have in my pocket a blueprint that I prepared to show where we lose money in the coal business.

I do not know of anything that will make the subject of imperfect cost determination clearer to you in the brief time allotted to me than this blueprint. It will make clear to you wherein the coal industry, not alone in Illinois but all over the country, has gone wrong through sins of omission. I find that average groups of men are not very greatly different from a kindergarten attendance in that a picture goes farther with them than too many figures. This "hole in the doughnut" was therefore prepared with the idea of giving at a glance (not to any of you gentlemen who are adept and earnest in your efforts to improve, but to many other operators who do not give cost study sufficient attention) a clear picture of their delinquency in omitting certain vital items, proper and necessary to be considered in determining sale price on their product. This should give them the desired ideas at a glance.

The doughnut is made up of the recognized items, items which are recognized because they must be paid monthly. There is no escape from the monthly labor and material bills. The hole in the doughnut, the dough that you cut out and which you usually throw away or use to make more doughnuts, is supposed to represent the unrecognized items because their payment is deferred and in those neglected items, the payment of which is deferred, are the proper reserves for depreciation of plants for the depletion of land, for the provision of proper funds to safely and certainly carry out liability insurance and finally, a strange, almost unknown item in the coal business, PROFITS.

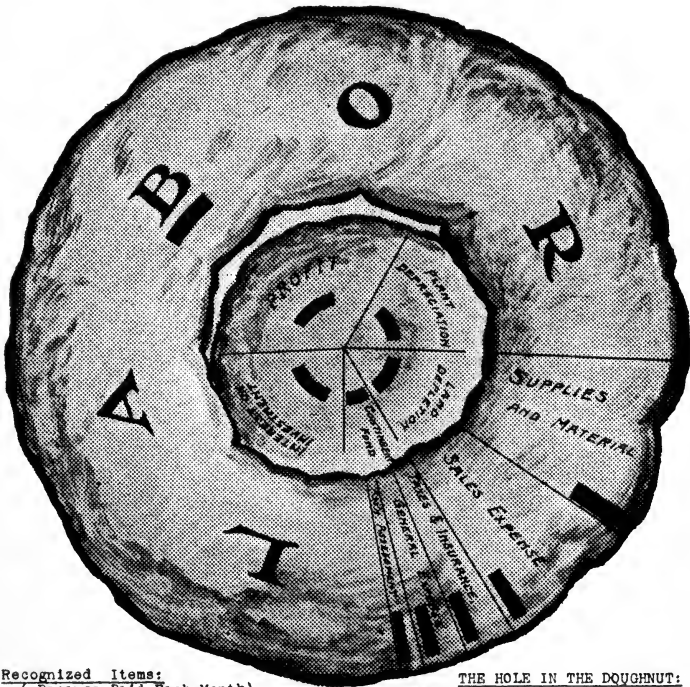
We have with us at this time—I shall not ask them to rise and be identified, but they are in our midst today—a couple of gentlemen from the Federal Trade Commission, whose incidental purpose here is to investigate the matter of the Franklin County cost study report, but in a more general way the industry as a whole in Illinois. We are not to be alone in the enjoyment of their attention and inquiry. In the past eighteen months we have had several such gentlemen out to visit us, at the direction of the Trade Commission, but as these gentlemen have become presumably proficient in the matter of acquaintance with our conditions, they have been called to other departments in the work of the Federal Trade Commission, so that with Messrs. David L. Wing

FRANKLIN COUNTY COAL OPERATORS ASSOCIATION

"THE HOLE IN THE DOUGHNUT"

Showing Why Some Operators Do Not Make Money

Through Failure to Include ALL NECESSARY ITEMS in Determining Proper Sale Price.



Recognized Items:
(Because Paid Each Month)

- Mine Labor =====
- Mine Supplies =====
- Sales Expense =====
- Taxes & Insurance =====
- General Expense =====
- Asn. Assessments =====

THE HOLE IN THE DOUGHNUT:
Neglected Items:
(Because Payment is deferred)

- Plant Depreciation =====
- Land Depletion =====
- Contingent Fund =====
- Interest on Investment =====
- P R O F I T =====

(you can fill in your own figures)

and R. L. Gardiner, we now have our second or third set of representatives here, some one or all of whom are, in the early future, to provide us—all of us, throughout all the coal producing states—a schedule, on which they will ask us to answer certain questions in reference to our industry and our own particular properties—the idea being that through the answers provided on this schedule they will be able to get a general idea of the actual condition that does prevail in the industry in the several districts, not only in our states, but in the country as a whole, with the hope that from such data they may find basis for friendly assistance and counsel as to methods of relief. With reference to our acknowledged and repeated assurance to the Commission that we are perfectly willing and ready to adopt a uniform system of accounting if in the adoption of such system we might find some way to overcome the unfortunate competitive conditions and results that we have had to endure the last several years, they undertook to advise and I trust later will undertake to recommend that certain systems suggested by us are acceptable to the Commission. Meanwhile, and pending some definite recognition by the Commission on the basis of submitted data or plans suggested by some of the present coal trade associations, it certainly behooves the several groups of mine operators now getting under co-operative organization guidance to give serious and painstaking study to the matter not only of costs, but of various other subjects equally vital to the common interest. I feel disposed to insist that although costs are a very definite and important factor, that having determined a fair cost which we can prove is fair that we have only gone part of the distance that a good trade association, coal or otherwise, ought to go. A proper cost system and the proper determination of costs is valuable not only for the purpose of enabling you to practice economies in your own properties and by comparison with your neighbor to extend the benefit of all the genius that exists in your field or in your state, or among the several states, but proper cost knowledge is also absolutely essential for the intelligent determination of a proper market or sale price. It is legitimate and must be legal that we should not be asked to sacrifice our coal at a price which does not safely cover **production cost** and provide proper reserves for those purposes which are good not only for the producing company, but economically for the commonwealth in caring for the men that are injured or that are killed in our employ and to encourage development of the best class and type of mine plant that will give us the maximum amount of coal per acre in the land that we work, and finally, it would seem equally sane and equally legal to protect a proper return on invested capital, and we are certainly not beyond our privilege in asking even beyond all these items a profit for our own efforts.

If there is anyone now who wants to ask any questions about the Franklin County Association, or about our notion of coal trade association, I would be glad to answer him, if I can. Otherwise, I am going to yield my place to Mr. White.

CHAIRMAN MODERWELL: I find, gentlemen, that it is not safe to ask Dr. Honnold any questions unless you are prepared to answer them yourself, because he will make you answer them yourself before he gets through.

DR. HONNOLD: I thank you, gentlemen. (Applause.)

CHAIRMAN MODERWELL: In addition to being engaged in the coal business, I took a little time off last spring and went out to preach the gospel and among other places I went to Cleveland. I found a benighted lot of gentlemen down there who were willing to listen to what I had to say and I understand that Mr. White is here to tell us the result of my mission. Mr. C. P. White, of the Pittsburgh Vein Operators' Association of Ohio. (Applause.)

MR. C. P. WHITE: I have been much interested in Mr. Crews' address and in Dr. Honnold's talk, first, because so many coal men, as

well as those engaged in other lines of business, have been giving thought during the past few years to the possibilities of co-operation between industrial concerns in the same line of business, largely through such associations as those of which Mr. Crews has spoken. Secondly, because I have had some experience in this work and it is because of this fact, I assume, that I have been asked to discuss for a few minutes what you have just heard.

For a number of years prior to last April I had been in charge of coal dock properties at the head of Lake Superior and concerned in the sale of coal in that northwestern territory. For about a year before leaving that country, the corporation which I represented was a member of the Northwestern Coal Dock Operators' Association, and for the latter part of the term I was a member of its executive committee. Mr. Crews was, and still is, I believe, attorney for that association. He has had experience of a year or more in directing the activities of the Franklin County Association and keeping these good people in the straight and narrow path, within the law.

It was a foregone conclusion that Mr. Crews' address would fully cover the ground, and he has so nearly exhausted the subject in a theoretical way that there is little left, I feel, to say on that score. Dr. Honnold has also spoken on the subject, which leaves so much less for me to talk about except possibly to corroborate what these gentlemen have said. Perhaps I can, however, give you some information as to the practical work of such associations by relating a little of my own experiences and outlining the results obtained in the associations with which I am familiar. I believe that Secretary Groverman of the Dock Association is here and could tell you of the present conditions in their territory, but while I was in the North I saw as a result of this association work confidence and business friendships take the place of suspicion, doubts and cut-throat tactics previously forced upon the coal interests in that field by the clever buyer who worked upon the seller's distrust of his competitor until prices never made were being met and cut and the whole industry was involved in a struggle for individual existence. Entirely aside from the present condition of abnormally high prices at the mines, the members of that association have been educated by joint meetings and proper discussions of common problems to a state of mind where reduced operating expenses and a fair and reasonable return on money invested seems assured.

I went to Cleveland in April of this year. The operators of the so-called number eight field in eastern Ohio had had an association for a number of years, but their activities had been confined largely to dealings with their miners' organizations. This spring, however, a number of the operators deemed it advisable to establish such a statistical bureau as you have heard described, in connection with the other work of the association. I was selected as secretary, and in accepting was told by my friends that if I could make a success of the work in that field, could get "that bunch" together, I would be entitled to a niche in the Hall of Fame. We now have a membership comprising approximately 50 per cent in numbers of the operators, with about 85 per cent of the production of the field. We exchange between ourselves and through the medium of the association office full information as to sales and contracts made, give daily reports of shipments from the mines, show weekly recapitulation of sales and of deliveries, with prices realized, grade by grade. We tabulate figures as to hours worked and tonnage produced, with data as to our supply and causes of delay. We give monthly costs of mining operations and a summary of deliveries and realizations when the books are closed. Today, and this comes not from the work of any individual, but from the effects of information disseminated, from regular meetings, from association of the members and from a frank, full and lawful discussion of the problems and conditions of the industry, I do not believe that today our members could be driven or persuaded to go back to the methods of a

year ago. I think that we have made the benefit of co-operation plain to our members and that others starting since we began will show their several associations fully justified and in the final analysis well worth while. I thank you, gentlemen. (Applause.)

CHAIRMAN MODERWELL: I have been surprised to see the number of coal men that have been able to get away from their own affairs to attend a meeting like this. You all know what the condition of the bituminous coal industry is at the present time. Nevertheless there are some who have not been able to get here, and among others is my friend Mr. Hord of Lexington, Kentucky. I have not seen Mr. Hall in the room. He is the next speaker on the program. I wasn't sure about him, but from Mr. Hord I had a wire to the effect that he would be unable to be here. Mr. Barker also is unable to be here. Mr. W. H. Huff of the Victor American Fuel Company of Colorado was unable to come, but he sent a letter which I will ask the Secretary to read, if he will. It is a very interesting letter and he puts his finger on some things that are of interest in the industry at the present time.

Mr. Huff's letter was read as follows:

Denver, Colorado, November 11, 1916.

Mr. J. F. Callbreath,
Secretary, American Mining Congress,
Hotel La Salle, Chicago, Illinois.

My Dear Mr. Callbreath:

When I wrote you a few days ago, I did not know I was "appointed" to help the discussion of coal marketing. It is always an interesting subject to me and I am disappointed over my inability to attend the convention.

The address of Mr. Crews brings into view points not heretofore altogether clear to many of us—the evolution of the legal phases of anti-trust and trade laws, and although not entirely conclusive that some zealous prosecutor will not regard the dissemination of information of the character spoken of as unduly stimulating prices, there is wholesome encouragement in what a few responsible public men have said on the point of costs. The laws on combinations invariably qualify by saying, "It shall be illegal if it is intended to restrain trade or has that effect."

I wish to speak of price lists—price quotations. I think under the unfair trade section it is possible for a case to be made against the operator who makes secret prices. An operator in the habit of publishing prices lists, who then makes low secret prices, is certainly guilty of unfair methods. His circular then becomes a decoy and a subterfuge. It is the secret, hidden thing that offends. It was the secret rebate in rail-roading that was condemned and it is to be expected that the man who so uses his circular shall lose caste with his fellows. It's a form of deceit and cheating. In a certain way my price list is a tacit contract with my fellow operators that I am in good faith quoting certain prices. The public welfare is the foundation of all laws, so when a law says that "Unfair methods of trade are declared unlawful," it says so to protect the public, and my fellow operator is as much a part of the public as anyone else.

I am not one of those who doubts the honesty and good intentions of mankind. The public, generally, must be honest, else we would not get on at all. Since the major part of all business is done on faith in one another, men, as a whole, must be essentially honest.

I think our chief difficulty is suspicion of one another. It was said of Lincoln he demanded of himself strict accountability (I don't like that expression any more), but was lenient toward others. If we all practiced that, all would go well. I also believe much of the discord is due to the spread of gossip. A "gossip" is one who "prates"; one who "tattles" and tells "idle tales"; he is a destroyer of character and WE MEN have stigmatized gossiping as a practice peculiarly characteristic of the feminine sex—yet I would wager almost every one attending the

convention has been guilty of gossiping. Recently we sent our salesmen a circular reading:

"Section 5 of the Act to create a Federal Trade Commission says: 'UNFAIR METHODS OF COMPETITION IN COMMERCE ARE HEREBY DECLARED UNLAWFUL.'

"Much mischief is done the coal industry by the 'peddling' of so-called misdemeanors of other companies or their salesmen.

"I believe part of the demoralization that actually occurs is the result of the 'loose talk' between competing salesmen—one telling the other of alleged cuts; that 'a certain salesman understood that another salesman had heard someone else had indulged in.'

"There are many men on the road selling coal. They meet frequently on trains, at stations, hotels and other places. The custom of talking 'business scandal,' 'coal gossip,' has grown. Much, and I believe most of the scandal, is wholly without foundation, but it circulates with all the semblance of truth.

"I am not aware that you ever take part in this. We not only discountenance this in our own men, but we wish to go further. Please make it a point to discourage with others the spread of such so-called information, on the ground that untrue statements come within the scope of Congressional Acts with respect to unfair trade methods. Where, unfortunately, there is some foundation, they are, I believe, isolated cases and will probably not continue unless perpetuated by similar acts of others.

"A salesman only damages the interest of his employer by spreading such tales. If he cares at all about the net earnings of his company, by what logic does he 'gossip'? If this company requires him to sell at list prices, how can he justify (to himself, even) spreading stories that make his own selling more difficult?

"We are not satisfied to be only passively interested in this reform. We wish to be actively aggressive. Leave no stone unturned to overcome this habit so productive of harm to employers, and so inane from the standpoint of the salesman."

And afterwards I sent a copy to each Colorado operator with the following letter:

"I enclose copy of letter Mr. Vaughn has sent to our salesmen. As it is a plain statement, it needs no explanation.

"Mr. Hurley told us last July his examination of the industries the country over convinced him the troubles were largely due to their own lack of business skill.

"As to who has been responsible for unfair methods—that is, 'who started it,' it would be difficult now to tell, but any one of us can be the pioneer in applying a remedy.

"I am sending a similar letter to all coal operators of Colorado to ask their co-operation in stopping practices of this kind.

"Please understand I do not charge any particular concern or any group, and I send this to no one to indicate that he has endorsed or forwarded the habit, for I believe much of this sort of thing is the result of our own neglect in permitting it to go on; but if each concern will instruct its selling department in similar fashion and require observance, we will be on the road toward fair trade methods and I hope you will co-operate in this particular move.

"I am telling nothing new. We all know what our troubles are and we all will make a brain-acknowledgment thereof, but this brain-knowledge has yet to become a part of our conscience. Many of us, and perhaps all, have attended camp meetings, revivals and the like. At these meetings a certain few become 'convicted.' Now when they were 'convicted' they acquired more than a brain-knowledge of their shortcomings. The drunkard knows for years that he is wrong, but he drinks on—until one day something happens and he quits drinking. He has been 'convicted.' It's all very

well to devise cost sheets—and I am a hearty believer in them—to entice, seduce, or otherwise convince a man that if he is to have profits he must sell above cost, but it all gets back to the first person, to the party of the first part; in other words, what am I doing? And these acts are not so bad, perhaps, if done by the man who owns the mine, but what of those who are hired by persons or corporations? What are they hired for? When you were hired, did your employer say, 'I have tried to get rid of my property; to wreck this business; but I'm too slow at it; I need help; now go to it; smash it; kick it; kill it; and do it rapidly'? No! If he had said such a thing you would have been afraid; afraid he couldn't pay you. Only clubs and fraternal associations have charters and by-laws that say, 'This association is not organized for profit.' If your company's charter does not say specifically it is for profit, somewhere it says 'and to do such other things as may be necessary and proper for the welfare of the company.'

What I am contending is that the most necessary thing now is thorough and honest conversion to the Gospel of Fair Profits. How to reach this end is immaterial, but until we all have the honest desire, methods and plans are futile.

In a plea for better methods of trade, I once heard a quaint old man say, "Let's try not to cut each other's throats; we will make some money and maybe after we have made a little we'll get to like it."

We have been fooling ourselves and in the general fight, who gets the benefit? The buyer! And do you know what he thinks? He thinks we are fools!

Very truly yours,

W. H. HUFF.

CHAIRMAN MODERWELL: I am unfortunate in not being acquainted with the next gentleman on the program. Is Mr. James E. McCoy of Knoxville, Tennessee, present?

MR. JAMES E. McCOY: Mr. Chairman and gentlemen: When Mr. Callbreath, your able Secretary, to my great surprise, notified me that I had been put on the program for a ten minutes' talk on some phase of the subject as introduced by Mr. Crews' paper on "Co-operation in the Marketing of Coal," my first impulse was to decline and ask by what authority this splendid body of representative business men should be punished by having to listen to me, especially when there are men here who have devoted many years to the general subject now under discussion, many of them men who are known and recognized as experts in the business. Instead of discussing any one of the different phases of the subject, I would be more greatly pleased to listen to the explanations and recommendations of those more experienced in the business.

The subject of co-operation is one of vast importance and I am least of all able to suggest or offer anything new on the subject. To my mind, Mr. Crews' paper suggests much more than co-operative selling, since he gives you a brief history of the Sherman or anti-trust law now governing or controlling industrial affairs.

May I not venture to touch briefly upon some of the fundamentals of co-operation? Before taking up in detail the possibilities, allow me to state what I consider to be fundamental requirements. They are as follows:

(a) We must have a co-operative mind; that is, a mind to co-operate plus confidence in our fellow men. Without these necessary attributes no plan devised by man can succeed.

(b) Our work must be intensive, being principally in the interest of its members.

(c) We must keep within the law.

Again, in order to successfully co-operate, we must have uniform cost accounting, uniform sales contract, uniform terms, etc. Judging from the public statements made by the Hon. Edward N. Hurley, chairman of the Federal Trade Commission, I feel safe in saying that a lack

of information pertaining to costs is largely responsible for the serious condition now obtaining in the coal industry. I am told that in Germany a coal operator or manufacturer can tell you to the last decimal point the exact cost of his production, whatever it may be. It is absolutely necessary for the coal operator to know the exact cost to produce a ton of coal before he can properly fix the price and hope to successfully operate his mine.

The advantages in a uniform sales contract, terms of settlement and so forth, are also obvious. To successfully market any product, the manufacturer or coal operator should know what the market conditions are. To that end association secretaries should compile from data furnished by its members at regular intervals statistics that will give them this information. Trade associations of all kinds, particularly those in the coal industry, should work together on freight rates, credits, abolition of trade abuses, etc.

The question of price is the keynote of all association work and everything an association does contributes to this end. Information as regards production, cost, freight rates, markets, labor conditions, etc., all have to do ultimately with the matter of price. Therefore, the crux of the matter is that all these activities tend to the stabilization of prices.

The coal people must think and act together in all matters of a common interest, first by districts or fields representing a community of interests, then as a whole, which means we should have a national coal association composed of the several associations with offices in Washington, D. C., with a secretary and a competent staff of helpers, able and capable of handling the larger problems growing out of legislation, both state and national, affecting the industry.

Honest, broad-minded men need not agree upon every phase of co-operative association work, as it is now practiced by the several coal associations in order to work and plan together, and I am sure I speak for all honest, forward-thinking coal operators in the southern Appalachian field when I say that they will gladly meet half-way any and all who are honestly striving to lift the coal industry to a higher and better level, placing it in its rightful position economically and otherwise. No operator, regardless of his ability, application or capital, can realize the full measure of success to which he is entitled unless the industry as a whole prospers. Prosperity as a whole is impossible without co-operation.

I thank you. (Applause.)

CHAIRMAN MODERWELL: My affections in the coal industry are primarily with Illinois, but I got my start in the coal business in West Virginia and I find a lingering affection for the state of West Virginia. In the days when I was selling West Virginia coal it was a case of dog eat dog and sometimes we both ate each other up. I understand that they have learned better down there now and that they are willing to see if they can't at least get cost out of their product. The next speaker is one who devoted a good part of his life to try to secure for the workingman in the coal industry a living wage, and while he is doing a little different work now, I think he is indirectly at least benefiting the men with whom he used to be associated. You all know him, Mr. Thomas L. Lewis, Charleston, West Virginia. (Applause.)

MR. THOMAS L. LEWIS: Mr. Chairman, I do not know why I have been called upon to explain a subject that probably I do not know a great deal about. The West Virginia operators, I presume, are very well known the country over, charged time and again with being the greatest price cutters in the coal industry. I desire to state that when they asked me to take charge of the work of a trade association fourteen months ago I was very skeptical of my ability to do any good in that state. I am not sure yet that our work is going to be a success, but if we are to judge by the work of our executive committee and

whatever I can do to carry out their plans, I think the charge of cheap coal from West Virginia is a matter of history.

You will pardon me if I relate a little of my experience along another line, but having a direct bearing on the work of all these trade associations.

Twenty years ago last spring the mine workers of the central competitive coal producing states were induced by the operators of those states to accept a sweeping reduction in wages, under the plea that times were hard, competition was so keen that it was impossible to sell coal and give the men an opportunity to earn any wages, much less a living wage. The mine workers at that time accepted in good faith the plea of the operators, but we discovered very shortly after that, after we had accepted a reduction in wages of fifteen and twenty cents per ton, the operators went out and gave all of that to the consumer and a little more, due entirely to the fact that the operators then—and you will pardon me if I talk plainly on this subject, because that is my weakness—that the operators then practiced methods that they did for several years after. Each of them surrounded himself with a veil of mystery, refusing to discuss with his neighbor operator anything about his business, but passing the word along to the salesmen, "Get the best price you can for the coal you are going to sell, but remember one thing, get that contract regardless of the price." That is the condition that has kept the coal mining industry of this country in a position where it is regarded, and it can be proven, notwithstanding the fact that it is the most important industry in the United States, to be the cheapest. It sacrifices more lives of human beings and nets a less return on investment than any other industry in the United States.

I realized those things when they asked me to take the secretaryship of the Splint and Gas Coal Association of West Virginia. I realized the jealousies that existed among the operators. I realized that that condition had to be broken down, and I also realized it was quite a task to harmonize the conflicting interests and get the operators to believe what we used to try to make the miners believe, what was good for all the operators must necessarily be good for each operator. And in that line of work we believe that our executive committee has been more than successful. I regard myself as only an individual carrying out their plans in so far as I know how.

We find that co-operation in the marketing of coal has for its object, from the standpoint at least of West Virginia, to prevent the reckless waste of the fuel resources of that state, to reduce the number of fatalities and accidents in the mines of that state, to make effective workmen's compensation laws and the application of those laws for the benefit of the mine workers of West Virginia. We believe what is true of that state is also true of the application of those objects to every other coal producing state in the country.

We find that the success of the movement will depend upon our ability to eliminate from the operator's mind the petty jealousies that have largely governed them in their business affairs in the past, to remove from their minds any prejudices they might have collectively or individually toward each other.

We believe that every operator must rise to the occasion and have absolute confidence in each other's integrity, honesty and a desire to do something for the general uplift of the coal mining industry. We believe also that it can be accomplished, but it will be necessary to appeal to the elevating thought in the human mind, not that element of human weakness which so many of us possess, the desire to do something to tear another man down.

We believe that it is necessary, as has been stated positively, clearly, and, I believe, in a convincing manner by the different gentlemen who have addressed this Congress, to have a uniform cost accounting system. The reason that I believe there is a necessity for the uniform cost accounting system is the fact that many operators actually believe

they can take their payrolls and make them show the total cost of production and sell coal from that standard, and delude themselves into the belief they are making money. In other words, if the cost of the labor in a mine amounts to one dollar a ton and they are selling coal for a dollar and five cents a ton they think they are making money. They have ignored the fact that they have invested a certain amount of money in the coal property, either by paying royalty on the leases or by paying a certain amount per acre on their original investment. They ignore the further item of expense required to build tipples, install machinery, etc., and many other items of expense which enter into the cost of production. There is a great work being done by the different trade associations, and especially by the Federal Trade Commission, in convincing the operating coal men of this country they know very little about what it actually costs to produce a ton of coal. There are corporations and there are firms who have very splendid cost accounting systems, yet they have discovered that in the opinion of the representatives of the Federal Government they have not included all of the items of expense that should be charged against producing coal. We find in this work, if we are to perfect it in all of its details, we should know what it costs to produce a ton of coal in order that we could lay the ground work for real conservation of the fuel resources of the United States.

We find also there is a necessity for the protection of the lives of the men in the mines. There is not any one in our country but who will favor, in fact, strongly advocate, having laws enacted to protect the miners who produce coal, and yet there has been so little said and done, until within the last year or two, to convey to the public mind that one of the real causes of the actual destruction of life in the mining industry is the continual clamor for cheap fuel. Once we convince the coal consuming public they are contributing to the enormous loss of life in the mining industry, we will discover that the coal consumer will be the quickest to lend assistance to the coal industry of this country to conserve human life. If for no other reason, we believe that the trade associations are accomplishing a splendid and a permanent good. We find that if the operators are expecting to have permanent success in the various trade movements now organized we must take the coal consuming public, which is the nation, into our confidence. We must throw our business wide open and show the consumer what it actually costs to produce a ton of coal, after every item of expense has been charged against the cost of production. I believe that it is necessary for the operators first to know themselves, and to know themselves they will have confidence in each other, and when they have more confidence in each other they will be able to present the cause of the evils afflicting the coal mining industry to every branch of business in the country, to every legislative body in the United States, to every governmental authority which is investigating the coal business and its methods, and will be able to convince the American people that the coal industry is not only the most important industry in this country, but that it has received very little consideration from the nation. If we will co-operate, if we will unite, if we will endeavor to understand each other, the moment we have accomplished those three things, then there will be no trouble in convincing the American people that the coal industry has been ignored, that it has been in one sense stultified, that it has been damaged almost irreparably, that there have been no returns on investment, that the miners have not received the standard of wages to which they are entitled, considering the danger of their occupation, and that the American people, if not directly, are indirectly responsible for this deplorable condition.

I want to say that we have every reason to be glad, we have every reason to be proud, we have every reason to be hopeful that the mining industry is finally coming into its own, and the more actively the different coal trade associations work to that end the quicker success will

crown all our efforts. All the coal industry requires is the same treatment other industries receive—justice.

I thank you. (Applause.)

MR. CARL J. FLETCHER: Mr. Chairman: On account of the fact that I represent probably the smallest group of operators that support any such association, I thought perhaps I would escape talking to you.

We have heard today a great deal about co-operation in the marketing of coal, and all these general policies are good. When our Knox County Association was formed, only six months ago, we had no trouble in outlining policies that were sound and good and which we all wanted to follow. The application of these policies to the individual is where we had the difficulty. The work at first was very slow, but during the six months we have progressed a little and have reached a point in co-operation where there is no danger that this association will ever be abandoned. I haven't anything to add to the policies which have been outlined by the preceding secretaries. I had an idea that perhaps some of the secretaries of the different associations would tell us more intimately what they are doing and what they have accomplished towards obtaining better co-operation.

I think it would be of interest to you to know some of the things we are trying to accomplish. We owe our life to the Franklin County plan. The operators in Knox County tried to organize under several other plans, but were not successful; in fact, three or four months were spent after they decided to form an association before the Franklin County plan was proposed and adopted.

Co-operation between the members of our association is the first and most important thing to be accomplished. We wanted voluntary co-operation; co-operation because it was the right thing to do, and because each member trusted his neighbor. We have not got it yet, but we have reached a point now where if one operator has a strike the other operators do not regard it as an opportunity to jump on him and take advantage of him. They realize that they may have a strike in their own mines at some time in the future, and that it is to their own best interest to help.

Since these different operators' associations have been formed—some 22 in number, representing different districts all over the country—it would appear that co-operation in the marketing of coal might mean that all the members of one group were co-operating in selling their coal against other associations working in the same way, instead of selling their coal as individuals. In our county we are all mining the same quality of coal, and it has similar characteristics. One of our purposes is to extend the market for Knox County coal. The amount of coal consumed is limited by conditions over which we have no control. Since the amount of coal is fixed, it might seem that if one group were more aggressive than another that they might extend their market at the expense of other associations. We desire to extend our market only as far as we are justified from an economic standpoint; in other words, only as far as it is best for the consumer, because that is the only basis that is permanent and, in a broad sense, advantageous to ourselves. In order to determine the extent of this zone we are studying our own product; the characteristics of it; the way it burns and the kind of equipment to which it is suited. This work may be peculiar to our association, but I was an engineer before taking up this work, which probably accounts for the fact that we are doing more along this line than the other associations.

We are certain that co-operation does not mean that it is good policy to go out and sell some other association off its feet where we do not have any market.

Our co-operation in selling has been carried on in other ways. We produce and sell various sizes of steam coal. Different members are not able to sell the sizes in the proportions produced. One operator

might have an opportunity to sell more screenings than he produced. He would sell them, and then he would spend the next month trying to catch one of his fellow members in a hole and tie him up to a contract.

Our co-operation has gone to such an extent that the members do not consider that it is good policy to sell coal which they cannot produce, which has a tendency to make the running time of the mines more even, and at the same time the costs for the different members more uniform.

I am not prepared to outline more of our policy, but it is the application of the policy to the individual that is the difficult thing, and the thing that will eventually save all of us.

CHAIRMAN MODERWELL: I neglected to say that Mr. Fletcher represents the Knox County, Indiana, Coal Operators' Association.

On account of the length of the program and the fact that time is passing, I am going to dispense with the discussion under the five-minute rule on this interesting subject. We have a number of very interesting things to come yet. The gentleman who was to have spoken first this afternoon, but who was not here at the beginning of the session, has now come into the room, and we will hear from Mr. S. A. Taylor, with his report from the Committee on Uniform Cost Accounting Systems. Mr. S. A. Taylor of Pittsburgh.

MR. S. A. TAYLOR: As I see before me today a number of faces who are probably not familiar with the appointment of this committee, I think it might be well to state that this committee was appointed as a result of a paper read by myself at one of the former meetings of the Mining Congress in Philadelphia, pertaining to the question of uniform reports; and in connection with the uniform reports we found out, after the committee was appointed, that the most important one was that of uniform accounting. Subsequently, therefore, the committee was changed to that of Uniform Accounting and Reports.

REPORT OF COMMITTEE ON UNIFORM COST ACCOUNTING AND REPORTS.

To the American Mining Congress.

Gentlemen: Your committee has labored, more or less assiduously, for several years in an endeavor to secure something definite in connection with the purpose of their appointment.

Our efforts, after an attempt to get associations of operators interested, were mainly devoted to the matter of getting the Federal Trade Commission to authorize or recommend a uniform system of accounting, believing that if they could get this accomplished it would go a long way toward the accomplishment of uniform reports. We made several attempts to interest the Federal Trade Commission in the matter, and for some time it seemed as though our efforts were futile; but, whether or not it was our continued efforts in this direction, the fact is that much has been accomplished through and with Mr. Hurley, the chairman of the Federal Trade Commission, and the work of the Franklin County Association of Illinois coal operators, who took up the work on a somewhat larger and broader scope, which has been the means of accomplishing more than your committee were able to do, acting as a committee.

The work of the Franklin County Association has been so successful that we understand there are now, either formed or in the process of forming, some nineteen or twenty other associations working along practically the same lines.

In addition to the above form of co-operation, the Splint and Gas Coal Association of Coal Operators of West Virginia have labored along somewhat similar lines, through an able committee composed of Messrs. W. M. Puckett, Wm. S. Ord and C. H. Jenkins. This committee has spent a great deal of time on the mat-

ter of a uniform system of accounting for coal mines, a copy of which is hereto attached and made part of this report by permission of the committee as a matter worthy of close scrutiny by members of the Congress.

At the present time it seems an assured fact that the first phase of your committee's work will be satisfactorily solved by the establishing of a uniform system of cost accounting; if not for the entire coal producing country, at least a uniform system for large districts, and may in the end result, through the present help now being extended by the Federal Trade Commission, in a uniform system for all coal companies. When this is an accomplished fact we believe the remainder of the work of your committee will be comparatively easy, for as soon as a uniform system of accounting has been secured we believe the securing of national and state co-operation toward a uniform method of reporting will follow without any such great objection as had to be overcome to get the uniform accounting scheme under way. In fact, several officers of the national and some state officials have stated to members of your committee that they are in hearty accord with this work, and realizing as they do the advantages that would accrue to the various departments of government which have to do with compiling and comparing statistics from different districts and states, which now are far from uniform, we believe we can count on the assistance of all such officials. We wish also to say that some of the associations of coal operators which have been formed, and which are now being formed, have as one of their fundamental purposes the co-operation with national and state officials, to the end that this very thing may be accomplished.

SWAN SONG.

In this connection we wish to state that the work of this committee has now reached a stage where, like some other committees of the Congress in the past, they have to some extent done the pioneer work and are about through with the work assigned them, not because they have been able to accomplish the desired end themselves, but in a roundabout way have gotten sufficient interest awakened in the subject through channels outside of the Congress as to carry the matter to a successful conclusion, and that about all that remains for your committee to do is to make a summary of the work during the coming year and possibly work up a report on the work done by these various organizations, after we see how they are handling the same, for approval by the Congress.

Respectfully submitted,

S. A. TAYLOR,
E. T. BENT,
J. C. M'KINLEY,
Committee.

MR. F. S. LANDSTREET, Chairman,
Executive Committee Splint & Gas Coal Association,
Bankers Trust Building, New York City.

DEAR SIR:—

Your Committee appointed to draft a Uniform Cost Sheet has experienced considerable difficulty in arriving at conclusions which would be practical for all operations large and small alike. In order to approximate true cost, accounting methods must be standardized. The object of colliery accounting is to preserve a complete and accessible record of every financial transaction, which will so locate and classify those transactions that the cost of every important item making up the plant will be accurately shown, and the cost of the product accurately ascertained.

Your Committee recommends five general classes of Accounts, as follows:—

Financial
Real Estate
Improvement
Equipment

While we are directly concerned with the Operating Accounts only, we will briefly enumerate what we mean by each one of these classes, since they

Operating

are all interdependent and must work out together.

FINANCIAL ACCOUNTS are intended to cover the fundamental accounts of the company:—

Capital
 Funded Debt
 Sinking Fund
 Accruing Sinking Fund.
 Sinking Fund Trustee
 Surplus
 Bills Payable
 Bills Receivable
 Investments
 Cash
 Accounts Payable
 Accounts Receivable
 Profit and Loss

The first two accounts need no comment. They provide for the securities issued by the company.

The next three accounts, referring to possible Sinking Funds, require some explanation. Your Committee finds Sinking Fund Accounts treated by coal operators in various manners. It should be remembered that while sinking fund is payable out of earnings, it does not in any way affect the amount of the earnings, the profit or the loss. It simply is a provision for the payment or retirement of a previously incurred obligation. A Sinking Fund generally requires the setting aside regularly of a certain sum per ton of output. It seems to be generally payable at some specified time, but the date of payment is generally several months after the period for which that particular accounting is rendered. The accounts should show accurately the accumulating of this Sinking Fund. They should also show the balance of the Sinking Fund, if any, in the hands of the Trustee from time to time. No matter what the terms of payment are, the Accruing Sinking Fund should be credited monthly with the Sinking Fund earned during the month and Sinking Fund should be debited. These accounts will always balance one another and are merely introduced for purposes of record. When the period during which any installment of Sinking Fund is completed, Sinking Fund should be credited and Accruing Sinking Fund should be debited. When payment to the Trustee is made the Trustee must be charged with the funds sent and Cash, of course, must be credited. When the Trustee purchases bonds and these are cancelled he should receive credit for the actual amount expended by him in the purchase of the obligations, whether purchased at, above, or below par value. The Funded Debt Account should be debited with the face value of the obligations returned to the company, and Profit and Loss should be debited or credited with the difference between the price paid and the face value of the securities according to whether they have been retired above or below par value. In this manner the Trustee Account shows at all times any unexpended balance in his hands, and the Sinking Fund and Accruing Sinking Fund Accounts show the accumulation for the current term.

Your Committee, realizing that financing is frequently accomplished by the sale of securities at less than their face value, suggests that where this is done the difference between the face value of the obligation and the amount received for it is a proper charge against the property purchased with the proceeds of the obligation, or against any improvements constructed out of them.

The Surplus represents undistributed earnings, and, added to the capital account, gives the book value of the property.

The other accounts in this class require no comment whatever.

REAL ESTATE. This account should show the value of all real estate owned, whether that real estate has been paid for in cash, stock, notes or other evidences of indebtedness.

IMPROVEMENT ACCOUNTS should include an account for each item of permanent improvement, such as houses, store buildings, railroad tracks, railroad bridges, tipples, tram roads, mine openings, etc., and upon exhaustion of the coal are subject to no salvage. The value of these items, therefore, varies from time to time with the amount of coal which can be won during their service or life. Any repairs to these improvements must be charged currently to the corresponding operating accounts: repairs to houses to Rent Account, repairs to tipples, tracks, sidings, etc., to Coal Account.

EQUIPMENT ACCOUNTS are intended to cover that class of items from which at the exhaustion of the coal there may be some salvage. These accounts should be inventoried periodically and are all subject to varying rates of depreciation. The depreciation on these equipment accounts is chargeable to the corresponding operating account. The necessary Equipment Accounts seem to be as follows:

Machinery, will include such items as locomotives, mining machines, pumps, fans, etc., but should not include any machinery for generating power or any machinery in a Machine Shop. These items will be later taken care of.

Mine Equipment, will include mine cars and all the tools used in the mines.

Steel Rails, will include only steel rails, frogs and switches.
Copper Wire, will include only that character of copper which could be removed and would be of salable value. Small sizes of wire have practically no salvage value and should be charged direct to operating accounts.

Stable Equipment, will include all live stock, wagons, carts, harness, etc.

Power House Equipment, will include everything used in the production of power, and the depreciation upon this equipment is a proper charge to Power.

Shop Equipment, will include all the machinery and tools used in the repair shop, whether the same be simply a forge and anvil or elaborate equipment consisting of lathes, shapers, planers, etc.

Recreation Equipment. Your Committee has included this Account on account of the fact that some companies have provided Moving Picture Houses, Play Grounds, Y. M. C. A. buildings, etc. All of these things must be considered from a business point of view in their cost, and the expense incident to their operation must ultimately be accounted for in the cost of the product, provided they are not self-sustaining.

The other Equipment Accounts seem to indicate by their names just the character of equipment they are intended to cover.

This brings us to the last and most important division—

OPERATING ACCOUNTS—Conditions vary greatly at different coal plants, and your Committee feels that the best way to meet these conditions is to treat such account as a separate and individual department. We will subdivide these Operating Accounts into Main Operating Accounts and Auxiliary Operating Accounts. The Main Operating Accounts are those from which earnings are directly derived. They are, as generally used, seven in number, as follows:

- Coal
- Coke
- Merchandise
- Rent
- Powder
- Commissions
- Interest and Discount

The Auxiliary Accounts cover those departments which are not readily assignable to any particular one of the operating accounts but really render service to more than one and perhaps even in many cases to outside interests altogether. These Auxiliary Accounts we will carry as independent departments and they should carry charge accounts with each one of the Main Operating Accounts.

Power is one of these accounts. Every operator should know what his consumption of power is and what his power is costing per K. W. hour. The total cost of the power produced should be distributed monthly by crediting Power Account and debiting the various operating accounts deriving benefit from it. It is perhaps impractical at most places to measure the power used by the different accounts. The Committee recommends that this distribution be made to Coal, Coke and Rent Account, for lights, etc., on the basis of installed motor and light horse power.

Stable Operation Account should be charged with all feed and supplies purchased, with time of stablemen, and depreciation upon live stock, wagons, harness, etc. Time of all teams should be kept and charged to the proper operating accounts at a rate sufficient to cover all cost of service. Stable Operation receiving credit for same. Coal Account should be charged with a fixed sum per month for each mule used in the mines. This should be sufficient to cover cost of feeding, depreciation and allowance for loss of mules. At the end of the year there will be some balance one way or the other in this Account, and this balance should be adjusted in proportion to the amount which the principal earnings accounts have contributed towards Stable Operation credit throughout the year.

Repair Shop. Your Committee has had a good deal of trouble in arriving at a fair method of handling this account. Repair Shops vary from small Blacksmith Shops to elaborately equipped Machine and Car Shops, but it has concluded that the same method should be adopted with respect to this that has been applied to other similar accounts; that is, it should be treated as an independent department, receiving credit for work done and material used and the proper operating accounts should be debited. Any balance at the end of the year should be handled as outlined in the Stable Operation Account. Where one small Blacksmith Shop is operated the same result might be obtained by charging all time and material direct to the operating accounts.

A Material & Supply Account is necessary and all material should be charged out upon orders issued by department foremen at an advance over cost sufficient to pay the expense of running the department. Any balance at the end of the year should be adjusted as in other accounts.

Accrued Taxes. Coal, Coke, Merchandise and Rent should be charged monthly with an amount estimated to be sufficient to cover one-tenth of all taxes, corporation, state, excise, personal and property, and Accruing Taxes should be credited with this amount. When the actual tax tickets are received the necessary adjustments can be made.

Insurance should be charged monthly to the proper earning accounts. Unearned Insurance should be inventoried at the end of the fiscal year. Insurance upon houses should be charged to Rent Account, upon Tipples, Mine Buildings, etc., to Coal, upon Store Buildings to Merchandise, upon Office Building to General Expense Account.

Workmen's Compensation premiums should be currently charged as paid to the appropriate operating accounts.

Boarding houses should be self-sustaining, but in the event of loss it should be charged to the cost of product.

Labor Transportation is likewise a current charge to the operating account for which the labor was imported.

Where land is leased, Coal and Coke will be debited with all royalty paid.

Interest and Discount. The Committee has considered very fully the propriety and justice of charging the main earning accounts with interest upon the total capital invested in the business. There are many plants in the State built largely on borrowed money, and some altogether. In such cases it seems clear that the interest paid is a proper charge against the product. This being the case, if uniformity is to be obtained, it seems logical that all should charge coal and coke with a reasonable rate of interest upon the capital and surplus tied up in the business. The general result then would show the profit derived from operation in excess of what the money would have brought invested in ordinary channels. Your Committee recommends 6 per cent for this rate.

This account should receive credit for all interest charged to the operating accounts for the use of capital and surplus, less investments, and for all discounts, and should be charged with any interest paid. It is from this that the charge of interest to the product does not affect the total net earnings. It simply transfers the amount so paid from one account to another, and, if adopted, results in a uniform cost method, whether the capital be borrowed or not.

Depletion or Amortization. A reserve for depletion or amortization should be provided, which shall be credited monthly with a sum equal to that proportion of the total value of all permanent improvements not subject to material salvage at exhaustion of property, and the product charged with a corresponding amount, which the coal mined during the month bears to the total available coal at the beginning of the month. This reserve may be carried until exhaustion of property, or may be written off against improvements from time to time at will of individual. Of course, current repairs, of whatever magnitude, throughout the year should be charged direct to the main operating accounts, and these repairs contemplate the maintenance of the property in service until its exhaustion.

Obsolescence. The Committee further recommends that coal and coke be charged currently with an amount sufficient to replace any machinery, equipment or improvement which may become obsolete. Obsolescence reserve to be credited. Any replacements made on account of obsolescence will be debited to this account, and the Committee recommends one cent per ton for this purpose.

Depreciation. A depreciation reserve account should be carried from month to month. Depreciation should be charged to Coal and Coke, and this account credited monthly. The aggregate of this monthly charge per ton should be sufficient to balance the actual depreciation found upon closing the books at the end of the year. The Committee does not feel competent to advise the rates at which depreciation should be charged upon the various items constituting the Equipment Accounts. These will largely have to be determined by individual experience. It submits, however, for consideration its opinion as to what the rate of depreciation should be on a few items, as follows: Boilers 10 per cent, Engines and Generators 7½ per cent, steel rails and copper wire 5 per cent, mine locomotives 10 per cent, mining machines 15 per cent, steel mine cars 10 per cent, wooden mine cars 5 per cent. The wooden cars are subject to less depreciation because they are being continually renewed.

The Committee further recommends that, for the sake of uniformity, and for the purpose of comparison with market quotations, a fixed sum per ton be charged to coal and coke to cover selling expense. Where the operator is selling through an agency, this amount is readily determined. Where the Selling Department is a branch of the general organization, it should be credited with a similar commission and the product charged. This may seem like a hardship, but it seems desirable for uniformity, and, even if it demonstrates that the Selling Department is the money maker, that fact should be determined. This leaves only one important account untouched.

Expense Account. This account is intended to cover all items of a general nature, office expenses, postage, traveling expenses, salaries of officers, etc., and should be distributed monthly. Only an arbitrary basis can be suggested for this, and your Committee suggests that it be distributed amongst the principal earning accounts in proportion to the monthly charge to each one of these accounts.

Your Committee believes, after very full consideration, that such a system of accounting as outlined above would get as close as it is possible to get to the true and actual cost of coal and coke, and it believes that a

system of this kind will demonstrate conclusively that very little coal is mined in West Virginia at a profit.

Respectfully submitted,

W. M. PUCKETT,
WILLIAM S. ORD,
C. H. JENKINS, Committee.

That is the swan song of the committee. (Applause.)

I wish to state, however, briefly in connection with the report of the Splint and Gas Coal Association, for the benefit of those who have not had a copy of the report and probably will not see it in print for some time, that it is a very commendable report. It is made to the chairman of the Executive Committee of the Splint and Gas Coal Association of West Virginia, of which Mr. Lewis is the secretary.

They have subdivided their accounting into five principal accounts, financial, real estate, improvement, equipment and operating accounts. Under the first head of financial accounts they are intending to cover the fundamental accounts of any operating company, and are briefly as follows: Capital, funded debt, sinking fund, accruing sinking fund, sinking fund trustee, surplus, bills payable, bills receivable, investments, cash, accounts payable, accounts receivable and profit and loss.

There is a good deal in this report which I will not take the time to read at the present time, but that will give you an idea of what it is.

The second account of real estate embraces or should show the value of all real estate owned, whether that real estate has been paid for in cash, stock, notes or other evidences of indebtedness.

The third, or the improvement, account is intended to show and include an account for each item of permanent improvement, such as houses, store buildings, railroad tracks, railroad bridges, tipples, tram-roads, mine openings, and any repairs to those buildings, rent account, etc.

The next is their equipment account, and that is intended to cover that class of items from which at the exhaustion of the coal there may be some salvage. These accounts should be inventoried periodically, and are all subject to varying rates of depreciation. The depreciation on these accounts is chargeable to the corresponding operating account. The equipment accounts cover the following: Machinery, stable equipment, power house equipment, shop equipment, mine equipment, copper wires, rails and all other incidental equipment accounts that might be brought into your general account.

The next, and probably one of the methods of accounting which is least stable, is the operating account, and this is taken to cover in the main all accounts and auxiliary operating accounts, such as coal, coke, merchandise, rent, powder, commissions, interest and discounts. These are subdivided in this report in accordance with other things.

The one thing that I think ought to be brought out particularly clear here is in reference to the depletion or amortization account. We find that generally, in fact, very frequently, few operators pay any attention to their amortization account or depletion account.

Another is the obsolescence. The committee here further recommends that coal and coke be charged concurrently with an amount sufficient to replace any machinery, equipment or improvement that may become obsolete. Obsolescence reserve is to be credited. Any replacements made on account of obsolescence will be debited to this account, and the committee recommends one per cent per ton for this purpose.

Another of very great importance, I think, is the depreciation account. I will read the total of their suggestion on depreciation: "A depreciation reserve account should be carried from month to month. Depreciation should be charged to coal and coke, and this account credited monthly. The aggregate of this monthly charge per ton should be sufficient to balance the actual depreciation found upon closing the books at the end of the year. The committee does not feel competent to advise the rates at which depreciation should be charged upon the

various items constituting the equipment account. These will largely have to be determined by individual experience. It submits, however, for consideration its opinion as to what the rate of depreciation should be on a few items, as follows," and this account I thought you ought to hear, and probably it would be well to discuss, if you cared to, this point as to what the rates of depreciation should be. It gives a few items here, as follows: "Boilers, 10 per cent; engines and generators, 7½ per cent; steel rails and copper wire, 5 per cent; mine locomotives, 10 per cent; mining machines, 15 per cent; steel mine cars, 10 per cent; wooden mine cars, 5 per cent. The wooden cars are subject to less depreciation because they are being constantly renewed."

That is all I have to say. I thank you. (Applause.)

CHAIRMAN MODERWELL: You have heard the report of the committee. What is your pleasure with regard to it?

MR. T. L. LEWIS: I move that the report of the committee be accepted and placed on file.

DR. F. C. HONNOLD: I second the motion.

Upon the motion being put by the chairman it was declared carried.

CHAIRMAN MODERWELL: Mr. Lewis, have you a report for the Committee on Workmen's Compensation?

MR. T. L. LEWIS (West Virginia): Mr. Chairman, I regret to state that we were unable to get the committee together in order to prepare a report. We realized the importance of workmen's compensation, and, not having the views of the members of the committee, and being unable to get together to prepare a report on the subject, I was unwilling myself to prepare an individual report for fear it might be construed as being my idea. Consequently we haven't any report to submit on that question.

CHAIRMAN MODERWELL: Gentlemen, we are to have the opportunity now to hear an address on "The Cost of Coal" by Director George Otis Smith of the U. S. Geological Survey of Washington. (Applause.)

DR. GEORGE OTIS SMITH: Mr. Chairman and gentlemen, I feel that I am coming here this afternoon, somewhat under false pretenses. I have prepared an expression of opinion and also a presentation of some facts on the subject addressed really to the consumer, to the consuming public. I did not expect to have before me so representative a body of operators; but I, of course, did not intend to say anything to the consumer that I am not willing to say to the operator. However, I think that you will see that some of the things I say are not at all new to you, and as I have heard the other speakers this afternoon I realize that many of the things that I am to say have already been said. To me that is a gain, because that fact leads me to believe a little in some of these things because you have already stated them.

Dr. Smith's paper will be found on page 452 of this report.

CHAIRMAN MODERWELL: The chair will hazard the remark that for a spectator the speaker has a remarkable familiarity with the subject.

I want to call your attention again to the smoker. The tickets to the smoker are yours for the asking, if you will only ask for them as you go out of this room. The smoker begins at 8 o'clock, instead of at 6:30, as originally announced.

The meeting is adjourned.

COAL SECTION.

Wednesday, November 15, 1916.

Afternoon Session.

Dr. I. C. White of Morgantown, West Virginia, presided as chairman and called the meeting to order at 2:30 p. m. Mr. Alexander Blair, Jr., acted as secretary.

CHAIRMAN WHITE: The meeting will come to order. I understand the Committee on Uniform Legislation and the Resolutions Committee have largely to do with coal matters. Those committees are in session, so that our numbers will be small, but the time is passing and we might as well get started. The author of the first paper, Mr. J. W. Paul, is absent, but he has sent in his paper, which is on "The Duties of Mine Inspectors." This will be read by the secretary, Mr. Blair.

Mr. Paul's paper will be found on page 433 of this report.

CHAIRMAN WHITE: You have heard the paper. Are there any remarks? If not, we will pass to the next paper, "What Becomes of the Benefits of Production Efficiency?", by Mr. George H. Cushing of Chicago, Illinois.

MR. CUSHING: Mr. Chairman, I am sorry this paper was not prepared in time to be distributed in printed form, so that I could follow the rule of the organization, which is to read it by title and give the author five minutes to explain.

Mr. Cushing's paper will be found on page 465 of this report.

Dr. White's presence was required in the Oil Section at this point, and Mr. E. W. Parker presided in Dr. White's absence during the remainder of the meeting.

CHAIRMAN PARKER: The chair regrets that there are three other sections of the Congress that are in session this afternoon. I think it would have been a good idea for all of the members of the Congress to have heard some of the plain truths that have been enunciated by Mr. Cushing in his very interesting paper. The holding of these different sections divides our attention very uncomfortably. I know that the chairman, Dr. White, would like to have been here, but Dr. White had to go to the Oil Section. Mr. Cushing's paper is now open for discussion and the chair would like to hear from any gentleman who has something to offer or any remarks to make in regard to the paper. Is there any gentleman here who has some question to ask Mr. Cushing?

MR. W. W. RISDON (New Mexico): Mr. Chairman, in order that Mr. Cushing may not feel that we are disinterested, it seems to me that his remarks are so patent, so clear, so conclusively the truth, that it leaves no room for discussion.

CHAIRMAN PARKER: If there is no further discussion, we will proceed to the reading of the other papers. I am informed by the secretary that neither Mr. Puterbaugh nor Mr. Harry N. Taylor is present.

The next item on the program is an open discussion on "The Closed Shop and the Check-Off as Related to Efficiency in Mining Operations." There is no one assigned to open that discussion. There ought to be some gentlemen from Illinois or Indiana or Iowa or Arkansas, and particularly from Oklahoma, who have had some experience with the closed shop. We would like to have the discussion opened by some member from one of those states.

MR. T. H. O'BRIEN (New Mexico): Mr. Chairman, I think our president, Mr. Scholz, ought to be able to give us some information along that line.

CHAIRMAN PARKER: Mr. O'Brien's suggestion is a very good one. Mr. Scholz, you are familiar with this situation; come up and start the argument.

PRESIDENT SCHOLZ: Mr. Chairman, I had not expected to be called upon and I do not think that I can respond, but since I hear no one else will open the discussion, and as I have been called for, I will have just a few words to say.

I think it is well understood that the coal mining industry is the only industry which collects union dues for the members of the union organization, for the purpose of being shot at with the same ammunition that they supply. That, in short, is my observation of the check-off.

It has become such a fixed condition that the coal mine operators do it unconsciously, just as they breathe unconsciously. That, in my mind, does not detract from the viciousness of the abuse. Some of my colleagues will not agree with me when I say that check-off is a bad thing. I think the value of an organization should be made so apparent that every member would not only be willing but would gladly contribute to the maintenance of the organization. But I do not think that the miners' union should insist on the collection of the check-off through the employers. Therefore, I think the principle is wrong, and whatever is wrong in principle cannot be of much benefit to the members belonging to such an organization. The miners' organization has been very arbitrary in the collection of the check-off, and the coal company that would not meet the check-off on the days when the dues are to be paid would find the mine closed down. That brings us to the natural conclusion that the miners' organization absolutely depends on the coal operators to keep them alive.

I hope this will start the argument. I think there are other men here who have had more experience than I have had with the check-off system, and I trust that they will give us their views regarding this matter. I only hope that some day the miners' union will see the situation in the right light and will depart from this custom and will depend upon the payment of its dues by its members the same way that every other organization depends upon the payment of its dues. As I say, I think it is wrong in principle, and whatever is wrong in principle cannot very long obtain.

CHAIRMAN PARKER: Mr. Scholz, what has been your experience in regard to its effect upon the efficiency of the miner?

PRESIDENT SCHOLZ: I do not know that you could very well connect the collection of the check-off with the efficiency of the miner, excepting that its effect is to make a man feel that if he pays something into an institution he must get something in return. The fact that we work under a closed shop makes that man think that he can call upon the organization whenever he wants to and under whatever conditions to back him up. The men become more arbitrary and care to subject themselves less to the rule of reason because they have the rule of might and power behind them. In that sense of the word I think the check-off has worked to the detriment of the coal mining industry. I want to say that it does not apply in all cases, but unfortunately it is true in a great many.

CHAIRMAN PARKER: Mr. O'Brien, do you have a check-off in New Mexico?

MR. T. H. O'BRIEN (New Mexico): That is not in force in the West at all.

CHAIRMAN PARKER: Any further remarks? There must be some gentleman here from some of the other states where the check-off is in effect.

PRESIDENT SCHÖLZ: I might give you some figures of the amount of the check-off. I made a compilation last year, taking a number of the leading companies in practically all of the states where the check-off was collected, and I found that the average man paid into the funds of the organization, both international and state, money amounting to about thirty dollars per capita.

MR. CUSHING: Mr. Dering, won't you kindly relate your experience with the check-off in Indiana?

MR. J. K. DERING: Mr. Chairman, Mr. Cushing and Mr. Snyder are both better posted on a certain case than I am, on a case in Indiana, although they ask that I tell something about it.

The Vandalia Coal Company in Indiana had a mine which they considered very dangerous on account of the gas, and they looked into the subject of electric lamps and found a lamp which they thought was

practical to use in this mine. As I understand the proposition, they took it before the mine inspectors of Indiana and they approved of the introduction of electric lamps into this mine. They went before the Compensation Board and the Compensation Board not only approved the electric lamps, but went so far as to say that if men were injured in this mine with an open lamp they would have no case before the Compensation Board. In the face of all these arguments, and with the sanction of these two boards, a strike was ordered at this mine, and after many weeks of contention the miners ordered out the men of all the mines of the Vandalia Company and associated companies, some nine mines, wasn't it?

MR. W. J. SNYDER: Yes.

MR. J. K. DERING: And according to the rules of the national organization President White would not interfere, said he could not interfere until it was a state-wide proposition. Mr. Ogle, the president of that company, in my judgment, was in the right in sticking to his original plan to put electric lights in that mine or giving up its operation, because I believe that if he had undertaken to operate it in the face of all of these statements, and all the facts, and if he allowed the men to go in and work with the open lights, and the men were killed, he would be guilty of manslaughter. That is my personal opinion.

The miners started to increase their check-off in Indiana to take care of this suspension and succeeded, as I understand, in increasing the check-off during one month. The operators tried to stop it, tried to limit the check-off to what it had formerly been, just for miners' dues, and were brought right up against a shutdown of the entire state. By compromising and making a check-off for a month for the additional amount they got out of this hole, but it was a very narrow escape, and it was to my mind a very embarrassing one. I am ashamed to say that my company was a party to permitting the miners to collect additional dues to fight one of my own neighbors. But that is what we were up against within the last three or four weeks.

Mr. Snyder is an operator in that deal, and perhaps there is more to the story than I have told you.

CHAIRMAN PARKER: We would be very glad to hear from Mr. Snyder.

MR. W. J. SNYDER (Indiana): It resulted in the Vandalia Company making a terrific sacrifice by abandoning that mine in order that the entire state might avoid being tied up. Talk about efficiency, it was certainly efficient on the part of the miners. They had us all going. Their usual check-off is nominal. They asked fifty cents per week per man, or two dollars practically for a month, in addition to their regular check-off, which two dollars a month, or fifty cents per week per man, was to sustain the striking miners of the Vandalia Coal Company. That is the way the check-off works. Mr. Scholz has very aptly suggested that we do it very much like we breathe. I think that the broad-minded miners ought to see it the way Mr. Scholz presented it, but I do not believe they ever will, because that is their best and most powerful club. The reason I asked Mr. Dering to mention it in this connection was to show the efficiency on the miners' part, and wherever it prevails it will always be worked that way. It gives them a club with which to accomplish their ends.

Like Mr. Scholz, I have always felt that any organization ought to be large enough to raise its own funds to sustain itself without calling upon some one else to do it for them. In Indiana we very recently had this very vital case, the closing down of all the mines of one company because of the condition of which Mr. Dering spoke, and in spite of the fact that the operator was striving to safeguard the miners. We have been talking a great deal about safety for the miner. The miner does not want safety. I am speaking in a general way. I know that

there are miners who do. We have had a hard time along that line ourselves lately.

We tried to introduce explosives that are regarded and have been demonstrated in some states as being much safer than others, but they resisted. I have been thinking a great deal as to how we can educate the miner to honest, intelligent co-operation along safety lines, but the case cited by Mr. Dering brought out the fact that one company was striving to safeguard its men through a method sanctioned by the state officers and by the Compensation Board, and yet that mine was put under strike because the company was trying to safeguard its men. They struck on that account. Then they put on their check-off and most of us met it, practically all. I suppose if it had gone on they would keep making it, or the men would have gone on a strike. In order to avoid that, the Vandalia Coal Company, seeing the condition in the state, sacrificed itself by abandoning that mine, and it was the best mine they had.

PRESIDENT SCHOLZ: Mr. Chairman, if I might be permitted to add just one statement to what I said, I would like to say that since I have taken my seat I notice in this room a man who is very well versed in the mining industry of the state of Iowa, Senator Clarkson, a man who has taken a great interest in the welfare of the miners of Iowa by being the most active in the passage of the workmen's compensation law. We have had differences with him as to what we should do, but we always believed that those differences were honest on his side and honest on our side. But we operate a mine in Iowa, and for his information on the subject, principally on the workmen's compensation law, I want to cite an incident that occurred two years ago, at which time I was general manager of a group of mines located at Melcher. I happened to be visiting one of our places, accompanied by one of our superintendents, the mine foreman and the district mine inspector. This miner had been piling his slack behind him for quite a ways from the face and we had to crawl over the pile to get to the working face. I found he was charging his hole with powder by the use of a charger. The charger is a hollow cylinder. The top is partly open, into which the powder is poured from the keg. He was pouring the powder into the charger. Several charges of powder of that kind are used to complete the charge. This man had on his cap a carbide lamp. While he was pouring powder out of the keg more or less dust, of course, rose, and I promptly grabbed his lamp and took it out of his cap. I said, "For goodness' sake, don't run this risk. If you do not want to protect yourself, I don't want to be burned in this hole." He looked at me with more or less surprise and said, "What's it to you?" I said, "I am speaking for myself when I am here. I am here in an official capacity, on an official visit. Besides, this is a violation of this company's rules. You have got to carry them out. I am the general manager. You have got to recognize my authority." He said some unpleasant things, but finally quit. I simply waited to see what the next step would be, and finally he took the coal dust and commenced tamping his hole with it. I said, "Stop. If you do this once more you will be fired." He said, "If I am discharged, the whole mine goes on a strike." I said, "All right, out you go." I insisted on his being discharged, but the mining foreman interceded for him, and upon his promise not to do it again he was reinstated.

Now, his entire position was based on the fact that he was supported by his local organization. That brings us right back to the conclusion that the check-off is the root of the evil, and I think it is very, very undesirable and detrimental to the coal mining industry, and one which I hope we will be able to cure at some time or other. I do not agree with Mr. Snyder that it can't be done. By appealing to the union, that they depend upon themselves for the collection of their dues rather than looking to us, so as to enable us to establish better discipline, and we will have less of this thing where a man thinks that he can deliberately

violate a rule which is established for his own protection because the check-off is going to back him up.

MR. DERING: May I ask a question, Mr. Scholz?

PRESIDENT SCHOLZ: Yes, sir.

MR. DERING: Suppose at the next meeting when we have to settle the mining scale that the operators take a firm stand that they will not recognize the check-off, would not check-off for the miners, how long would our mines lie idle before the men would submit to it?

PRESIDENT SCHOLZ: If you would ask me if it would snow on the 25th day of December or not snow, and I could definitely answer you; in other words, if I were a prophet I might be able to answer that question correctly. I think it might be a long time, although I have talked to a great many men, a great many miners, in my business career of some twenty-five years, fifteen years' experience with organized labor and ten years' experience with labor that was not organized. I have made it a point, one that I have employed with profit, to get very close to our miners. I can call a great number of my men by their first names and slap them on the back and ask, "John, how are things going?" and what he is doing, and sometimes he will get confidential with me, and it has been the expression of a great many of these men that they are not in favor of the check-off as now in force. When these men are put up in a row in the presence of their officials I know very well that their answer would not be the same as it was to me when I asked them confidentially. I had that experience only two weeks ago. Our miners, in answer to a question as to whether or not they would strike, which question was asked by us, said they would not strike over Clause 4 in the agreement, but when a call went out for a strike they struck just the same. No one wanted to carry the name of scab. The word scab is a black mark against a miner, to avoid which he is willing to sacrifice his home. He will move to Colorado and work in a non-union district, supplying coal to the territory otherwise furnished by the union miners. He will do that rather than be a scab in the union territory. This is a condition and not a theory upon which they work. I think if the men were called upon to step out rather than surrender the check-off that they would stay out for a very long time.

CHAIRMAN PARKER: We have had a great deal of pleasure in listening to Senator Clarkson on Monday. I think we will be equally glad to hear from him now in response to Mr. Scholz' invitation.

SENATOR JOHN T. CLARKSON (Iowa): Mr. Chairman, before I speak upon this very important subject I feel that you will pardon me if I say that I have enjoyed every moment of my time here at this gathering. This is my first experience attending a mining congress and I have been very much interested in every phase of the meeting which I have been enabled to attend, and this particular phase, which is merely one of the sidelights that goes into the whole ramification of the innumerable complications that we meet in industrial affairs, is indeed very interesting, and I think that I have some reasonably well-fixed ideas upon the matter and bottomed upon actual experience. If it were purely a theory, and a theory only, I could most heartily agree with my brother Mr. Scholz, with reference to the abstract principle of fealty to an organization to collect dues and assessments by voluntary contribution, but from actual and practical experience I am unable to agree with him. But I am not unmindful of some of the unpleasant things that arise from labor organizations.

The ultimate question is one of unions, for, after all, that is what it amounts to, and check-off is merely incidental. If we once admit that we want unionism for collective bargaining by an organization of miners or any other industry, then it becomes necessary to adopt some means of obtaining the best unified effort on their part. From practical experience I know as a matter of fact that you would not be enabled to obtain or retain an organization without the check-off, however desirable other means might seem from a theoretical standpoint. It was

my privilege, and I might say pleasure, from experience some twenty years ago to be directly identified as an official of the miners' organization in Iowa. For the last twenty years I have been engaged in the practice of law. The past two years I have been identified with the miners' organization in a legal way from a state standpoint. And yet, during the twenty years last past, I have been sympathizingly interested in the progress of the organization and the mining industry generally.

Twenty years ago, when personally interested in the organization, we then sought to obtain membership by voluntary contribution in the way of payment of dues, and, while there were a few who always paid, there were many, probably a less number now than then, who would not pay, not because they were opposed to the union, not because they were not desirous of obtaining whatever benefits might be derived therefrom, but because there was an element in the class as individuals, as there is in any other class of industry, who are willing, too willing, to obtain and accept something for nothing, and willing that some other fellow do the work, just as you find it right here in your association. There are many of us that are willing to come here and sit down and watch some of our officials do the work, and I am sure that the president of this association can give very splendid, tangible and substantial testimony to the fact that there are innumerable of his associates that are quite willing that he should do the work. And so it is with some miners. They are quite willing to accept the benefits, irrespective of who may pay therefor. Then, again, there is an element, a minority, I grant you, who would much prefer, and I say this deliberately. I say it without reservation, who would much prefer from a personal standpoint to make a contribution to a keg of beer, to go out into the woods and sit around and drink it, than to make their contribution to the miners' organization. They are in a very small minority, I grant you, and some of them who would do that rather than make a contribution create dissatisfaction upon the part of the cheerful contributors, resulting in a downfall of the organization. Such facts are not alone characteristic of miners any more so than it is of any other class of men, wherein the men who would make the contribution become discouraged, and disorganization would be the result, together with the breaking up of the union. So that, after all, Mr. Chairman, you ultimately get back to the proposition, which is the primary one, whether or not it is better for employers to enter into and transact their business from a collective bargaining standpoint than with employes solely as individuals.

Now, that brings me up to another point. I am one of those who believe that many of the employers, beyond question, would deal fairly with their employes if there were no such thing as a labor organization, and yet I will venture there is not an employer but what will admit that there are men, as employers in the mining industry, who would not do that, and they do it along the same line and for the same reason and bottomed upon the same principle that they carry on cut-throat competition in the means and methods of transacting their business. This is the frailty of human nature, seemingly. And so we are required to consider another phase of the problem, which is the one of education, and when I say education I mean in the broader sense. I don't mean solely and only from a text-book standpoint, but from a standpoint of correct thinking; the habit of thinking correctly; the habit of developing correct thought; the habit of recognizing that other men have rights as well as one's self. There are men all along the line that fail to think along that line.

Taking the case now that was illustrated or suggested and named here by the gentleman, on the face of the facts that were given here, it would seem to me as though the position taken by the employes in Indiana was very unreasonable, and no one could offer an apology therefor; and yet there are men that will do things that are unreasonable, even in the very face of being well organized or well-intended methods of procedure. Take the individual case suggested by Mr. Scholz. There is

no question but what that man was unquestionably in the wrong, because the laws of the state of Iowa provide that a man is absolutely prohibited from the use of coal dust to tamp his hole with. I remember the law so well because it was my pleasure and my privilege to be the author of that law, and the only thing that is lacking in that law, although it is pretty strong as it is, is that I would have vested police power in every mine superintendent and mine foreman for the purpose of more effectively enforcing the law; and yet I was unable to obtain the support of the coal operators of the state of Iowa to enable me to put that through under those conditions.

CHAIRMAN PARKER: Is there any penalty attached to that law?

SENATOR CLARKSON: There is a penalty. It is a misdemeanor for a violation of the statute. The mine superintendent or, had Mr. Scholz seen fit, he could have gone to the justice of the peace and filed an information and could have prosecuted him therefor. In saying that I would not want you to feel now that I criticize Mr. Scholz for not doing so. That is not the thought that I intended to emphasize.

MR. W. J. SNYDER: He would have had a strike.

SENATOR CLARKSON: I am not so certain about that, brother. Possibly so. Possibly he might have had a strike in your locality. I would not want to go so far as to say that. I think that I know the temperament of the district officers of the state of Iowa sufficiently to know and believe and to be able to state authoritatively that they would not have undertaken to have supported him under those conditions. I feel that I know those men well enough to know that they would not have undertaken to have backed him up under those conditions. I can say this, for I am now speaking for myself, as general counsel for District 13 of Iowa. I unquestionably would not have offered any defense in behalf of the district for him. Rather, on the contrary, we would have prosecuted.

Let me illustrate to you. I regret very much that we find it necessary to sometimes get just a little personal in these matters, because in our frailty of thought we are better enabled to emphasize the problem probably in that way, but to show you the temperament and the thought of the officers of District 13, permit me to say that there was a case where the miners felt that the operator was violating the contract between the employers and the employe, and it was brought out in the evidence in the case that unquestionably the operator was violating the contract, and yet, without following the usual routine, the usual method of procedure, I should say, of settling those matters, certain men undertook to determine the grievance themselves. In other words, they were witness, they were prosecutor and they were the judge. They assumed to themselves the authority so to do, and they immediately issued an edict that there would be no work until this rule was complied with. The district officers condemned the proposition and told them that they would be required to return to work, and upon a refusal so to do the individual who refused would be suspended. As a local union, as a whole, they refused, and the entire local was suspended, and then action was brought against the district officers to collect damages and the matter was fought out in the district court, where their actions were supported, and in behalf of the district officers and the district I defended the action. I point to that merely to show you the trend of thought and the temperament of the district officers of District 13 with reference to those matters. They held that contract to be sacred. Now, I am not here to say that their judgment is always accurate. I have seen times when I would radically differ with them, had I anything to say about those matters. We cannot hope that all men will at all times be correct in their conclusions. We cannot hope that the individual will at all times be correct in his conclusions. Nay, on the contrary, we must expect to find many more individuals among the employes who arrive

at inaccurate conclusions than would be the case with the operators. Why? Because his training of mind has not been the same. He is not a business man. In other words, he has not been compelled to constantly train to accurate thinking along those lines, and therefore he follows his natural desires, rather than logical conclusions, to arrive at those things. And it all comes, as I view it, from the fact that we are more or less in an adolescent age in industry. We are just developing. It is a process of evolution. And, if we will keep in mind at all times the proposition that it is a matter of evolution and that we ought to strive constantly, one with the other, to co-operatively endeavor to try to train ourselves along the line of an endeavor to avoid as far as may be the inaccurate thinking, it seems to me we will make very rapid progress.

I had the matter illustrated to me yesterday with one of the most apt situations that I have listened to for some time, wherein it was complained that a miner will sometimes stick his head into danger, seemingly the most unreasonable thing imaginable, just as the one that is suggested here by Mr. Scholz. And yet I have no doubt that every man in this audience in some way does some ridiculous thing every day. For instance, right here on the streets of this city, where the policeman will blow his whistle, which is an indication that we should stop at the street corner until he has given the next alarm to enable us to go across the street in safety, when the traffic will be permitted that way, and yet we find men, innumerable in number, crossing to and fro, arriving at the middle of the street, waiting for a street car to go one way and an automobile the other, and as soon as the automobile passes he will dart by right in front of another moving automobile, the most ridiculous thing imaginable, and yet it is done right along, and that, too, by intelligent men; men who are accustomed to thinking; men who we have a right to believe would not put their heads in danger. Why? Simply we do not train ourselves from habit to avoid those things. And there to my mind is one of the weak places of the American people as a people; they lack a proper respect for the law, which, when indulged in, becomes a habit affecting all of our actions, private and public. It seems to me that labor organizations can and will be used as a proper and effective means, when assisted by employers, to aid in correcting our imperfect habits upon the part of employer and employe.

And I want to say, Mr. Chairman, that one of the most delightful things to me in this meeting is to see the spirit of co-operation and a desire to train ourselves away from the habit of doing the incorrect thing and try to arrive at the correct thing.

Now, the mere matter, as suggested here by Mr. Scholz, that of voluntary contributions, would not fill the bill, because that would presuppose that every fellow would contribute and, if he did, you would still have the opportunity for wrong action that my brother speaks of. Therefore, if the purpose of stopping the check-off is to dissolve the union, then we ought to take that position and say so, and not leave it to a matter of saying that we will countenance the organization if sustained by voluntary contributions, for, after all, there is no question in my mind but what the check-off means the life or death of the union.

MR. CUSHING: May I ask a question?

SENATOR CLARKSON: Certainly, if I can answer it.

MR. CUSHING: Isn't the miners' union the only one in the country that has the check-off?

SENATOR CLARKSON: I am not sufficiently versed on that, my brother, to concede that to be the fact. Let us say that it is the fact. That still does not meet the true situation that is confronting us, what others might do is not controlling, and by way of illustration permit me to say this country is the only great, substantial nation on the face of the earth that is out of this awful catastrophe that is taking place abroad, and we are the better off morally and financially because of that fact. (Applause.) It seems to me what others do is not always the safe

basis, so we get right back to the ultimate question: Is unionism the proper method of procedure? If it is, then there can be no harm, but great benefit, in giving the check-off so that they may sustain it. If unionism is not the better course to pursue, then the check-off is the one you should eliminate. In answer to that question, we must solve the proposition as to whether or not dealing with men collectively is the better plan to conserve the rights of employer, employe and the public. To my mind, that proposition must be resolved and answered in the affirmative, for I cannot help but feel from my experience and study, even with all of its shortcomings, even with all of its objectionable features, I am still abidingly convinced that dealing collectively is far superior to the old method of attempting to deal with individuals, for the reason that there is a measurable amount of strength on each side able to reasonably conserve their rights and assist in the great, ever-present problems of public welfare.

That there are men who will take advantage of that power, I grant you. And there necessarily must be evolved out of that unfortunate condition some means, some methods by which we may constantly advance to an improved discipline, individually and collectively, yet I am frank to say that, while we may hope to approximate the perfection in our daily contact, I doubt very much if you may hope to arrive at perfection in the very near future. (Applause.)

CHAIRMAN PARKER: Gentlemen, I think we are getting along and bringing out some interesting discussion on this subject. I do not know whether it is proper for the chair to attempt to enter into a discussion of this question or not, but I can state that in the anthracite region, as you know, the check-off has not yet become a factor. We have, however, had since last April a great many of what are known as button strikes, of which you probably have heard. I made a little compilation on these interruptions to mining operations a short time since, and found that the actual time lost in button strikes since the 5th of last May, when the new agreement was signed, had resulted in a loss in wages to the miners of something over two million dollars. The tonnage, as it might have been mined during that time, which would have gotten into the markets would be something over a million tons more than what was mined, and if this had been accomplished there would not be any complaint today of shortage of anthracite in the markets tributary to it.

We had rather some striking incidents in the button strikes. Senator Clarkson says that it required the check-off in order to keep up the membership. One mine of the Temple Coal Company, a Lackawanna mine, has been on strike for something over six weeks now. There was from six to eight hundred men employed in that mine, and there are a half a dozen or so men who did not have their buttons. That mine has been idle, absolutely shut down, because of the total number of men employed about one per cent did not wear the union buttons. The matter has been before the Conciliation Board upon several occasions. The men have been ordered back to work, but, led by the local president, they have refused to obey the order of their district president or the mandate of the Board of Conciliation. The mine is still idle, or was at the time I left, and, notwithstanding the fact that they do not have the check-off, it looks as if ninety-nine per cent in that particular mine were members of the union.

We would like to hear a few words from some of the other gentlemen present. Mr. Cushing, you ought to be able to talk on this subject.

MR. GEORGE H. CUSHING: I was just thinking as Senator Clarkson spoke about the suggestion that Mr. Scholz might have carried that case to the justice of the peace. I remember reading a speech by one of the international officers of the miners' union in which he told the organization in Iowa that it did not make a damned bit of difference what kind of law they passed; if they elected their own justice of the peace there would not be any convictions under that law,

It was called to my attention just a moment or so ago that the law in Oklahoma compels a mine foreman and the mine superintendent to arrest a man that is found guilty of violating the law on any points involving safety. They have never been able to get a conviction in that state, as I understand it, even though the mine foreman and mine superintendent have carried out the instructions according to the law.

SENATOR CLARKSON: Mr. Chairman, in our state, of course, an information may be filed in any part of the county, the entire county would have jurisdiction over a case of that kind, but I would not want to leave the impression with this audience that my thought is that this is the solution of the proposition, just arresting a man at every stage. That is not my thought. There may be isolated cases where such drastic methods are essential and will perform efficient service and bring to some extent the desired result. But if we are going to depend upon penal servitude or fines I doubt very much the efficiency of that as a sole remedy. There must be a broader remedy than that. There must be the remedy of evolution. That is the remedy which I desire to more strongly emphasize than I would criminal prosecution.

CHAIRMAN PARKER: Are there any other gentlemen present to contribute something to the general remarks upon this subject?

MR. F. P. WRIGHT (Kentucky): Mr. Chairman, I am very sorry that I was not here at first to hear the commencement of this discussion. I don't know that I should speak because I may be following along the wrong line, but I have had considerable to do with union miners.

We are situated in a district called 23, which is in Kentucky. That is the only union district south of the Ohio river. We have non-union competition east of us, Eastern Kentucky, to the west of us in several states, and to the south of us, in Tennessee and Alabama and parts of Arkansas. I am very much interested in this question. I came in when Senator Clarkson was speaking, and he speaks from the union side, and like all union men he is always prepared, and I hesitate very often to combat anything this gentleman said or that those gentlemen say unless I am well prepared.

A lot of things he says about the unionism and check-off is true. The old days of master and man in the old-fashioned acceptance of the ward are passed. Speaking about combinations, check-offs, those are small things, but there have been combinations on the other side, we all know. The reason for our little union section down in Kentucky was for protection against the absolute dishonesty and eagerness for wealth and cruelty of a few operators. As he said, some operators will treat their men fairly and some will not. Some miners will treat their employers fairly and some will not. It does not make any difference from my experience what the situation of a man is in regard to social levels; that honesty and uprightness is not a monopoly of any one class. The idea that every employer is a rascal and trying to exploit labor is just as foolish as to say that every laboring man, every working man is honest. They are born that way on both sides.

One man asked me once, "Wright, you don't seem to have much trouble with your mine. I never have to come to your mine to settle any disputes. What is your rule?" Well, I told him, I said, "I have no special rule. I think the Golden Rule is a mighty good mine rule." And another faculty I have, without any self-praise, is trying to put myself in the other man's place once in a while, to look at it the way he looks at it, and the same thing that Senator Clarkson said, that we expect of these miners traits that the men who have been more fortunate in education should have but don't, any more than these miners, is my experience. I have had some of the most outrageous things done at my mine by the local union that you can imagine, the most foolish, but I have gotten along with them very well. I have not been able to

compete with non-union labor in the matter of expense account, payroll, but they have a great many other expenses that we do not have.

I will give you a little history of this last year. Our contract was out on the 31st of March. Now, on the first of March we had our annual convention about the wage scale and all the operators demanded a reduction while the miners demanded an increase. That was against my judgment and my advice, which was to tell the miners just what we could pay and what we would pay and say, "Boys, when you are ready to sign up we are with you." But the idea of trading, everybody asking for more than he expects to get, or you won't get what you want otherwise, is not what I am in favor of. Anyway, that idea was carried out. We wrangled and wrangled and had committee meetings and met in Louisville and spent our money in the hotels and finally came together. About the first of May we agreed to give the miners last year's scale and conditions. They agreed to accept last year's scale and conditions, but I should say that when we agreed to last year's scale—(they made that proposition)—we agreed to that with the exception of four points that we wanted to put in the conditions. Probably I am taking up too much time with a personal matter.

CHAIRMAN PARKER: Not at all.

MR. WRIGHT: But those four conditions were left to a committee with a commission behind it and the result was that they did not agree at first, but finally the sub-scale committee did agree and signed a tentative agreement that we sign a contract, a tentative agreement with the exception that these four conditions that the operators wanted were not included and those four conditions were left to a commission of four, two operators and two miners. If they could not agree on any or all of them, decision should be left to the fifth man and his decision would be final. The sub-scale committee of three miners and three operators agreed to that and signed it. It was sent back to the scale committee of the miners. They objected. They refused it. The operators' scale committee accepted it. The result was a strike on these four propositions that the sub-scale committee agreed to arbitrate. Then the national union stepped in, the national government at Indianapolis. It advised the men to go to work. The men refused to go to work. We had a strike on the 15th of May that lasted until the 10th of August. Then a queer condition arose. The national union officers in Indianapolis stood by the operators right along and refused to recognize the strike and did not support it, didn't chip in one dollar for the support of the miners out of work, not a dollar. We won. We got three conditions that the commission finally agreed to. One condition they did not agree to. It was referred to the fifth man and his decision was referred to the operators and we agreed to it. There was a situation where the national government of the union miners of America were against their own rank and file.

CHAIRMAN PARKER: Any other remarks on the subject.

MR. FOWLER: Mr. Chairman, I have listened with a great deal of interest and pleasure to the various remarks that have been made. And especially those of my brother, Senator Clarkson. Inasmuch as the proceedings of this meeting are to be distributed over the country and there has not been so much along this line before I think it will be read with a great deal of interest. Therefore, I would like to ask before you leave the subject that the Senator be asked to go just a little bit farther and make this point clear: Now, I do not desire to enter into a controversy with him, but to get the thing in the records as his words in answer to the statements made. Here we have the miners' union which has to depend on the check-off for its existence. There are many other union bodies, as suggested by Mr. Cushing, that do not have the check-off and they seem to get along very nicely without it. And if our friend the Senator would make that a little clearer I believe it would be to advantage to hear it at this time.

CHAIRMAN PARKER: As far as the chair knows there is no other labor organization that does depend upon the check-off in order to maintain its existence, and the chair would like to hear from the Senator and just as well from the rest of the audience in regard to that matter.

SENATOR CLARKSON: Mr. Chairman, as I stated before, I am not sufficiently informed to attempt to draw a comparison between conditions that prevail with other organizations, as compared to the miners. While I have given more or less thought and study and have read a good deal with reference to other labor organizations, I have not studied their conditions sufficiently to enable me to give any explanation why voluntary payment of dues might be successful in one and not in the other. Nor am I prepared to say that it would not be successful with the miners' organization. I only illustrated the conditions that existed some years ago, in its formative period. Now, since the organization has become more developed and has had broader experience it might be that it would be possible for them to get along without the check-off. Yet, to my mind, I cannot feel that the organization would be sustained. When I say sustained I mean from the standpoint of maintenance and kept in a cohesive body without the check-off as it would be with the check-off. Now, why other organizations are able to, I don't know. As I said before, I would not attempt to make a comparison and give the reasons why because I have not attempted to study it. I am frank to say that in the last twenty years that my time has been more devoted to the practice of law than it has been to labor organizations.

CHAIRMAN PARKER. Mr. Weitzel, can you give us some statement in regard to the check-off in Colorado, how it worked out, how it is at the present time, in regard to the efficiency of labor?

MR. E. H. WEITZEL (Colorado): I am sorry I did not come in a little sooner. I was downstairs at the Uniform Mine Legislation meeting.

I never had any experience with the check-off in Colorado. I think they have had a check-off at a few mines, but none with which I was connected.

I had experience with the check-off in Ohio some years ago, and it seemed to me that the necessity for the check-off is that if they did not have the check-off they could not get the money. I was at Bellaire, Ohio, during the anthracite strike in Pennsylvania and I remember how the boys used to come to the office and tell me that it was intended only to check off the coal that they mined by the ton, and that there ought not to be any check-off on the yardage. Another fellow worked overtime, extra time, or emergency and he didn't think that ought to be checked off and I am quite certain that if it were left to the consent of the miner in each case that the check-off would have dwindled down, that is, the extra check-off for strike purposes would have dwindled down to a very small amount. It is my opinion that the life of the organization depends on the ability to force a man to both join the union and pay his dues.

JOHN P. REESE: Mr. Chairman, the miners' union can exist just as successfully without the check-off as it can with, and I have no brief to speak for the miners' union. I happen to have had the experience in districts with the check-off and without, and I wish to defend the check-off system from the standpoint of both the miner and the operator.

We have heard a good deal of talk about the check-off system, read a good deal in the press. The check-off system is justified, has justified itself, both from the standpoint of the miner and the operator who is willing to run a closed shop.

Whenever I would attack the check-off system I would attack the union. If I am going to do business with the miners' union I want the check-off. I experienced, both as a representative of the miners' union

and a representative of the organized coal operators, the evils and the blessings of both the check-off system and the union mine without the check-off system. The check-off system is the least of two evils. Now, all that any miners' local union needs today to get along without the check-off system where they are unionized is to establish the card system, and if you have a real, energetic, up-to-date pit committee with the card system you will petition the miners' union as an operator to give up the card system and take the check-off. Why? Because on Monday morning following pay-day, or the day set for them to pay their dues, the pit committee station themselves near the top or the entrance of the mine and exact a clearance card from each man before he is allowed to go down the mine; and it is a very simple, very simple proposition. They work it in the block coal fields of Indiana and have worked it for years and did not want the check-off system. I don't know whether they have ever adopted the check-off in the block coal of Indiana. They had not several years ago and had a compact, thoroughly closed shop in the block coal district in Indiana. On the K. C. track, which is now a part of the Burlington system, in southern Iowa, for several years the miners' local union at Cincinnati refused to adopt the check-off system and stayed with the card system. The result was that every Monday morning following the Saturday dues paying period there was a lot of your employes chased home because they had either failed to bring or had forgotten their card and they were not allowed to go to work without their card. Hence, the operators were very willing and very anxious to have the check-off system inaugurated.

Now, on the proposition of the closed shop that goes with it, it seems to me that if a coal operator is going to make an agreement with his employes that he wants a closed shop, he needs a closed shop, you can't hold the miners' union responsible for the acts of your employes if only a part of your employes belong to the miners' union. That is the argument that induced the operators with which I did business as a miner to agree to the closed shop. They make a contract with the miners' union and they expect the miners' union to deliver under the contract. True, they do not always do it but they come nearer doing it, they can come nearer doing it, they will come nearer doing it where all the men belong to the union than where only a part of the men belong to the union. Now, of course, I realize that you could have an agreement with a miners' union and only a few men paying the dues and that you would get along very nicely in operating the mine, but like most open shops it would not be a union mine any more than our boasted open shops are union shops. They are not. The union don't have any influence in an open shop. They might have had something to do with agreeing upon the original wage scale, but they have no influence in seeing that the wage scale is carried out or that its various provisions are interpreted to their liking.

The open shop proposition simply means that the employer is running his business. Now, whether he has a right to run his business or not, that is another question, but if you are going to do business with the union, do business with the union, hold the union responsible for the acts of its members, and you do not want to be a "sponger" in the language of the miner. You don't want the benefits of the Illinois Coal Operators' Association, for instance, or the Manufacturers' Association and not pay your dues to it. Then, why should Bill Smith be allowed to get \$1.10 a ton for digging coal in 1916 in a mine where he used to dig it for \$0.55 a ton and not pay his dues to the union that got that price? There is no defense of the man who wants to receive the benefits of government and not pay his taxes. What do we think of the coal operator that refuses to affiliate with the association in his district? We do not call him a scab but that is just what we think of him. (Laughter and applause.) And the miner does what we would do if we had the power. The miner says, "You don't get the benefits of our organization unless you pay for them." The operator would say the same thing if he

could to the operator who does not belong to his association, and if you do not believe that just attend an operators' meeting. (Laughter.)

Now, I believe in the closed shop, and I believe in the check-off system and I believe as an operator that the check-off system is not an evil. When you talk about cancelling the check-off system be fair with yourself. Whenever you get ready to take the check-off away from the miners be honest and say that you are going to lick hell out of him and run your business to suit yourself. That is what it means because they say to you in return when you demand they give up the check-off system, they say, "All right; but we are going to inaugurate the card-day." You will give up your demand before you have the card system three months.

And why haven't the miners a right to inaugurate the card day? Haven't the miners a right to refuse to work with a man? The courts have held that they have. And why shouldn't he have, if it is costing him and the rest of the miners of a certain locality ten dollars a year or twenty dollars a year, or, in the instance my friend from Colorado speaks of, in Ohio, where at that time they were paying ten per cent of their gross earnings. I paid it. I was getting \$75 a month from the miners' union and paid ten per cent of the gross to support the anthracite strike. Now, why shouldn't every man in that mine pay that same ten per cent? The miners' representatives in congress assembled had agreed that that was what was going to be done. We all believe in representative government. Some operators seriously object to collecting anything but the fifty cents a month necessary to run the local union. I am willing to collect every cent that they will sign up for. I say it is their money and they earned it and as long as they pay their honest debts let them assign the rest of it to their union if they want to. I believe that we should recognize the condition as it really is.

Now, whether the union conditions, whether the open shop or the closed shop gives you the most efficient workmen is another proposition entirely, entirely another proposition. There are some advantages in running a union mine. As to whether there are as many as there are in running a non-union mine I don't know. I don't know about that. I am inclined to think that you could develop individual efficiency more in a non-union mine than you can in a union mine. I know there are a lot of things that I could do in my mines if I didn't have to consult anybody about laws and agreements that would give me cheaper coal, but whether that would be a good thing for society or not is another proposition. My idea is that if we can keep honest men in official positions in the labor unions generally, in the miners' union in particular, that so far as humanity is concerned we are better off with the union closed shop, check-off condition, than we ever were with the old system of the open shop and the employer running his own business to suit himself, because it is a fact, no matter how unpleasant it is, that there were mighty few employers who knew how to run their business when they were allowed to run it to suit themselves.

MR. DERING: Mr. Reese, may I ask you a question?

Mr. REESE: Yes.

MR. DERING: Do I understand that you believe in the unlimited check-off? In other words, if the mines in your particular district, your neighboring mines were out on a strike because of some difference of opinion, such as we had in Indiana over this lamp question, which I illustrated, do you think you would permit your miners willingly to check-off to support this neighboring mine to lick your own fellow operators? Is that your attitude?

MR. REESE: The matter of limited or unlimited check-off is, of course, a proper matter of agreement. I have no objection at any time to entering into agreements providing for the unlimited check-off for union purposes. I do object to the check-off being used for purposes outside of the union. For instance, I have known of cases where bar bills were attempted to be collected on the check-off and all kinds of subterfuges resorted to in order to collect those bills. When it is a general

assessment on all the employes alike, on all the members alike, in other words, when it is a legal assessment, I claim it is all right, whether it be ten cents or ten dollars or any other amount of unlimited check-off for the purposes of the union.

MR. DERING: Mr. Chairman, I would like to be sure that I understand Mr. Reese and I want to ask him some more questions if he is willing.

MR. REESE: Certainly.

MR. DERING: This case that we have just had, Mr. Reese, in Indiana, where the Vandalia mines were shut down on account of the electric lamps, are you familiar with it?

MR. REESE: No, I am not.

MR. DERING: Well, it was a case where a company tried to put in electric lamps to promote safety and the miners' union not only tied up that mine but all the rest of the mines. Now, do you think it is a good practice for the rest of the operators in that vicinity to allow a check-off of fifty cents per week to support the miners that were in such a strike as that?

MR. REESE: Well, where was the contract? Who was violating the contract?

MR. DERING: The miners were violating the contract.

MR. REESE: Who were?

MR. DERING: The miners were. Mr. White admitted they were but he said until the whole state of Indiana went on a strike that he could not take hold of it, he could not stop it.

MR. REESE: Well, it was an illegal strike of the miners.

MR. DERING: Yes.

MR. REESE: Well, I would not support it at all.

MR. DERING: Well, what would you do on your theory of an unlimited check-off? What can we do? We got right up against the proposition there of either checking this off, or, as happened, the Vandalia Company abandoning the mine to get out of the hole, or the whole state of Indiana going on a strike. Now, there is not an operator in our state, in Indiana, but what prefers collective bargaining, but when it comes to furnishing the miners' union with the money to lick my neighbor I am very much opposed to it.

I would like to see and I hope to see come out of this trouble that we just had some form of compulsory arbitration at some time in the future. I am in a position where I recognize the fact that you can't compel a man to submit to a decision of compulsory arbitration, but I think it would always, nine times out of ten, have a good effect. I hope to see the day when there is some hope that we can get that proposition, a proposition like that through, rather than to have occur what we did have down there. I have stated before in this meeting in regard to this particular case that the mine inspectors told the company that they were in the right, that the compensation board told the company we were in the right, and John White told us we were in the right, but the miners, the local president of Indiana—

MR. REESE: The district president?

MR. DERING: The district president pulled all the rest of these mines of the Vandalia Coal Company out and came within an ace of pulling the entire state out and would have done so if this company had not sacrificed its mines. Now, if we are to follow your ideas what would we be confronted with most of the time?

MR. REESE: Now, Mr. Chairman, the gentleman certainly does not know me or my record or he would not say anything like that. That was up to Mr. Penna and the coal operators' association of Indiana, and if necessary to strike the whole state of Indiana, they should be willing

to do so. You know a strike is an awful thing, almost as bad as war, but there are times when they are the least of two evils, and the coal operator must not be afraid to strike.

The proposition is here. In your agreements you have a provision for settling your disputes and that does not involve this question of check-offs, limited or unlimited. That does not involve sacrificing your neighbor. Your neighbor in this case was you. You and your neighbor belong to one of the contracting parties to that contract. Somebody laid down on the job and would not carry out the provisions of that contract. If John White, the international president, said you were right, then you ought not to have abandoned the mine.

Now, those individual abuses will occur in all states. They have occurred in all states, but my proposition is this, that if the miner working in the union mine wants to contribute ten per cent of his wages, which has been the maximum he ever contributed to my knowledge, if he wants to contribute ten per cent of his gross earnings to his union, that it is perfectly all right for him to do so. I have no objection to his doing it when he is working for me. But when it comes to that proposition you mentioned in Indiana we probably are just as bad in Illinois and Iowa and the other states where the miners' officials or the miners' board have taken the wrong stand and where even their national president could not whip them into line without the operators' helping. Usually the operators will help when the big officials are with them, but I agree with Mr. Dering that for those kind of cases we need compulsory arbitration. I have always been in favor of compulsory arbitration. As a miners' official, as a member of the American Federation of Labor, I advocated compulsory arbitration. I think it is right in all those cases that compulsory arbitration is preferable to fighting it out, but until we get compulsory arbitration we have got to fight it out. And Indiana ought to lick that state president or that state board or whoever was in wrong. If the inspector said the company was right and the national president of the miners' union said they were right and the compensation board said they were right, then it was evidently a question of where the miners' state officials needed a licking and you could lick them. You could lick them and you can always lick the fellow that is in the wrong.

MR. S. A. TAYLOR (Pittsburgh): I would like to ask a question. Mr. Reese, in connection with your assessment of ten per cent which you speak of as being fixed during the anthracite strike, how did you square yourself with the Sherman act? An action such as that, is it or is it not a combination in restraint of trade.

MR. REESE: It undoubtedly is.

MR. TAYLOR: How did you square yourself?

MR. REESE: The difference between the miner and the operator under the Sherman act has been that the miner has been willing to take a chance and that the operator was not.

MR. TAYLOR: That is a statement of the proposition on which you worked?

MR. REESE: I should say so.

CHAIRMAN PARKER: Mr. Taylor, you have some good arguments on this subject and I am sure the gentlemen present would like to hear from you.

MR. TAYLOR: I have little else to say on the matter: I had some experience along a line which in my judgment most of the operators have had themselves. I can recall a case at some mines I had charge of. We were supposed to have not an unlimited check-off, but there was a good deal more check-off than was necessary for the ordinary uses of an organization, and I recall a number of times that we had to meet the pit committee. A number of times when they were supposed to meet the mine foreman they dodged in one opening and out another until they would get their day's work put in. I was told by one member of the union that during one month in one of those mines the pit committee

put in 17 days. There were a number of openings along the hillside in the crop coal and the pit committee would watch the mine foreman coming out of one place and they would dodge in the other and just follow him around, so that they would not see him until they would have their day's time put in, or until it would be too late to go back to work. Now, I think that was a case where unlimited check-off was a damage to the miners as well as to the operators. Those men, that committee, were getting their wages or per diem from their union without rendering any service. On the other hand they were simply giving the operator a lot of trouble when really no trouble existed. Very frequently I have had this occur, when they would come into Pittsburgh, which was only a nickel fare from the mines, the committee would come in there to see the miners' president to have a conference with us and I would turn the whole thing over to him and abide by his decision, which was not always against us by any means. The state of affairs was simply brought about in my judgment because there was too much money in the hands of the local association for the legitimate purposes of that association. At least, that is the way I sized it up. I think if there had been a fair check-off, a check-off sufficient to carry on the ordinary work of that local and possibly pay their national dues, it would have been better for that local and better for us.

I am not ready to take the position where I would say that I am willing to give an unlimited check-off. I don't believe it is right from an operator's standpoint. I don't believe it is fair to the miners. I don't believe the honest miners' officials want such a thing. I think it is to the detriment of the public good.

PRESIDENT SCHOLZ: Mr. Chairman, Mr. Reese was not in the room when I made my first statement and since there is a very radical difference of opinion between his expressed views and my own I want to call attention to one very significant word which Mr. Reese used in the closing sentence of his statement, and that is when he said that if the district officials were honest. That to my notion is the crux of the whole situation.

Mr. Reese as president of the Mine Workers of Iowa was selected by himself to settle a dispute between Illinois miners and our company over a very trivial matter, involving sixty-four cents. I had heard of John Reese. I think I had seen him once and I said, "Whatever he says I will abide by." He was called into the conference and when the board convened to present the case the miners' officials could not agree upon a question to be arbitrated and the arbitrator had to go home. So when Mr. Reese expresses himself as he does he does it more as an idealist than as the real and true man that he is, and not as one that really deals with the conditions that we find confronting us every day.

CHAIRMAN PARKER: Are there any other remarks on the subject of check-off?

MR. NEWBERGER (Pennsylvania): Mr. President, I come from the anthracite region of Pennsylvania and this is the first opportunity I have ever had to listen to a real experience meeting of bituminous operators and apparently some representatives or ex-representatives of the miners' side. And I wish to say that judging from what I heard today that we certainly don't want the check-off in the anthracite region, because I believe we have less trouble in our relations with our men without the check-off than you have with the check-off in the bituminous region.

CHAIRMAN PARKER: Any other experiences on this interesting subject? If not, I believe we have arrived at the end of our program. We will now stand adjourned.

THURSDAY, NOVEMBER 16, 1916.

Morning Session.

Mr. W. C. Tucker, of Kentucky, presided as Chairman and called the meeting to order at 10:40 a. m. Mr. Alexander Blair, Jr., acted as Secretary.

CHAIRMAN TUCKER: Gentlemen, the meeting will please come to order.

The gentleman who is to deliver the first paper at this meeting I learn is unfortunate in not being present. So we will have to omit that and the first paper we will have is on "Difficulties I Have Met in Coal Litigation and the Remedies," by R. W. Ropiequet, of Belleville, Ill.

MR. R. W. ROPIEQUET: Mr. Chairman, I might preface this paper with the statement that if it had not been prepared I would have taken this meeting as a text illustrative of the difficulties I have met in the matter of coal litigation, for that which confronts the makers of this program, in the inability to produce the results which were promised upon the provisional program, is oftentimes one of the greatest difficulties that we meet as coal operators. Now, that is not a part of my prepared talk and I will get down now to my text.

Mr. Ropiequet's paper will be found on page 354 of this report.

CHAIRMAN TUCKER: Gentlemen, you have heard this very interesting and instructive paper, and in the course of the gentleman's remarks with reference to co-operation I was reminded of an incident that occurred in our territory some years ago when competition was cutting the throats of the various operators and an effort was made to get them together. A meeting was held and all the operators in the territory were present and they all agreed to co-operate, but one man. His contention was that if the co-operation as outlined was agreed upon that it would not be lived up to, that some of the operators more keen for personal advantage or personal profit than for the good of the entire body or business would break away. He was asked the question if he didn't think there were any honest men, or if the men in the room, rather, were not honest, if there were no honest men in the country. "Well," he said, "there may be, but," he said, "they are not in the coal business." (Laughter.) That seems to symbolize the attitude that one coal man feels towards another. They are afraid of each other. These various papers that have been read at the meetings at different times have brought out some very interesting discussions and as it is clearly the desire and wish that these discussions be had, that the fullest light possible be thrown upon the subject up for discussion, I will be very glad if any of you gentlemen have anything to say on the subject, you will let us hear from you, our next speaker will not be here for a few moments, and if we could fill the interval with some discussion that would be interesting to the members, we would be very glad to hear from some of you gentlemen.

MR. T. A. LEMMON: Mr. Chairman, I would like to hear from Mr. Williams of Streator. I saw him sitting over there in the audience.

THE CHAIRMAN: We would be very glad to hear from Mr. Williams.

MR. J. E. WILLIAMS (Illinois): I thank you, Mr. Lemmon, for noticing that I am in the room but this is a question clearly for expert knowledge that you have up now, that is, how to deal with situations arising from railroad problems. I haven't any information that would be worth while giving the body on this subject. That is a process of working out that we are all striving with.

I have been impressed by the one thing through the Congress, of which this is a part, that we are striving and want to rationalize business. We are striving to keep away, it seems, from cut-throat competition of all kinds and striving to get co-operation. That is the one unified note that I have found throughout this conference, a denial, really, of the fundamental principles upon which our economic system is based, the theory of the original economists being that if you allowed the law of supply and demand full play and natural advantage to have its effect on the cost of production, that the result would be the best state of affairs for consumer and everybody else, and in that way the consumer

would be protected. I find here that that theory has been denied and that we are faced with a new situation. I find that those who are supposed to be the chief protectors of the old regime are departing from it. I find that we are endeavoring at all point to get away from cut-throat competition, which is supposed to be the protection of the consumer, and it seems that there is only one possible recourse. If competition is to be stopped and co-operation between bodies is to be established then the question arises, how is the consumer to be protected? How is the producer to be prevented from piling up prices on them? There seems to be no answer to the fact that if we check competition there must be state control of some sort, state regulation, I suppose, by commissions or otherwise. Then you are faced with the question of how you are going to get competent commissioners under the existing regime, and you are there confronted with the fact that the man who is placed in a political position is placed there because he is a good vote getter, not because he is a good man for the job. And so we are in this vicious circle.

I think it is a wonderful thing for bodies of this kind to meet together and grapple with those problems, trying to introduce rationalities, for that, no doubt, must be the solution and not to follow the economic theory of cut-throat competition. We are launched upon the question, upon the journey, upon the endeavor of introducing rational control in the business. If there is nothing else that is visible in the prosperity now seeming to sweep over this country right in these war times, it is that the nations at war have been obliged to discover something else besides the profit-making motive to make the business of the country go. It seems to me that is what we are seeking now. We have just been told in the last paper that in the search for co-operative action the trouble was that nobody would take the initiative and do the work but it was to "let George do it" all the time, an attitude that has an individualistic origin. And these endeavors to get the benefit for a small group in an industry are working towards the point where we are abandoning the individualistic principle, so that we may work more as bodies than as individuals.

Now then, how are we to find a balance between these varied interests, between the different interests of railroad and coal mine, between coal mine operator and employe? These things have not got to be fought out in the future. They have got to be thought out. That is why I think these meetings here are of great value, to try to establish rationality, some principle of reason, instead of this everlasting appeal to the sword that has been going on, not only internally in this country but in international relations. I hail these efforts as being in that direction. I am myself professionally a peacemaker. My business is adjusting and mediating complaints and controversies between employers and laborers. I am happy to say that there has been some partial success in that direction, which has not been secured wholly by an appeal to law, or by an appeal to prejudices, but by trying to reconcile all of the interests, trying to satisfy the real interests of both parties, which is not an easy thing to do. It is not an easy thing to do, but it is a possible thing to do. Whether you know it or not, that is what you are engaged in here now, to try and bring all interests into some reconciling synthesis, in which you must regard the interests of the other man. You must regard the interests of the railroad when you are contending for your own interests.

How are we to do that? It is going to be an intellectual process. It is going to require the best brains, the best conscience that you can bring to bear. It is not going to be, as it was said a little while ago, a fight. It is not going to be war. It is going to be a plan by which the interests of the parties involved will be reconciled. That is rather a vague, general statement, but it is the best one that occurs to me at this time as a contribution to this discussion.

CHAIRMAN TUCKER: Gentlemen, can we hear from some other member on that subject? Mr. Reese, have you anything to say on this subject?

MR. JOHN P. REESE: Mr. Chairman, this is a subject with which I am not familiar, but inasmuch as my friend Ropiequet has prepared and ably presented two very interesting papers in this Congress, in the coal section, I feel that I should at least express my appreciation of those papers. I believe that both his papers and all other papers presented to these meetings tend to prove, if they do not prove conclusively, that the solution of our various problems is in better organization and closer co-operation.

It seems to me that while I have no traffic problems, never having been situated where it was necessary for me to make a study of the freight rate situation, I do know, as all others do, that the freight rate situation is unsatisfactory, and that it, like the labor problem and safety-first and all our other problems, is a lifetime job. I happen to be in the coal business where our only interest is to produce the coal for a railroad company, and hence if I did know anything about the freight rates I would attempt to defend the railroad company; but I do happen to know from previous experience that there are freight rates that were predicated originally on what the traffic could bear. I do know that as between different coal districts that there is a readjustment in freight rates that should be worked out. But in the freight rate question, as in the labor question and all other questions, we have that selfish, local interest to contend with and the solution of it is going to take closer organization and closer co-operation to solve the problem and do justice to all concerned. The coal salesman and that end of the mining business would be the proper ones to discuss this paper. My only excuse for getting up is to show, as one member of the Congress, that I appreciate these papers. I believe that the freight rate question as well as the other problems with which we have to deal will be worked out eventually through a better organization of the forces, the rule of reason being the final yardstick in all our problems.

I am naturally an optimist. I feel that while we have to fight occasionally, notwithstanding our friend Bryan, that we do have to spend money in preparedness, yet you never meet a man, in business at least, who wants to fight for fight's sake, neither in the coal nor any other business. There are times, however, when we will fight as the least of two evils. I think that is the position of the American people. We think we can lick the whole world if we have to. We hope we will never have to. But we realize we can't do it with the equipment that Brother Ropiequet had when he was down in Florida. But I believe that organization is the solution of our problem, a traffic bureau for the solution of our freight rate question and various other bureaus for the solution of our various other problems. My own effort has been devoted to the labor problem and the production end. I have had no experience in this freight matter except as an observer. I know that there are two sides to it. I know when you talk to a traffic man of a railroad that he has got a side, and Mr. Ropiequet points out that he is very well able to present his side. Mr. Ropiequet knows that because he has failed to get some of the freight rate adjustments that he went after.

MR. ROPIEQUET: We all have.

MR. REESE: But the path of better organization and closer co-operation to me seems to be the path that we are going to have to travel in order to get our 100 per cent efficiency in all departments. I thank you. (Applause.)

CHAIRMAN TUCKER: If there are others here who are vitally interested on this subject of freight rate litigation and have something to say, we will be glad to hear from them. If there is no further discussion on this paper the next address will be by Mr. Charles L. Dering, "World Trade Conditions of the Future." Mr. Dering. (Applause.)

Mr. Dering's paper will be found on page 198 of this report.

CHAIRMAN TUCKER: I am sure you have listened with a great deal of interest to the very instructive address we have just heard, and while the speaker was talking I wondered if we were not somewhat in the attitude of the young man I knew once whose name was Frank Lee Stewart. He always signed it in full, Frank Lee Stewart. Some of us one day asked him why he didn't use his initials, why he went to the trouble of writing out his full name. He said: "Because my name is Frank Lee Stewart, thank God." (Laughter.) The majority of us thank God that we are Americans, but I am sure that individually and nationally we are not alive to the opportunities that confront us. This paper was very interesting, very instructive and listened to, I know, with a great deal of attention and was very much appreciated.

I believe this closes the list of speakers for the meeting. Unless there is some further discussion, the meeting will be adjourned.

METALLIFEROUS SECTION.

Tuesday, November 14, 1916.

AFTERNOON SESSION.

George E. Collins, Denver, Colorado, Chairman.

CHAIRMAN COLLINS: Ladies and gentlemen, you will please come to order.

Dr. Waldemar Lindgren of the Massachusetts Institute of Technology, and until recently the head of the Economic Department of the United States Geological Survey, was to have read the first paper. I understand from the gentlemen upstairs that Dr. Lindgren is expected to be here later. However, ladies and gentlemen, Dr. George Otis Smith, Director of the U. S. Geological Survey, has very kindly agreed to read, or to give a summary of a paper by one of his staff on the lead and zinc resources of the United States. It is not necessary for me, I hope, to introduce Dr. George Otis Smith to this meeting. You all must have heard of him, and of the great institution which he represents. Dr. Smith, if you will kindly address the meeting.

(Applause.)

DR. GEORGE OTIS SMITH (Washington, D. C.): Mr. Chairman and Ladies and Gentlemen: I regret that Mr. Siebenthal was unable to be here in person, for the reason that his plans for field work this fall could not include Chicago as one of the way stations. I wish to state to you that his zinc report for the year 1915 is now in press, and we had hoped to have copies, at least of the proof, for distribution at this meeting. We found that impossible, but copies of the report will be mailed to all who care to send to Washington for it, or if you will leave your name with Mr. Callbreath, I know he will be glad to send it to Washington, and we will see that a copy of the report is mailed to your address.

Mr. Siebenthal, of all our geologists, has possibly been in one way the most fortunate during the past two years, for he has had, perhaps, the liveliest subject—that of keeping tab on the development of the lead and zinc resources of the country, and he was asked to prepare a summary paper on the whole situation. I will here only summarize as your chairman has said, his paper.

Mr. Siebenthal's paper will be found on page 397 of this report.

CHAIRMAN COLLINS: Dr. Smith has to attend a meeting of one of the other sections, and we shall have to excuse him, but before he goes I think the meeting here would like to express its appreciation to him of the paper of Mr. Siebenthal, which he has summarized and read, and I would like to say on behalf of everybody, I believe, here, and certainly on behalf of my confreres in the west, that we greatly appreciate the continued good work that the United States Geological Survey is doing for us. We get, perhaps, more real benefit from that work than from the work of any other governmental department.

MR. J. A. EDE: Yes, I think so, too.

(Applause.)

CHAIRMAN COLLINS: I do not see Dr. Lindgren here. I have heard nothing of him or of his paper. Following that on our program is Mr. Tupper, Mr. C. A. Tupper, of Chicago, Illinois. Is Mr. Tupper here?

(No response.)

CHAIRMAN COLLINS: The position of a chairman of a sectional meeting whose speakers have not turned up is not an enviable one. It is very much like the play of Hamlet where the noble Dane is left out. Is Mr. Ruhl here from Joplin? Mr. Otto Ruhl?

MR. OTTO RUHL (Missouri): Yes, sir, if the chairman please.

CHAIRMAN COLLINS: Mr. Ruhl, would it be convenient for you to give your address at this time?

MR. OTTO RUHL (Missouri): Yes, Mr. Chairman.

CHAIRMAN COLLINS: The name of Otto Ruhl, I may say, is so well known that it is unnecessary to say anything further. His name is one of the best-known names in that district. I introduce Mr. Otto Ruhl.

MR. H. I. SEEMAN (Colorado): I would like to know whether there is not an export duty on certain metals from Mexico, which might have a bearing on this discussion?

MR. RUHL: There is, yes, sir, and the Carranza Government, according to what has been reported, is placing an export duty on both lead and zinc.

MR. SEEMAN: Yes, that is my understanding.

MR. RUHL: That will greatly interfere with the recent importation from Mexico, cutting down the importations from the previous month's to the last month's report, to the amount of something like 8,000 tons, but whether that will continue or not, of course, is outside of our province, and we cannot rely upon Carranza doing anything for us.

MR. SEEMAN: No, and I thought it might have a very important bearing on any duty we might put on it. They would raise the duty so they would keep that commodity in their own country, and we possibly could not get anything from that country, just following out the policy of British Columbia.

MR. RUHL: That is quite true, Mr. Seeman, that is, with this exception. In Mexico, conditions are such as to practically forbid a zinc smelter within the boundaries of the country of Mexico. They are pretty nearly forced to send all ores either to this country or to some other country.

MR. SEEMAN: Well, she has just as much oil as we have.

MR. RUHL: But that has not been developed until recent years, however.

MR. SEEMAN: Well, we will own it after a while.

CHAIRMAN COLLINS: I think I can point out and remind Mr. Seeman that even more important than cheap fuel in zinc smelting is skilled labor, which these companies have to hire, and it takes a long, long time for them to train it up, and there is hardly any conceivable prospect of that class of labor being developed in Mexico under the conditions that apply now, or that will apply for the next generation.

MR. SEEMAN: Mr. Ruhl's paper will undoubtedly appear in the printed proceedings?

CHAIRMAN COLLINS: Yes, it will appear in the proceedings and I am sure we will all read it again with great pleasure.

MR. SEEMAN: Yes, and I want to go over it carefully, as it is something that requires a great deal of attention, and it is replete with valuable information.

CHAIRMAN COLLINS: That is certainly so.

SECRETARY CALLBREATH: Gentlemen, we will arrange a better room for you tomorrow, and we will have to announce where it will be.

CHAIRMAN COLLINS: Mr. Secretary, I would like to ask you whether any further word has been received from Dr. Lindgren.

SECRETARY CALLBREATH: I have just received a telegram saying that he would not be here. I had a letter saying he would be here.

Dr. Lindgren's paper will be found on page 435 of this report.

CHAIRMAN COLLINS: And Mr. Weed; have you heard from him?

SECRETARY CALLBREATH: Mr. Weed will not be here. I had a telegram from him this morning saying that sickness prevented his coming.

CHAIRMAN COLLINS: That very largely interferes with our program, ladies and gentlemen. I was going on to say that if there is any discussion on the subject of Mr. Ruhl's paper, it would now be very much in order.

I am reminded of one aspect of the subject upon which Mr. Ruhl did not touch, and I think it is one which concerns us all, whether we are free traders or protectionists, whether we believe in compensating duties, or in duties for revenue only, and that is the possibility that may arise in case of war. Every nation has had it brought home to it within the last two years that war, under modern conditions, increases the requirement for all common metals, and some of the uncommon metals. Any nation is apt to have its supplies from the outside cut off entirely as the result of war. It is a very strong argument, and one to which insufficient weight has been given heretofore, in favor of the protection of home industries, that when we have a home industry established, we are better fitted, in case of war, to suddenly develop the output to the full requirements under war conditions. If we have to start in after war to develop the materials which war requires, we are going to be at a terrible disadvantage for the first year or two of any war, and the first year or two is very apt to tell the entire tale.

If there is any discussion on this paper by the meeting, it is proper at this time.

MR. M. H. BREDE (South Dakota): Will Mr. Ruhl's paper be published?

CHAIRMAN COLLINS: Yes, in the proceedings it will be published.

MR. BREDE: It is one of the best papers I have ever listened to, and I would like to read it carefully.

CHAIRMAN COLLINS: Well, it needs careful study and deserves special attention.

MR. HENRY LONG (Wisconsin): Mr. Chairman.

CHAIRMAN COLLINS: Mr. Henry Long, Wisconsin.

MR. LONG (Wisconsin): One question is not quite clear to me and that is on this question of a revenue basis without its doing harm. Take on the smelting in bond, with the benefit of the draw-back, when they get 99 per cent draw-back and there is one per cent retained, only one per cent retained for the Government, that is not sufficient to defray the clerical expenses, and I would like to ask what benefit does the Government derive? That is, if there is a heavy exportation? That is one thing Mr. Ruhl did not touch on, and that was not quite clear to me and I have never been able to find out about it.

MR. RUHL: Yes, I understand that.

CHAIRMAN COLLINS: Mr. Ruhl, would you mind coming up here in front so that all the audience can hear you?

MR. RUHL: Well, I wish to say that Mr. Henry Long has correctly stated the position the Government takes with respect to duties under both the revenue and the protective doctrine. There is a good argument in his statement there, of course, of retaining the correct proportion of the duties, no matter whichever doctrine is adopted. I believe the Treasury Department of our Government has long contended that the retention of simply one per cent of the duties under the drawback clause of the tariff schedules is not sufficient to pay the expenses of the custom houses, and all the other expenses involved in the book-keeping system which must be kept up but, as affecting either one of the doctrines, it does not enter into the question, because it applies in both instances. That is simply a matter which must be taken up with new policies of the Treasury Department, rather than either of the two doctrines involved in the tariff policy.

MR. LONG: Well, they assess you on an income of 100 per cent, and if you get a return only on from 85 to 90 per cent that is recoverable, where do you get off?

MR. RUHL: Yes, that is true.

MR. LONG: The Government should make its tax on the recoverable values.

MR. SEEMAN: I think so, too.

MR. RUHL: That has been done to a large extent, Mr. Seeman, by the Treasury Department rulings. I think, in the case of zinc, the recoverable quantity is placed at 84 per cent, but under the present tariff law, of course, that is not the easiest thing with us, but it is assessed on the value of the ore. In the country from which it is imported, regardless of what we recover, of course, your market value there would be determined by what you could recover, but, under a specific duty, so much per pound metal content, that would be taken into consideration at the time the duty would be levied, as to whether it would be a compensating duty or not.

CHAIRMAN COLLINS: Are there any further questions or remarks on Mr. Ruhl's paper? If not we will next listen to a paper by Mr. C. A. Tupper on the subject, "The Mining Industry; Its Magnitude."

Mr. Tupper's paper will be found on page 318 of this report.

CHAIRMAN COLLINS: Mr. Tupper was announced here to give an address. Failing Mr. Tupper, Mr. W. J. Kelly, who is here, and who had been requested to deliver a paper on the conditions of Mexico, some time preceding this, and who was unable to do that at the time, because of absence, but is now here, and I believe he has some notes and would perhaps be willing to give us the benefit of his remarks at this time. Mr. Kelly.

MR. WILLIAM J. KELLY (Chicago, Ill.): Mr. Chairman.

CHAIRMAN COLLINS: Mr. Kelly.

MR. WILLIAM J. KELLY (Chicago): Mr. Chairman, Ladies and Gentlemen and Brother Miners: It is a high honor to be invited to speak before the first convention I have had the pleasure of attending.

A short time ago I was requested by the officials of the American Mining Congress to write a paper on mining conditions in Mexico, with which I am very familiar. On account of my absence from the city at that time I did not see my way clear to do so. I returned from Mexico, however, only a few weeks ago, and found it possible to attend this convention.

While in Mexico I endeavored to study conditions there very thoroughly. I have also studied press reports published in our own country in regard to conditions in Mexico; and I desire to present to you today a few of the conclusions to which I have come in my own mind, as to the conditions prevailing at the present time in the Republic of Mexico, and the relation which they bear to the conditions now existing under which valuable ores are produced in our own land.

I have listened with great interest to the highly illuminating papers which have been presented by our friend from Joplin, in regard to the tariff for revenue as relating to a compensating duty on lead and zinc ores. I desire to say that it has never been my pleasure to listen to so valuable a dissertation on one of the most complex and vital phases of our mining industry.

This paper on the duties levied on ore was particularly interesting to me, as while I listened I could not help but remark in my own mind on the conditions existing in Mexico with relation to such duties. In the Republic of Mexico, under the reign of Porfirio Diaz, the tariffs on ore were two and one-half per cent. Just think of it, ladies and gentlemen here present! Two and one-half per cent for all three ores, whether it was low or high-grade ore. We could not ship anything from the Republic of Mexico into the smelters of the United States located at El Paso, Texas, or at any other place in the American Republic to be smelted, unless we paid the exorbitant tariff of two and one-half per cent. This tariff took from us the major share of our profits on the low grade ores. Confronted with this situation, there was but one thing left for those representing the American capital invested in Mexico to do. We had to leave all the low grade ores on the hillside near our mines, away down in the Republic of Mexico or else, failing that, we had to procure some form of concentration or stamping looking towards making a higher grade of ore out of the lower grade ore before shipping the same out of the Republic of Mexico into the smelters located in the United States.

There exists at the present time in the Republic of Mexico a state of anarchy. But even where the country is peaceful, under present transportation facilities, or with transportation facilities as they existed before the warring factions uprooted the different railroads from their very beds—even at that time you could not get ore out except by shipping it away around to Monterey, or away down to Vera Cruz, or to Tampico, or else come back to El Paso, where you could get into our own country by paying this highly exorbitant tax of two and one-half per cent. With these conditions in mind, therefore, I will endeavor to relate to you a few of the disheartening experiences suffered by the miners of Mexico.

To distinguish the transportation problems confronting the two groups of miners, that is, the American miners and the Mexican miners, I think it will be necessary for me to call your attention to the transportation facilities offered to the miners of America.

Our systems of transportation are the greatest in the world; but in Mexico, unheard of conditions exist. Some of the mines are as far as 150 miles away from the site of a railroad, others are 65, 75 or 80 miles. Some few are within four or five miles. The ore must be taken down the tortuous trails of the mountainsides of Old Mexico upon the backs of burros. Many is the time that I have sat in the valley and seen in the far distance a pack train of burros winding its way down the steep mountain side with its burden of treasure, and have wished with all my heart that the miners of Mexico might be furnished with even a small percentage of the advantages enjoyed by the American miners in the way of transportation facilities. Those are conditions that existed even during the reign of the great dictator, Diaz, who, as you all know, until the time of the revolution, held the country in the grip of his iron hand. He was a dictator withal, but he maintained some semblance of peace. But with the onset of the various revolutions, business stopped entirely.

During the reign of the Madero government, that is, while the revolution was in existence, everything practically came to a standstill. However, after he was once elected and placed upon the throne—for that was the true significance of his election—the mines all opened up, and their owners began pumping out the water with which their mines were filled during the time of the revolution, when they had to stop their mining operations. However, coal was practically impossible to obtain

because of the lack of railroad facilities, and the result was that again, after this first disheartening experience, the miners of Mexico were again practically driven out of business.

But after the assassination of Madero, the country immediately became much as it is today, the most dissipated country on God's green earth; a country ravished by fire and sword, a country filled with thousands of motherless and fatherless children, a country filled with hungry mothers and starving babes. That is the Republic of Mexico today.

I have lived in the country, I know the people, and I returned from there but a few weeks ago. I returned from the midst of that cataclysm of anarchy, death and fire, starvation and pestilence, into the peace and plenty of America. While there I talked with and listened to many intelligent Mexicans. At the present time I find that the country is very much split on the question of Carranza. Many regard him as a high-minded benefactor of the poor, while others regard him as a treacherous robber. It is this division of thought which is creating many factions.

It is a great pity that for the sake of humanity, for the sake of those millions of our fellow beings who are starving, something cannot be done for that God-forsaken country.

There is no more productive country in the whole world than Mexico. When our crops are burning up here from drought and sun, crops in Mexico, under the beguiling hand of a most equable climate, surpass in luxuriant growth anything I have ever seen.

There is no other country on the face of the earth which can recuperate itself quicker from its troubles than Mexico can. They can be broke today, and be a financially sound government tomorrow. The soil of Mexico is so fertile that they can produce any class of crops. The hills are filled with very rich minerals. When the trouble in Mexico settles down, which it is certain to do before very much longer, men who are interested in that country know that it will be impossible to keep American capital out of Mexico, since it knows the great advantages to be reaped from that land in the way of mining, ranch lands, coal fields, oil fields and timber. There are many millions of acres of land in that country which are far superior to any which we hold in the United States.

But while Mexico is wonderfully rich in natural resources, her people are bound down to servitude by the enmeshing grip of ignorance. Throughout the whole length and breadth of the land they know neither Christianity nor education.

Ladies and gentlemen, and our honorable chairman, I thank you.
(Applause.)

CHAIRMAN COLLINS: I am very sure that we are all extremely obliged to Mr. Kelly for his eloquent address.

I am sorry to say that, owing to the absence of three of our speakers, it leaves us practically with no business before this section for the remainder of the afternoon unless, perchance, some other gentleman has something he wishes to say.

Upon motion, duly carried, the meeting adjourned.

METALLIFEROUS SECTION.

Wednesday, November 15, 1916.

AFTERNOON SESSION.

Mr. A. A. Codd, Reno, Nevada, presiding.

CHAIRMAN CODD: The Metalliferous Section of the American Mining Congress will now come to order. Ladies and gentlemen, to open these discussions on time seems almost impossible, and this is rather emphasized today because of the change of our meeting place from the upper floor to this larger room.

The request has been made that the speakers will announce their names and the states from whence they come, so that the reporter can make a correct record.

The first paper which is on our regular program is Mr. W. R. Allen, of Butte, Montana, who is not present and has not sent a paper, so we will have to forego that part of our program. The next address is "The Marketing of Zinc Ore," by Mr. W. B. Shackelford, of Webb City, Missouri. We will now have the pleasure of hearing Mr. Shackelford.

(Applause.)

MR. W. B. SHACKELFORD (Missouri): Mr. Chairman, Ladies and Gentlemen: The topic assigned to me is one dealing with the sampling and the marketing of zinc concentrates in what is known as the Joplin district, a district which embraces northeastern Oklahoma, southeastern Kansas, southwestern Missouri and northwestern Arkansas.

The methods of marketing there are open market sales. There are, I presume, from 15 to 16 different smelting companies who have offices in our district and are represented by buyers for their particular concerns.

The concentrates are prepared and are sold to the buyers in the bin. The buyers bid for these ores. While the bidding is not always competitive bidding, and there may be times that appearances indicate there is a sort of a gentleman's agreement between the buyers as to what price shall be paid, the price paid for the higher grade ores, which we class, in speaking of high grade ores, as lead-free ores, which run 60 per cent or better metallic zinc, and such ores usually form the market, make the market, as it were, and the price paid for these ores is usually based very closely on a ratio between the day's spelter quotation, or the spelter quotation in East St. Louis. This ratio is generally about eight to one, that is to say, take an ore that we would receive \$80 base for, on an eight to one ratio, spelter in East St. Louis would then be quoted at ten cents. Sometimes this ratio is not so good as eight to one. There have been times when it has run better than nine to one. When the ores became scarce and the smelters had contracts that required ore, it ran better. The old method obtaining some twenty years in that district was a little different than the one in use now.

Then a buyer would go to your bin and offer you so much per ton for your ore without regard for its metallic contents, or without regard to the amount of moisture the ore would carry. The present method is one in which the buyer purchases the ore on an agreed assay basis. The ore is then loaded in the cars for shipment and the buyer takes one sample and the seller takes another sample, and there frequently is an umpire sample taken, so that if there is any wide difference in the assays, that is, between the two samples, the buyer's and the seller's sample, the umpire sample can be run to determine the amount to be paid in for the ore settlement. The ore is bought, as I say, upon a basis agreed upon; the determinations in running the assay are usually for zinc, iron and moisture. However, when ore carries quite heavily in lead there is sometimes asked a lead determination.

Taking a 60 per cent ore, we receive \$1 for each per cent over 60 per cent in settlement, and are penalized \$1 for each per cent under 60 per cent. We are allowed one per cent for iron. That is, if your ore carried one and one-half per cent of iron, you would be penalized 50 cents. The moisture is simply deducted from the total gross weight of the shipment. The mean of the two samples is taken to determine the basis of settlement. It is very seldom that we have differences of any consequence. Sometimes there are shortages claimed in weight, and if indications point to the scales being out of balance, the seller usually makes that good. If the shortage appears to have occurred in transit, the loss is upon the buyer. All settlements are cash upon determination of the assay. That form of settlement is used entirely in the Joplin district, and I presume originally started from the

fact that in the earlier history of our district, many of the smaller operators producing zinc ore were men that had very little means and they required the cash so they could meet their payrolls and pay their supply bills. This system is still in existence today, and when we appear with our assay and check with the buyer, we immediately receive a check for the full value of the ore.

I know of no contracts in force in our districts, although I think at one time there were some contracts in existence in Oklahoma that were made by smelters who purchased largely western ores. I understand that all such contracts have expired.

The penalties sometimes apply to excessive lime in the ore. Some smelters refuse to buy any ore that carries over one per cent lime, and some will limit you to two per cent, but you are usually penalized for lime contents above two per cent.

That is about all that can be said about the marketing of the zinc ore in our district. That is the usual form of marketing ore and the system of settlement.

If there are any questions, and I hoped in presenting this matter before you, that it might bring out some controversy, or expression of opinions from some of the western people as to whether our system was as good as the one that they use. They contract most of their ores, I understand, that is, whether or not there could not be some system of settlement arrived at that could become more generally universal through all this zinc producing country.

The one thing peculiar to the ores of our district is that they are not complex in their character like the ordinary western ore. In our district the ore values are zinc and lead. Sometimes we get an entirely lead-free ore, but generally they carry a small percentage of lead—of zinc.

Now, if there are any questions to be asked in regard to anything that I have stated or have omitted to state, I would be very glad to answer them.

MR. H. W. SEEMAN: Are you acquainted with the method of settlement obtaining for the ores coming from Montana?

MR. SHACKELFORD: No, I do not know the basis of those contracts, Mr. Seeman. I understand, though, most of their ore is contracted. I did hear, that during the period when we were receiving \$135 a ton for our high grade ores, that the Butte-Superior ores were bringing a much higher price than that, due to the fact that they had a contract, and that that contract was based on a certain ratio between metal and ore, and during all of the time that we were receiving this high price, the quotation on prime western spelter was around 24 or 25 cents at East St. Louis, and there was a spread between ore and metal of from \$95 to \$100.

MR. SEEMAN (of Illinois): Mr. Shackelford, may I ask you another question?

What I had special reference to was this. I understand the concentrates there, many of them, carry not only lead and zinc, but some gold and silver, and I was wondering how they paid for the contents other than lead and zinc.

MR. SHACKELFORD: I do not know their method of settlement, Mr. Seeman.

MR. GEORGE E. COLLINS (Colorado): So far as Colorado is concerned, every producer is a law unto himself and there is no limit. One contract of my own provides a base price for the zinc, based on 50 per cent, with \$1 deducted for each per cent below 50. Now we never get to 50. That for us is an unattainable ideal—50 per cent of zinc. The product we market assays anywhere from 38 to 45 per cent; occasionally we get down to 36 or 37 per cent, but the average is about 41 or 42 per cent.

Now, as to the residue value, or the value of the other metals, such as lead, and so forth. Without disclosing any confidential details I should say that the usual contract offered by zinc smelters covering the residue values, would be 60 per cent of the gold, silver and lead contained. We ourselves get a rather more favorable basis than that.

MR. SEEMAN: May I ask you how about the copper contents?

MR. GEORGE E. COLLINS: The copper?

MR. SEEMAN: Yes.

MR. GEORGE E. COLLINS: The only contract I know of personally that allows for copper, outside of the United States Zinc Company, is one I have myself, in which case we are paid 60 per cent of the dry assay. The shippers have to pay the treatment and freight to the lead smelter on the residues.

A great many of the smelters in making contracts offer to save your residues for you and deliver them to you for shipment f. o. b. cars. The objection to that system is, in the first place, that the best metallurgical practice for the zinc smelter is often attained at the expense of saving of residue value, and there is therefore, a difference of interest between the smelter and the miner.

Another objection is that while the zinc smelter will guarantee in his contract to use every possible endeavor to save the residues, we know they are usually dumped out of doors in the open air without any protection from the wind, and the loss in weight is very high; so that most of us usually prefer to sell on a contract where we are paid specific percentages of the assay value of the original ore.

Now, there are two questions I would like to ask Mr. Shackelford. He spoke of basing his sales on St. Louis or East St. Louis prices of spelter. How are the prices arrived at? We have had a good deal of discussion on that subject. Nearly all of our contracts provide for taking the average of the Engineering & Mining Journal quotations.

MR. SHACKELFORD: Yes, but that is very much under the published quotation.

MR. COLLINS: It is often very much under the published quotation, but what is the latter based on?

MR. SHACKELFORD: The published quotation in our district is furnished by the daily papers, and it is right in line with the quotations furnished by the American Metal Market Reporter, published by Trench & Company, and Trench's quotation is usually anywhere from 15 to 20 points higher than the Engineering & Mining Journal's quotation. At least that has been my experience.

MR. COLLINS: Yes, that would be my own observation, but I may say that so far as I know, all western producers sell on the Engineering & Mining Journal's average quotations. We have to use the best we can get.

There is another question I would like to ask Mr. Shackelford. You spoke of the car samples. Now, how are those obtained?

MR. SHACKELFORD: Why, after the ore is loaded in the car the buyer produces what we call a gun, which is a long, cylindrical tube, a little bit smaller at the bottom end than it is at the top end, and that is plunged down into the ore pile in probably 15 or 20 places, scattered over the area of the car, and the contents of that tube are dumped into a container, and it is thoroughly rolled and mixed and the sample is finally made up out of the last sample quartered out.

MR. COLLINS: I may say, with respect to the property under my control, that we are utterly unable to get accurate samples in that way. We usually take samples of the products we make at several different stages in handling.

MR. SHACKELFORD: Yes.

MR. COLLINS: We take that kind of a sample in three different stages, and they never exactly agree. I wonder whether pipe samples are any more dependable at Joplin than they are with us.

MR. SHACKELFORD: Mr. Collins, do you know whether your concentrates are reduced to the fine size ours are?

MR. COLLINS: Yes, Mr. Shackelford, a large portion of our concentrates will go through a 200 mesh screen.

MR. SHACKELFORD: We find this system very satisfactory and we get very close results. It is very seldom that we ever get so much as one per cent variation between the buyer's sample and the seller's sample.

MR. COLLINS: It is all the same sample, isn't it?

MR. SHACKELFORD: Yes, they practically are, but they are run by two different chemists. The buyer takes his sample to his chemist and we take our sample to our chemist, and the mean of the two chemists' determinations is the basis of the settlement. If there is a difference between the buyer's sample and the seller's sample, if that difference is not over one-half of one per cent, we pay no attention to running an umpire sample. However, if that difference is over one-half of one per cent, we run the umpire's sample.

The samples on which we make our settlements are taken at the smelter in the presence of the seller's representative.

MR. COLLINS: With respect to the difference between the assay of the buyer and the assay of the seller, we do not have very much trouble there, excepting that the smelter's assays are almost invariably lower. For instance, on my present contract we have to split on a difference of one-half of one per cent. Unfortunately, the smelter's assays are usually three-tenths or four-tenths under ours; just enough to compel us to split. However, where the difference is greater than five-tenths, of course, we get an umpire and then we settle on the umpire.

MR. SHACKELFORD: Well, I can say with regard to that point, that very often in our district the buyer's assays run higher than the seller's.

MR. SEEMAN: How do you arrive at your moisture sample? How is that taken, Mr. Shackelford?

MR. SHACKELFORD: That is taken in the ordinary manner. The sample is taken with a gun from the car by gunning the car. It is taken through the tube, and the contents of that tube are weighed, and then the moisture is evaporated out of it, and the chemist weighs it and gets the percentage of moisture in the ore. The only difference is that we get a little higher, or, rather, we get a little wider apart on the moisture than most anything else. The buyer's moisture sample as a rule runs a little higher than ours does. That is a little more out of proportion than the other items of determination.

MR. DAVIS: Would it not generally be the case that the sample taken from the bottom of the car would be a great deal wetter than the sample taken from the top?

MR. SHACKELFORD: Well, I hardly think so. The ore is not usually one day in loading, and very frequently the ore has laid in a bin for several days before being loaded, and we do not find, as a rule, that the moisture determination is any heavier by reason of being placed at the bottom of the car, or a sample being taken from the bottom of the bin, for your bin is drained or arranged so that it drains. We do not find very much difference in it, for we even go so far, taking it in wet weather, if your concentrate pile is exposed to heavy winds, to use a hose and we wet it down in order to keep it from blowing away, and we wet it at the time we are loading it sometimes, but it does not seem to make any appreciable difference in the moisture determination.

MR. SEEMAN: In watching your operations in that district, I noticed almost invariably your bins are out of doors uncovered, and it always struck me as being a rather crude manner. Why do they not use bins which are under cover, and then discharge from those bins

into your wagons, for you do use wagons in hauling to the railways, and then why do you not discharge by gravity instead of all that unnecessary shoveling? Of course they pay the expense, they pay for it as it stands, but that would be reflected upon the producer. It seems to me the methods are very crude in the manner of handling the ore.

MR. SHACKELFORD: Well, that is probably just one feature we have not become educated up to yet. That must be the only reason we have not adopted it.

MR. SEEMAN: Well, I asked an explanation of that when I was down there. I asked one of your most prominent producers why they did that and he said, "We should worry, because the ore buyer has to pay all that as he buys it, you know." But his answer was not satisfactory to me at all. It seems to me that is a very great waste, and a lack of good judgment, but I know that whenever a mining man goes into a new section he adopts their methods. I was asking this question just for my own information.

MR. SEEMAN: But you would have something to do with that, for if it did not cost the other fellow so much to load it you would make on it in the long run.

MR. PAUL A. EASBY (Missouri): It would be a matter of quantity and not of grade, and to make the arrangement and put it into the condition you speak of would cost more, and you would use it only a very short time, and it is not worth the expenditure of the money. The matter has been considered plenty of times, and there have been two or three of the larger mills that had it put in that way, but they cut it out and went back to the old method, the one that is in present use.

CHAIRMAN CODD: Well, we are very much obliged to you, Mr. Shackelford, for your address.

(Applause.)

CHAIRMAN CODD: The next address will be on "Oil Flotation," and, in place of Mr. Lyon, of Salt Lake City, at this time, Mr. H. J. Stander will give us a talk on that subject.

Mr. Stander's address will be found on page 510 of this report.

MR. STANDER: If there are any questions I would be glad to try and answer them.

MR. A. A. NORTON (Illinois): I would like to ask the speaker if it is not necessary for each locality to have a different kind and quality of oil, for the treatment of the ore in that particular locality. In other words, localities will differ as to the ingredients that go into making up the flotation method processes? There is quite a difference, is there not, in localities?

MR. STANDER: I am connected with an oil company in this country, so I do not very much care to talk about the oils, because I have certain patents and certain concessions on oils, but, however, I will say this: I do not think every ore needs a different oil. I do believe certain ores require different oils. That is, you cannot take, for example, coal, tar and fuel oil and refine into creosote mixed and make that work for any kind of ore, whereas that mixture of coal, tar, fuel oil and refined creosote may work for one or more ores, or may work for the copper ores in one district. That does not mean that if you go to the next ore you can use the same mixture for almost a similar copper ore, and, of course, that applies to lead or zinc ores and all the others.

MR. SEEMAN: How closely did you work out the Nickel Company proposition?

MR. STANDER: I warned you specifically, sir, not to question about the Mont Nickel Company. However, I will say this, that I spent about ten days in that country, and the Mont Nickel question is the hardest problem to my mind in this country, so far as the proposition of flotation goes.

MR. SEEMAN: I know that Dr. Schwartz worked up there for a long time.

MR. STANDER: And they are just as far away from solving the problem—and I do not believe that they will criticize me for saying that—as they were when they started. That is why I say that if many of our so-called flotation investigators would take up a problem like that, that they would do much more good than working on the gas and electrical theories. I am not criticizing those investigators, because I believe that we need that also, but I know that if I had the time or I had any man working for me on flotation all of his time, that I would give him a problem like the Mont Nickel Company's problem, or the problem of the Canadian copper people, in the cobalt district.

MR. COLLINS: I am afraid, if a good many of our scientific investigators tackled a hard nut like that, they would go out of the investigating business.

MR. STANDER: I do not agree with you.

MR. COLLINS: But there is one point, Professor, I do not at all understand. If it be true, as I gather it to be the upshot of your paper, and as I am personally inclined to think myself, that the essential factor in the flotation is the film, or that, in other words, the bubbles act rather, in the capacity of multiplying the amount of surface, why is it then that in many cases differences in oil should be so all important? One would think that if your oil conditions, which maintained the significance that you have described, that is, the essential thing in all cases, that one oil should do, yet it certainly is not the fact in my own experience, that one oil would do, and I never received from anybody the least hint as to why that is so, that in some particular cases only one oil, or only one combination of oil will serve at all. I never understood that myself and I never received from anybody else any hint that will explain it.

MR. STANDER: That is indeed a very, very hard question. I have been trying all along in this little discussion here to keep from answering anything of that kind, that is, why it is that one oil would have a different action on any one ore than any other oil. According to my opinion, believing the air film or water surface played the most important part, the solubility of one oil is not the same as the solubility of another oil, and secondly, the effect of one oil on the surface tension of the water is not the same as the effect of a second oil on the surface tension of the water. Also, as you gentlemen know, we classify all flotation oils into two big groups or classes, one of them the frothy oils and the other the collecting oils. Now, if anyone should ask me what is the difference between a frothy oil and a collecting oil, I know that it will take at least a half hour to answer it. However, briefly, as we would imagine, a frothy oil is an oil that gives you an emulsification.

Gentlemen, I have been criticized for using the word "emulsification," but I cannot find any better word—saponification, and one oil will give you a better froth, just as a collecting oil will collect up more of the sulphides than your frothy oil. You know the depth and the breadth of the collecting oil, but what is the difference between the real action of those two oils? That question would be quite a hard one, but I believe thoroughly that the action of one oil on the surface tension of the water and its solubility, as compared with the action on the surface tension of the water and the solubility of the second oil, that that plays a very important part.

MR. J. H. SHARPE (California): There is a question in my mind, a problem in my mind, and you do not need to answer the question if you do not wish to, but we have spent a great deal of money in trying to handle free milling ore that won't free mill all the time. In other words, we send down the creek about \$2 for every ton we handle. Say we handle \$25 ore, and get \$5 or \$6 of tailings, we send about \$2 down

the creek. The alleged reason, as put forth by the chemists who handle that end of it, is that it is a question of the presence of graphite in the ore. Now, I would like to ask you what is your judgment as to how this graphite problem could be handled by the assembling of oils? Now, those are things with which I am not very familiar. In other words, have you had any experience regarding gravity free milling ores, where the values go down the creek?

MR. STANDER: No, sir, I have had no experience in that at all. If I understand you correctly, the graphite hinders the flotation in your ore.

MR. SHARPE: We do not use the flotation process. We crush our ore. We mill our ore, and we crush to a reasonable fineness, say, 80 to 100 mesh, and the graphite seems to take a certain percentage of the free gold, and it just goes away down the creek. Now, when it gets into the cyanide plant, some other chemical reaction takes place, so that we have invariably from \$1.80 to \$3 a ton that goes down the creek, and that is the money that I would like to get.

MR. STANDER: I am indeed sorry that I cannot answer your question, but I believe that we have practical gentlemen here that are in charge of flotation work in the universities, and I would be very glad if you would all make a note of a question like that. That is another question that we can surely give to our investigators. I have had no experience in that.

PROF. H. C. RAY (University of Pittsburgh, Pittsburgh, Pa.): In connection with this matter of oil flotation, I wish to note a few observations made in connection with practical work, which may in part settle this question of why some oils act in one case and not in another, and why one oil should not work in all cases. The speaker does not mean to prove that this is the true explanation, but offers these few remarks for what they are worth.

The work done by me, which unfortunately was limited by time, seems to indicate that the chemical composition of the ore and the mill water plays a great part in flotation and on the re-agents used. Not necessarily those elements occurring in larger percentages, but some of the more obscure elements, present in some cases in small quantities.

It is a peculiar thing the part the impurities in the water play, either those present originally in the water or those obtained by solution of certain substances in the ore. Hoover tells in his book, "Concentration by Flotation," of a case where some swamp water caused the stoppage of the process, which trouble was immediately remedied by going back to the other water.

Now those of you who have done practical work in flotation know that the testing in the laboratory is ordinarily done on dry ore. Now we found at the Butte and Superior mill, where I have worked several summers, that in order to more nearly approximate mill result it was necessary to use mill pulp with the original mill water present. And by several actual mill tests it was found that by cutting down the amount of the fresh water in the system that the results could be varied somewhat. Further, it was noted that certain oils acted better to counteract these conditions than others. This seemed to show in a general way that certain types of oils reacted best when certain substances were present, or on the other hand better when certain substances were absent.

The mill water was analyzed and we found that certain metallic compounds were in solution in it, notably calcium and manganese sulphates. Zinc was also found present in small amounts. Then working under standard conditions with clean water, certain substances were added in varying percentages and the result on the recovery noted. It was found that some of the substances had a marked effect. Further tests seemed to show that in varying the oils, that this effect from the chemical was nullified, lessened or accentuated, in several cases to a

marked degree. The work was not carried to any definite conclusion by the speaker because of the press of routine work.

Now, I want to speak just a word with regard to the paper read by Mr. Shackelford, in answer to a question by Mr. Collins about the sampling of zinc concentrates by the so-called pipe method.

Several years ago all the concentrates, both mill-zinc and flotation concentrates, shipped by the Butte and Superior, were sampled before leaving the mill by this method. At some of the smelters the concentrates were being sampled in the same manner, but at the greater number the material was sampled by more approved methods, in some cases by mechanical samplers. At those samplers using approved methods, the control samples submitted to the Butte and Superior almost invariably ran several per cent higher.

My explanation of this is that in sampling with the pipe there is a tendency to miss the bottom layer because of the difficulty in withdrawing the whole of the core. Since at the Butte and Superior mill the concentrates were put in the car rather wet, sometimes almost "soupy," there was undoubtedly some tendency for the richer blende to settle out, and if a perfect core were not taken, the sample would be lower. As I did some of this sampling there, I know that it was very difficult to obtain a perfect core with the pipe. It doesn't seem that there could be enough settlement in the short time to cause any segregation, but it was noted that the lower the grade of concentrates the greater the disagreement between the two samples. Whether this method of sampling is still used and whether the disagreement is still found I cannot say. The concentrates shipped now are, of course, much drier.

Some gentleman asked whether the water collected at the bottom. It may in the coarser sizes, but in the finer flotation concentrates a condition analogous to water in concrete when being worked is seen.

CHAIRMAN CODD: Gentlemen, I am sure that we all appreciate this valuable paper. (Applause.)

We also have before us another paper on this subject by Mr. Dorsey A. Lyon, of the U. S. Bureau of Mines. Mr. Lyon is not present, but Mr. Seeman has kindly consented to read the paper for him.

Mr. Lyon's paper will be found on page 365 of this report.

CHAIRMAN CODD: This splendid paper will take its proper and regular place and be published in the proceedings of the meeting, and in behalf of this meeting I want to thank Mr. Seeman for the splendid way in which he has read this paper.

The next subject under discussion will be the address by Prof. C. F. Willis, of Tucson, Arizona, on "The Value of State Mining Organizations," by Prof. C. F. Willis, of the University of Arizona. Professor Willis.

Professor Willis' address will be found on page 564 of this report.

CHAIRMAN CODD: Well, ladies and gentlemen, are there any discussions to be had along the line of this most able talk? (No response.) I am sure that we all appreciate, and I desire at this time to express my appreciation to Prof. Willis for his most able presentation of the manner in which organization has been put to work in Arizona. Now, if someone will make a motion to adjourn, if there is no other discussion, I will be pleased to entertain a motion to adjourn.

Upon motion, duly made, seconded and carried, the meeting adjourned.

METALLIFEROUS SECTION.

Thursday, November 16, 1916.

MORNING SESSION.

Mr. H. W. Seeman, Illinois, presiding.

CHAIRMAN SEEMAN: This meeting will now come to order. Ladies and gentlemen, I have been inquiring from our Secretary and have been informed that we have two and possibly three out of the

seven or eight designated for our meeting here this morning. This is rather distressing, I think, to you as well as to me, and I do believe, and I am going to take this opportunity to announce that belief, that there should be some very forceful revision in the method of giving out subjects to the big men of the country to discuss before this Metalliferous Section, and then having the big men not to show up. This conference is attended by men from all over the United States, who come here from great distances, and who come here for the very purpose of hearing these talks, often leaving their businesses many times at great sacrifice, merely to listen to the papers by the big men of our industries who are announced weeks and weeks in advance, to give us some paper of real interest, because it is only those men who have given the matter long months and years of study that can discuss it properly and answer our question. For instance, I myself am very much interested in Mr. Frederic Laist's development at Anaconda, and I personally have given up matters of considerable importance this morning to come here and listen to this paper, but he is not here. Neither has he deigned to tell this conference anything as to his whereabouts or as to his intentions. Now, I am going to propose at some subsequent meeting that a revision of this method be made, so that we will have these men right at our meetings, Johnny-on-the-spot, or else we will have something in the way of a paper here from them.

(Applause.)

CHAIRMAN SEEMAN: I see that Mr. Parker has come in and evidently wants to say something to our section.

MR. E. W. PARKER: I want to request that any members of the Committee on Resolutions who may be present at this section, to meet at Room 1809 at 11 o'clock this morning, as we have two or three important matters to come before that meeting this morning, and, as the last general meeting is at 2 o'clock this afternoon, we of the Committee on Resolutions have to finish up this morning. I do not want to take away from you any of your audience, Mr. Chairman, but unfortunately the Committee on Resolutions has got to get a few things out of the way this morning.

CHAIRMAN SEEMAN: The first order of business is the report of Mr. E. B. Kirby, of New York City, Chairman in the Committee on Revision of Mineral Land Laws. I find that instead of Mr. Kirby being present, he has sent us a report, his committee report. If there is no objection I will read this in place of Mr. Kirby. Do I hear any objection? Not hearing any objection the same will be read. It is very short, gentlemen, and I will read it to you.

REPORT OF COMMITTEE

Upon the Revision of the Mineral Land Laws.

Gentlemen:

When the American Mining Congress a few years ago determined to bring about the reformation of the Mining Code, it appeared to many casual observers that the Congress had selected the most difficult and uninteresting of all tasks within its choice.

The foundations upon which vast structures stand are not exposed to view and never become subjects of popular enthusiasm. Only the few to whom this part of the world's work has fallen actively concern themselves about its workmanship, its safety and its effectiveness.

That the body of mineral land laws known as the Mining Code is the basis of all mining in the west and Alaska is generally understood. The industry is so vast and complex, however, that even within its ranks the overwhelming importance of this code to its health and its life is best realized by those who have had to do with the processes of creat-

ing mining property from public lands and also by those who are familiar with the record of such processes in past history.

Mining men know that it is fatal to the industry to treat mineral land like ordinary land; that an unwise Mining Code tends to rapidly paralyze the development of mining districts and that from ancient times mining men have had to struggle with the legislation imposed upon them by the superior power of non-mining men.

For over forty years, American industry has suffered increasingly from the defects of its Mining Code. By every means in its power it has called attention to these defects and has presented suggestions for their cure, but all to no avail. In the face of these past failures, the American Mining Congress undertook to secure the reform by an organized effort which would for the first time be persistent and also by adopting a novel and practical plan of action which has made an unusual appeal to the common-sense of mining men and legislators.

This was the idea that a work so technical and important as the revision of the Mining Code should be based upon the practical experience and judgment of those who are actually engaged in the industry. If their wisdom could be assembled and condensed for the use of Congress by a commission composed of men whose competence was known to the industry and this commission should hold public hearings for the purpose throughout the mining regions of the West and Alaska, then mining men could feel assured of a satisfactory result.

For several years the American Mining Congress has now been working for the appointment of this Commission; watching every chance at Washington and pressing its measure at every session of Congress. The discouraging indifference under which the work was begun has given place to a rapidly widening interest. The American Institute of Mining Engineers, the Mining and Metallurgical Society of America, and practically all the local mining organizations of the country have been actively co-operating in the work.

Two successive Administrations have approved the measure and two successive Senates have passed it. For two successive years the bill has nearly passed the House, failing once because of pressure of other business and again last winter through the causeless opposition of one man. It is clear that success is only a matter of continuing the patient and persistent work which it was known in the beginning would be necessary.

In the meantime while waiting for the next opportunity at Washington, the interest created has caused the Mining and Metallurgical Society of America to take up a discussion of the details of a new code. This valuable and important work is now in progress and is further stimulating and extending interest in the problems involved.

EDMUND B. KIRBY, Chairman.

CHAIRMAN SEEMAN: Are there any remarks upon report of the Committee? If not, we will pass to the next subject, "The Revision of Mining Laws," by the Hon. Charles S. Thomas, U. S. Senator from Colorado. Mr. Thomas does not appear to be present.

The next subject in our program is "The Foster Bill," by Dr. M. D. Foster, Chairman of the House Committee on Mines and Mining. Mr. Foster not being here, we will have to pass his name.

In the meanwhile we will pass to the next subject on our program, "The Prospector and the Apex Law," by Theodore F. Van Wagenen, of Denver, Colorado. Mr. Wagenen is not here, but he has sent us his paper, and I will ask Mr. Wright to read this, if you will, to the assembled multitude. Mr. Van Wagenen, gentlemen, by proxy.

Mr. Van Wagenen's paper will be found at page 224 of this report.

MR. KELLY (Illinois): Will this be published?

CHAIRMAN SEEMAN: Copies of all the papers that were read in any of the meetings thus far can be had at the desk, where they have them for distribution to the members.

CHAIRMAN SEEMAN: We will pass to the address of Mr. Frederick Laist of Anaconda, Montana, on "Electrolytic Separation." Mr. Frederick Laist. (No response.) Well, he is not here. Any further business we may have is open now for general discussion.

MR. J. H. ROBINSON (Arizona): It seems to me, Mr. Chairman, that in these meetings we have no co-operation among ourselves. As the Chairman stated, the subjects are assigned to the different members, and they fail to appear or even send their papers. It seems to me we are getting away from the object of the chapter. Now, as metalliferous miners, we overlook the vital point. Last spring in the Congress you will probably all remember the House of Representatives passed a highly objectionable bill. It placed a tax on copper as high as three cents a pound, and this bill, as I stated, passed the House and was referred to the Senate, and the committee that had this bill in charge sent it back to the Senate with recommendations that it be passed. Before final action was taken in the matter a few of the producing companies in the west learned that this bill taxed copper and eliminated all other initial products. They immediately got to work and took this matter up, and the copper tax was eliminated from the bill. Would it not be a wise act for this meeting, or for the Chairman of this meeting, to appoint a committee to watch national legislation, especially in the western states? If it had not been for one or two parties in the east at that time, this matter would have passed through Congress and would have been a detriment to mining especially.

CHAIRMAN SEEMAN: I would suggest, Mr. Robinson, that as you know we have a meeting tomorrow, that it would be wise for you to put your suggestion in writing and, through the Secretary have it presented for general consideration, because what affects us affects everybody. It is difficult to get the states into line. It is the duty of the Secretary of this organization, together with the officers, to thwart this various legislation, which they are trying to do, and present it to all of the members through the Mining Congress Journal. All of the laws affecting metalliferous mining or coal mining or oil or any of the allied industries are carefully presented in that journal. Then it is up to the members to get together, or to have some head through whom they can attempt to probe and find out what this legislation is, but I believe it would be wise for you to handle the matter by presenting some form of resolution in writing, which can be discussed at the general meeting.

MR. J. H. ROBINSON: Would it be out of order, Mr. Chairman, for you to appoint a committee from the western states, say Montana, Colorado, Idaho, California, New Mexico and Arizona, to take up this matter, one from each?

CHAIRMAN SEEMAN: Well, this is a very small section of the Mining Congress, and I really believe it should come before the general meeting, because there are many matters and many members who are not here who will be present at that meeting.

MR. THOMAS T. REED (New York): May I point out to Mr. Robinson that if he will turn to page 16 of this journal he will find that we already have something like sixteen or twenty committees on federal mining legislation, but apparently the trouble is too many cooks who spoil the broth.

MR. ROBINSON: I would like to have somebody on that committee that is on the job. Now, this matter that I spoke of is a matter that passed through Congress, it would have passed through Congress and passed through the House of Representatives and we had no news of it, or no word of it, until it had gotten through the committee in the Senate.

CHAIRMAN SEEMAN: Well, you know, Mr. Robinson, and if you do not I will state it for your information, the Mining Congress has a secretary at Washington who is appointed to take care of these

matters, and he has been rather Johnny-on-the-spot. They have had a great deal of service from Mr. Callbreath for this past year, and if notice of this legislation was not sent out, I am sure it was inadvertent, because I know that very careful and close attention has been given to all legislative matters affecting all kinds of mining, and I still say that I believe it would be wise for you to present this matter, so that everybody would understand it, and present it in a few words in a resolution so as to get some action. It at least can receive discussion.

What further business is there, gentlemen? I see the gentleman from Spokane has something to say. I can see it in his face.

MR. SIDNEY NORMAN: Nothing at all.

CHAIRMAN SEEMAN: He is a very live wire out in the west, as I remember distinctly being at the Spokane meeting and I remember him quite well from that meeting. Now, I would like to have a little expression from him as to what he thinks of attending a Mining Congress one thousand or fifteen hundred miles away from him, fully expecting to listen to the papers to be presented by some of our very prominent metallurgists and having none of them here. What have you to say about it?

MR. SIDNEY NORMAN (Washington): It has become sort of a habit with me, Mr. Chairman, to attend these mining conventions, having begun in the south in Goldfield in 1909, and I have followed them fairly consistently ever since. As for myself, I think it might be much better if this convention would dispense, in some large measure, with the technical aspect of the meetings, as that feature of the business, as I take it, being thoroughly covered by the meetings of our technical associations during the year. As a matter of fact, the technical men rather think the American Mining Congress is poaching upon its preserves when it has handled technical subjects. I should like to see some plan evolved by which the American Mining Congress would stick to the commercial side of the business, and I believe it would carry a more gripping invitation to the mining men from the west to come such a distance as this to attend these meetings. I do not know how it can be done, but that might be a question to be taken up and discussed.

CHAIRMAN SEEMAN: Are there any further remarks on this subject?

(No response.)

CHAIRMAN SEEMAN: Mr. Easby of Arkansas, or, I rather should say, of Joplin. Mr. Easby I know is very deeply interested in the zinc business. What paper did you come here to hear this morning, especially?

MR. P. H. EASBY: I came here to hear most of them I did not hear.

CHAIRMAN SEEMAN: Well, you have heard a few of them that I have read. Mr. Hegler, may I ask you why you came to this meeting this morning?

MR. HEGLER: Mr. Chairman, I came to this meeting this morning for the same purpose you did, and, likewise, I am as much disappointed.

CHAIRMAN SEEMAN: I know you came here to hear a Frederick Laist's paper on "Zinc Separation," because your partner did that same thing yesterday, and he didn't hear the paper he came to hear.

Is there anything further, gentlemen?

(No response.)

CHAIRMAN SEEMAN: Gentlemen, a motion to adjourn this meeting is in order.

MR. KELLY: I move we adjourn.

CHAIRMAN SEEMAN: You have heard the motion that we adjourn. Do I hear a second?

MR. WRIGHT: I second the motion.

MR. KELLY: When do we meet again?

CHAIRMAN SEEMAN: Well, at the next meeting scheduled in this pamphlet, this being, as you know, the wind-up of the Metalliferous Section; you will again be called to order at the grand ballroom this evening with your good clothes on, to eat and partake of Chicago's hospitality—at \$5 per.

The motion to adjourn having been unanimously carried, the meeting adjourned.

OIL AND GAS SECTION.

Tuesday, November 14, 1916.

AFTERNOON SESSION.

Judge Frank H. Short, of California, Presiding.

CHAIRMAN SHORT: The first matter I find on the program is "The Authority of States to Tax Production from Indian Lands"—Hon. J. G. Gamble, Des Moines, Ia.

MR. GAMBLE: I want to preface my remarks to you gentlemen by a statement that when I first received an invitation to address you today I rather misread the subject which was assigned. I had had some little experience with the question of taxation of mines on Indian lands, and hurriedly glancing at the letter, I thought because of my familiarity with that subject that perhaps you might want to hear from me on that, and in a measure I have prepared an address concerning the authority of the states to tax mines and mineral production on Indian lands. It is true that oil and gas are analogous to mineral production, such as coal, zinc or other metals, and what I shall have to say I think, although it may be more directly pertinent to mines, is equally applicable to oil production.

Mr. Gamble's paper will be found on page 232 of this report.

JUDGE SHORT: I was struck with the idea as I listened to the reading of the very instructive paper that if I were broke instead of approximately so, that this town in Minnesota would be the one I would go to. We have heard a good deal of the unearned increment, and it seems to me in that town a man entirely broke would be given a fairer show of what we call the unearned increment than in any town I know of. I would certainly enjoy living there if I were broke.

Now, gentlemen, the next matter that is on the program—I am acquainted with Judge Patrick, I don't see him here—is an address by Judge George H. Patrick, of Washington, D. C., "Oil Land Withdrawals." Is Judge Patrick present? Is there anyone here representing Judge Patrick?

If there is no one, the next matter on the program is an address, "The Relation of the Federal Government to Western Oil Production," by Governor James N. Gillett, of San Francisco, California. In introducing Governor Gillett, I suppose all of you know the Governor extremely well, or at least by reputation, and I think that all of us who know Governor Gillett can depend upon anything and everything that he says as carrying the weight of absolute truth and absolute conviction. That is the reputation he has earned by long years of service. I take pleasure in introducing Governor Gillett.

Governor Gillett's paper will be found on page 613 of this report.

MR. J. C. McDOWELL (Pennsylvania): Mr. Chairman, I have been very much interested in this matter. I am thoroughly familiar with the oil industry as it has been carried on for the last forty years in the United States, Canada and Mexico. I have operated in every field, and am largely interested in many fields at the present time. I have watched the progress of the Ferris bill, having been requested to make some suggestions in relation to it, but finally abandoned it as a hopeless task. I think the bill might better be labeled "A Bill for the

Prevention of the Development of the Oil Business" than any other label. I don't know anything that will more completely prevent development than the conditions that they propose to require for development.

I do not know of any legitimate prospector anywhere in the world that would go ten miles from developed territory and sink a well for a quarter of 640 acres and give the Government the balance, as he must do if the Ferris bill becomes a law. Suppose an operator would drill a well on 640 acres, suppose that well should produce as much as two thousand barrels per day, which is not unusual, what will the balance of the 640 acres of land be worth? The operator would have one-quarter of that, or 160 acres, and would give the Government 480 acres that would be worth more than a million dollars. In other words, the operator would be developing the land for the Government, which it will offer at public sale and the operator might bid for it. I don't know anyone who would make an undertaking of that kind, and when you go more than ten miles from development you have 2,560 acres. I don't know of any man who would drill so rank a wildcat well on so small a lease as 640 acres, and I am acquainted with all the large operators in the United States. I think this bill is seriously defective, and will result in a conservation that is very complete.

JUDGE SHORT: The matter will in a few moments be thrown open for discussion.

Senator James D. Phelan, of California, who was to speak on the "Federal Government and the California Oil Claimants," is absent, and the discussion is to be led by Mr. Louis Titus, who is present.

Before Mr. Titus starts the regular discussion there is one phase of the matter discussed by Governor Gillett that I wish briefly to mention; that is to say, that after this leasing bill that has been referred to has been reported by the Senate Committee, and without any dissent so far as the relief portions of the bill were concerned, and had been recommended, at least as to the recommendations for relief by the Secretary of the Interior and the Commissioner of the General Land Office, and others, there were accusations made that the California and Wyoming oil men were trying to loot the public lands and to deprive the Government of something that justly belonged to it, and to take away from the Navy something that justly belongs to it.

Now, there are just one or two considerations in addition to those mentioned by Governor Gillett that I wish to refer to.

In submitting a charge of this kind, amounting to accusations of fraud and bad faith, it is necessary to be somewhat specific. For instance, if I desired to charge a man with larceny I must charge that he took, stole and carried away the property. And it is well to consider that these "looters," so called, that went upon the public lands, made their locations many miles from water, and where the average well is from two to three thousand feet deep to discovery, and some of them all of four thousand feet. These men may have intended to steal these locations and lands from the Government. But they certainly did not intend to take and carry them away, for the very sufficient reason that they would have to be on the ground openly at work for two or three years at least on the average before they could even apply to the Government for a patent. And this after they had been inspected from month to month and day to day reported on, and in the face of this publicity they would have to ask the Government of the United States for a patent. Every one of them, of course, knew that he could not get a patent unless his location was honestly made and free from fraud, and was held in the open and developed in the open, and unless he made a discovery.

We cannot, of course, expect people who write muckraking articles for the newspapers to overwork their minds in the effort to ascertain the truth, because the truth would spoil most muckraking stories. But they ought to use their minds just a little bit before they accuse people

of trying to loot the public domain, especially in instances where such looting is both physically and legally impossible. They ought to consider whether it could possibly be done under the circumstances and conditions in question, or not. And there never was anything more utterly impossible than the practice of any actual fraud under such conditions.

I wish to add that these people have been subject to judicial investigation. The Government filed a number of suits in California, and in one of them there were between one hundred and fifty and two hundred different corporations and persons named defendants. And these cases were all on trial for months before Judge Bean of the United States Court. And although in one of the cases oil had been discovered in the well before the passage of the Pickett bill, it was held as a legal conclusion that nevertheless the provisions of that bill prevented the issuance of a patent.

It is perfectly well settled in the law that the locator of a placer mining claim, or any mining claim, who remains in possession and who is not ousted by anybody who jumps his claim and who has continued in possession and who has discovered the mineral or the oil, is entitled to a patent, regardless of the intervening delay, so long as he is not ousted by others. This has been the law ever since we have had a mining law until recently. Some of these oil claimants had actually discovered oil before the passage of the Pickett bill, which bill provided that if at the date of the withdrawal the locators were diligently engaged in work leading to discovery and diligently continued without interruption to discovery of oil "work leading to discovery" as to any of them they would be entitled to patents.

Some of them had actually performed these conditions, the conditions of the placer mining law, before the passage of the Pickett bill. But in many instances it is made to appear that on September 27, 1909, when the presidential withdrawal occurred, that they were not thus engaged in work leading to discovery, and it has been held that even though Congress passed the rule of diligence after they had discovered oil, yet the rule is made to relate to forfeit the claim before the law was passed and before the rule was in existence.

This sounds unreasonable, not to say absurd, but the holding is in substance to the effect that inasmuch as the locators had no vested interest before discovery, no matter what the morals or the equity of the situation may have been, that their later right to title depended upon the will of Congress, and Congress having legislated, the legislation applies, regardless of whether the acts resulting in the forfeiture were done or omitted prior to the passage of the act of Congress and the creation of the new rule of diligence therein called for.

In one or more instances the locators or their successors have been denied patents because ten months after the withdrawal Congress established a rule of diligence that had the effect to forfeit the title for a delay that occurred where the law, as it then existed, made no provision for such forfeiture. Nevertheless, because the locator had not done something that he was not required to do at the time he failed to do the same, nevertheless, a requirement later enacted has been applied that is construed to have the effect that although as between him and the United States no such diligence was required of him at the time, nevertheless, not having performed his work with the diligence later required, although not required at the time, he has forfeited his claim, although he had remained in possession and made discovery before the passage of the new law and the new rule of diligence.

Obviously this does not seem very sensible, and I have been for a great many years trying to train my mind to work along lines that were altogether logical lines, that we sometimes refer to as legal thought, and I admit that it does not sound logical, that it does not sound legal to a logical mind or logical to a legal mind to say that an American citizen under an American law has lost something because

he did not do something that was not required to be done at the time, but which was later required. Nevertheless this is exactly what has happened, and we are considering what amounts in effect to "*ex post facto*" law.

The true situation is that the United States Government came into these fields three years after they were developed and after five or six millions of dollars had been expended in the development of Reserve No. 2, and wherein there had been discovered a very large number of proven and developed oil claims.

The Naval Reserve No. 2 was established in December, 1912, and the presidential order of withdrawal was made in September, 1909, and the courts of the United States have held and found as a fact that in this intervening time between the withdrawal in September, 1909, and the establishment of Naval Reserve No. 2 in December, 1912, the Government, its officers, agents, examiners and special representatives stood by and saw these locators and oil developers, at the expense of millions of dollars, develop and demonstrate the mineral value of this property, and that the Government gave no notice or intimation that their claims were illegal, or that their right or claim to patent would be denied, but that it stood by and saw all these developments carried out and these expenditures made, and now attempts to assert title and oust the locators.

While no one citizen could act in this way toward another, it is held that the United States Government, because it is a Government, can do this thing that its own laws would not permit its own citizens to do.

The courts of the United States have twice decided that these men were in good faith, even as to those who entered after the withdrawals; that although they made a mistake in believing the law to be as five judges out of ten of the United States Court thought when they came to decide the cases, that the locators did make a mistake in assuming that the withdrawals were involved, that it was an honest mistake and that they entered and developed in good faith.

And they are held responsible for this mistake because all laymen are supposed to know the law, although lawyers rarely do.

In this connection I wish to emphasize that it is bad enough for a citizen of the United States to have his property withheld and for the Government to deny them what is morally and justly theirs, and to have receivers placed in charge of the properties they have developed. It is bad enough, I repeat, that they should be placed in this position, but it is wholly gratuitous and wrong that they should be charged with bad faith and bad intentions when the courts of the United States have specifically held that they were proceeding in good faith and with good intentions.

Now, I am sorry to have trespassed so far upon the position of the Chairman, but it is a subject with which I am familiar and in which I am interested, and I am very frank to say that for a good while I have been employed in many capacities to try to relieve those people that were expending their energy and their money in the effort to develop the resources of the public lands, and in this instance I speak in that capacity as a special representative of these people, but I believe I speak the absolute justice and equity and truth of the matter, and I therefore speak without hesitation.

Now, the general discussion will be led by Mr. Louis Titus, of California, who is thoroughly familiar with all of the phases of the oil industry. Mr. Titus.

Mr. Titus' paper will be found on page 606 of this report.

CHAIRMAN SHORT: Gentlemen, the matters that have been presented to this assembly are now open for discussion, and we hope you will be free in the expression of your views.

DR. NORMAN BRIDGE: Mr. Chairman, may I ask the Governor, or Mr. Titus, just the number of acres reserved in the Naval Reserve, the three?

MR. GILLETT: There are 38,000 acres in the Naval Reserve No. 1—

DR. BRIDGE: 30,000, you say?

MR. GILLETT: 38,000; 30,720 in the second one, and there are nine thousand and some hundred in the third, nearly 10,000 acres in the third. The first two are in California and the third is in Wyoming.

DR. BRIDGE: How many barrels do you figure there are on an average of oil in those acres?

MR. GILLETT: Well, I never made an estimate of that. I couldn't tell.

MR. TITUS: The Geological Survey estimate, George Otis Smith, made a very conservative estimate that there were 100,000,000 barrels in Naval Reserve No. 1 and 30,000,000 barrels in Naval Reserve No. 3. The amount of oil in Naval Reserve No. 2 I don't know that they estimated, because it is being taken out every day. At the last count there were 180 oil wells in Naval Reserve No. 2, all of them pouring out oil in great quantities every day.

MR. GILLETT: Mr. Titus, how many—what is the average yield in that California field per acre?

MR. TITUS: It is hard to say. We have had territory there yielding as high as 100,000 barrels per acre, and on small areas much larger than that. Of course 40,000 to 50,000 barrels per acre is generally considered by oil men to be a fair average of that particular territory, and these estimates of the Geological Survey are probably made very conservative.

MR. McDOWELL: May I ask Mr. Titus if the operators of these 180 wells within the Naval Reserve No. 2 are permitted to operate their wells and mine their oil?

MR. TITUS: Well, yes, sir. You must understand that every other section of the Naval Reserve belongs to the Southern Pacific Railway Company, patented to them in 1894. It is true the Government has a suit against the Southern Pacific to invalidate those claims, but in the meantime the Southern Pacific is operating a great number of wells. Secondly, the Standard Oil Company owns within the limits of this Naval Reserve, holds by patent, some 1,100 acres, upon which they have a large number of wells, and of course they are operating them, and they can't be stopped from operating them. The Honolulu Consolidated Oil Company has about 1,000 acres of patented land, upon which it has some wells.

Now, in addition to all this patented land upon which there are wells, there are a great many wells on land which isn't patented. Just as I have explained to you, the men go there before the withdrawal, and afterwards drilled the wells, and they are operating those wells.

Now, recently on several claims of that kind, but not on all, the Government has filed a suit and placed a receiver in charge of the property. The receiver does not stop the operation of the well. On the contrary, he works those wells with as great diligence as he can to get out every barrel of oil he possibly can get out. So the idea of that being a Naval Reserve is more or less of a joke, because it isn't a reserve for the navy or anybody else.

MR. McDOWELL: Are there any wells there that are owned and operated, the title to which is undisputed by the Government?

MR. TITUS: Oh, yes, a great many.

MR. McDOWELL: And then this Naval Reserve would seem to be a reserve in favor of the operators on that land?

MR. TITUS: It certainly is a point in favor of the man that has a patent of the lands there now. That is exactly what it is.

MR. McDOWELL: I am quite familiar with that region, and know the locations.

MR. TITUS: You hit the nail exactly on the head. That is exactly what it does.

On this Naval Reserve No. 1 I might say there are no wells in operation at all.

MR. McDOWELL: Where is that location?

MR. TITUS: It is what is known as the Elk Hill, and is about two or three miles east of the Buena Vista Hill, east and north.

DR. BRIDGE: It seems to me, Mr. Chairman, that the Naval Reserve, as explained to us, is sentimental mainly. The United States Government might get out of all of that reserve land, sooner or later, in oil or its equivalent, the value of perhaps two dreadnaughts. Possibly not more than one. All these difficult questions are to be considered in relation to the rights of a lot of these people, and to my mind it is absurd to regard those reservations as of any great consequence to the Government or to the Navy.

The Navy of the future—I speak as a director of the Navy League, and I am absolutely loyal to the Navy, but it doesn't seem to me it is necessary for the Government to take a fictitious attitude regarding the Navy in the matter of oil or anything else. The Government is able to pay for what it gets and what it needs in the way of a Navy and an Army. It is simply a trifling advantage to the Government to have in the long run to have set aside a lot of this land for a Naval Reserve, as though if it were not done the Navy might some day be crippled for the want of just that oil.

The Navy of the future is going to need an enormous amount of oil, if it uses oil, and no navy can afford to use coal if it can get oil.

The reason why navies have been slow, governments have been slow in building ships to burn oil, is largely the fact that oil hasn't always been procurable.

In the long run, the oil has got to be bought. The Navy will not use exclusively the oil from our own country. The oil supply of the world is not going to run out this century. There is oil enough in Colombia and Venezuela to supply the navies of the world for half a century, if not a century, and it is going to be mined, it is going to be procured.

The use of oil on all sorts of ships is coming into vogue rapidly. Depots are being created in various parts of the world so that oil-burning ships can be reoiled easily. There is so much oil being discovered, and so much will be discovered and developed, that there can be no monopoly in it, and these are some of the reasons that, it seems to me, unfortunate that the Government should have attacked this question on a sentimental side.

It will do very little good for the government to embarrass a lot of good people and to throw around a question of this sort a sentimental quality that oughtn't to enter into it.

MR. McDOWELL: To convince you that this is largely a sentimental question, as vice-president of the Indian Territory Illuminating Company, having a large lease on the Osage Indian land about to expire, knowing that the Government had under consideration the construction of a pipe line from Oklahoma to the gulf coast, I made a proposition to build a pipe line to the coast so that they might use the oil produced on the Osage Indian lands, and offered to contract to supply oil at the coast for the use of the Government. After some consideration, my proposition was declined. I would now be glad to take a fuel contract for the next five years for the United States navy to deliver them oil anywhere in the gulf coast at fifty cents a barrel, and that is cheaper than they can pipe it from Wyoming.

MRS. EMILY F. WELLS: Mr. Chairman, that gentleman spoke of lands in Louisiana that might possibly be turned into a Naval Reserve. May I ask him the location of that land?

MR. GILLETT: Well, there is a large tract of land in Louisiana that at one time was covered by a lake, and that land is claimed by the state of Louisiana, and it was discovered that there are very valuable and extensive oil deposits beneath it. It has been decided that that land now is owned by the Government. I think the Department of the Interior has so held that the Government is the owner of that land, that it didn't pass to the state of Louisiana under the Swamp and Overflowed Land Act.

MRS. WELLS: What lake was that?

MR. TITUS: Caddo.

MR. GILLETT: Two or three hundred years ago they claimed that the lake was no lake at all, that the Red River overflowed and made a lake. That is why the state of Louisiana is claiming that land as swamp and overflowed land.

MR. MAX W. BALL (Washington, D. C.): I wish Lieut. Commander Halligan and Lieut. Commander Richardson were here this afternoon to tell you whether or not the Naval Reserves are purely sentimental. In their absence all I can give you is the benefit of two or three conferences we have had with them down in Washington. There is a newly created Naval Fuel Oil Board, a board created some time in May to consider the question of adequate fuel supply for the navy, present and future. That board is composed of four officers. It has done some very deep studying in the last few months regarding the naval fuel oil question. Whether or not mistakes have been made in creating the various reserves that were created, whether or not mistakes have been made in including within those reserves land that was already included in valid claims, even including patent lands, the new conclusion reached by this new board which has given the matter careful consideration is that Naval Reserves are highly advisable. That conclusion was reached in full recognition of every fact stated by Dr. Bridge, that oil can probably be bought cheaper now than it can be produced by the Government, that the price of the oil contained in these reserves is not much greater, as Dr. Bridge says, than would build a couple of dreadnaughts, that a large part of the oil burned by the United States navy in the future will probably come from fields outside of the United States, and that as far as our navy is concerned there is going to be no sentimental reason why it shouldn't—why the navy shouldn't just as well burn Colombian oil or Mexican oil, or any other oil, as oil produced within the boundaries of the United States, if it can be purchased more cheaply.

But beyond all these things, the United States navy has to figure on an oil supply for at least 25 years. That is to say, all the war craft now building are oil-burning craft. It will take at least five years to complete the present building program. The average life, average effective life, of each of those war craft is about 20 years. Unless, then, the navy can be assured of oil to burn in those vessels during war time for 25 years there is no use building oil-burning vessels.

Now, that doesn't mean that the navy wants to reserve a 25 years' supply for the navy, by any means, but the navy is looking forward to the time when oil may be very much more expensive in the United States than it is now, and more particularly looking forward to the time when the major part of the fuel oil used in the United States may be produced outside of the United States, and by these reserves it is desired to provide against a contingency whereby, during war with a power across the seas whose navy is larger than ours, or war with an adjoining country from which some of the future oil supply might come, it might be impossible to import fuel oil for the navy. Thus these reserves are desired not primarily as a means of keeping down the commercial price of oil for the navy, but as a limited supply to tide the navy

over a limited period in case of an emergency when foreign oil might not be obtainable.

Now, as I say, that is entirely aside from the scheme of creating these particular reserves, or whether these reserves were so created that perhaps they violated equities which these people have, but I think that is enough to show you that the consideration is something more than a purely sentimental one, and there is hard business basis back of it.

Now, going back to something Judge Short said. I don't want to reopen an old argument, but Judge Short said, and Mr. Titus said, and I believe that Governor Gillett also said or intimated, that the first thought of oil for the navy in this withdrawal matter was at the time of the creation of a naval petroleum reserve, in 1912. Let me read you just a few words from a letter dated February 24, 1908 (mind you, that is before the 1909 withdrawal to which reference has been made), from the Director of the Geological Survey to the Secretary of the Interior:

I have the honor to call your attention to page 15 (inclosed herewith) of the Daily Consular and Trade Report of the Department of Commerce and Labor, of Saturday, February 15, 1908, which directs attention to the superiority of liquid fuels, that is, petroleum products in one or another form, on steamships, and also to the policy of the British Government in using such liquid fuels as emergency fuels in battleships; also to the editorial on page 3 of The Oil Industry of January 15, 1908.

It will be easy, if desired, to multiply the authoritative statements already in print concerning the superiority of liquid fuel for the navy. For that reason I have to recommend that the filing of claims to oil lands in the state of California be suspended in order that the Government may continue ownership of valuable supplies of liquid fuel in this region where all fuel is expensive.

That was in 1908, February, 1908. In December, 1908, there was a letter from A. C. Veatch, D. T. Day, and Ralph Arnold, restating these points, and asking that action be taken.

Then the withdrawal of September 27, 1909, was based on two letters dated September 17, 1909, one from Director Smith of the Geological Survey to the Secretary of the Interior, the other from the Secretary of the Interior to the President of the United States. The letter from the Director to the Secretary says:

"I have the honor to transmit herewith a copy of a letter addressed to your predecessor in February, 1908. The arguments presented in support of the recommendation made at that time are still valid, and they have been amplified in the Survey's Conservation report on the petroleum resources of the United States, a copy of which I submit herewith.

"Taking this into account as well as the increasing use of fuel oil by the American navy, there would appear to be an immediate necessity for assuring the conservation of a proper supply of petroleum for the Government's own use. I would therefore renew my recommendation that pending the enactment of adequate legislation on this subject, the filing of claims to oil land in the state of California be suspended."

In the letter of the same date from the Secretary of the Interior to the President, which resulted directly in the withdrawal of September 27, 1909, the Secretary says:

"I have the honor to bring to your attention the subject of the conservation of the petroleum resources of the public domain, with special reference to the present and future requirements of the American navy.

"The six largest battleships in commission or under construction are equipped for the use of either oil or coal and the fourteen latest destroyers use oil exclusively.

"The navy has a further interest in the conservation of the petroleum supply by reason of the absolutely necessary use of petroleum products for lubrication. A very conservative estimate is that at least one-half pint of lubricating oil is used for every ton of coal converted into power and that this quantity of lubricating oil represents over a half-gallon of crude petroleum.

"The recommendation was made by the Director of the Geological Survey in February, 1908, to my predecessor that the filing of claims to oil land in the state of California be suspended in order that the Government may continue the ownership of a sufficient supply of petroleum on the Pacific Coast where other fuel is expensive. No action to this end has been taken.

"The time appears opportune for legislative action that will assure the conservation of an adequate supply of petroleum for the Government's own needs. This legislation should give authority to fix the terms of disposition of public oil lands so as to provide for the future demands of the navy and should also authorize the permanent reservation of such areas as the Executive, after full investigation, may find necessary for this Federal purpose. It is believed that such legislation would not interfere with the profitable development and utilization of the California oil pools.

"In aid of such legislation and indeed as essential to the accomplishment of its purpose, all the lands hereinbefore mentioned should be temporarily withdrawn from all forms of filing, entry and disposal, including mineral entry."

That certainly sets at rest any idea that naval uses were not considered until 1912.

There is another argument which Judge Short and I have already had in other places. I don't know whether that is worth while going into on the floor here or not.

But Judge Short and Mr. Titus conveyed the idea that the act of 1910 contained the first declaration, first provision requiring diligent prosecution of work leading to the discovery of oil and gas as a means of holding an oil placer claim. Now if that were true, and it were made to relate back to the withdrawal which took place ten months earlier, it would be the grossest injustice, and it could hardly be imagined as coming from an American Congress or being confirmed by American courts.

What actually took place, as I see it, is this: The placer law was made to apply to petroleum deposits in February, 1897. Well, it was a misfit law, as Mr. Titus has said. It didn't work. A man couldn't go out with a pan and discover oil on the surface without any particular expenditure. It took months, it took many thousands of dollars to make discovery which would give a man a vested right in his claim. What assurance did he have that some other fellow wouldn't come along and jump his claim and run him off? Or what certainty could he have that something might not happen that would simply take away everything he had invested in his claim? As far as the Federal law was concerned there was nothing to give him any assurance of such security. There was no provision made for anybody who didn't actually have a discovery on his claim except in an enactment of the revised statutes, which says that where a dispute comes up between two claimants it shall be adjudged by the law of possession. The prospector, then, had to turn to the courts to determine what his measure of protection was prior to the time of making the discovery, and the court laid down a very clear and very distinct line of decisions which said exactly under what circumstances he would be protected in the ownership of those claims, in the possession of those claims prior to his making discovery. Judge Short had a good deal to do, I believe, with the shaping of that policy, as attorney for several of the claimants, and the Supreme Court of California has laid down a line of decisions that is

so clear and consistent as to be almost classical. Let me read you just a few of them:

Cosmos Exploration Co. v. Gray Eagle Oil Co. (112 Fed. 4). Land was not "vacant and open to settlement" and subject to selection under such act where at the time of the application it was in the actual occupancy of others engaged in exploring it for oil, under oil placer mining locations previously made by them, although such locations did not appear by the records of the local land office, and although they were not valid as against the United States, because there had been no previous discovery of oil on the land, **where the locators prosecuted the work of exploration with due diligence**, and with the result of discovering oil in paying quantities before the selection by the applicant under the forest reserve act had been approved by the land department.

As has been said, in the case of other minerals discovery preceded the demarkation of the boundaries, the posting and recording of the notice. In the case of oil, discovery, in the very nature of things, would rarely or never be made except at the end of much time and after the expenditure of much money the discovery of oil involving the erection of a derrick and the laborious drilling of a well, frequently to the depth of 3,000 feet and more. If, therefore, the placer mining laws, which were declared by Congress to be the only laws under which oil locations could be established, were to be made of any practical benefit to the oil locator, it must be by permitting him to mark the boundaries of his location and post and record his notice, and protect him in possession **while he was with diligence prosecuting the labor of digging his well to determine whether or not a discovery could be made.**

What the attempting locator has is the right to continue in possession undisturbed by any form of hostile or clandestine entry, **while he is diligently prosecuting his work to a discovery.**

Miller v. Chrisman (73 Pac. 1083).

It is to be remembered that it is not essential to the validity of a location that the discovery shall have preceded or shall coexist with the posting of the notice and the demarkation of boundaries. The discovery may be made subsequently, and when made operates to perfect the location against all the world, saving those whose bona fide rights have intervened. One who thus in good faith makes his locations, remains in possession, and with due diligence prosecutes his work toward a discovery, is fully protected against all forms of forcible, fraudulent, surreptitious, or clandestine entries and intrusions upon his possession.

Borgwardt v. McKittrick Oil Co. (130 Pac. 417):

The rights of the person or persons endeavoring to locate an oil claim, after the posting of notice, etc., are well settled by the decisions. Until the inchoate location is perfected by discovery, the locator has no vested right which Congress is obliged to recognize. But where his location is made in good faith, he has the right, as against third persons, which is transferable, "to be protected against all forms of forcible, fraudulent, surreptitious, or clandestine entries and intrusions upon his possession," so long as he "remains in possession and with due diligence prosecutes his work toward a discovery." *Miller v. Chrisman*, 140 Cal. 440, 447, 73 Pac. 1084, 98 Am. St. Rep. 63; *Weed v. Snook*, 144 Cal. 439, 77 Pac. 1023. As long as such a condition continues, no one, without his consent, can make the actual entry of the land essential to legally initiate a new location. But actual possession of the land, coupled with continued diligent prosecution of discovery work, are essential to his protection.

The requirement of diligent prosecution of the work was described in *McLemore v. Express Oil Co.*, supra, as follows: "This diligent prosecution of the work of discovery does not mean the doing of assessment work. It does not mean the pursuit of capital

to prosecute the work. It does not mean any attempted holding, by cabin, lumber pile, or unused derrick. It means the **diligent, continuous prosecution of the work, with the expenditure of whatever money may be necessary to the end in view.**" It is only one so actually possessed and so engaged in the **diligent prosecution of the work of discovery** who is thus protected, by reason of his attempted location, against an entry by another.

In a still more recent case (Smith v. Union Oil Co., 135 Pac. 966) the same court says:

If a qualified person peaceably enters upon public lands of the United States for the purpose of discovering oil or other valuable mineral deposits therein, and such land is at the time unoccupied, and there is at the time no valid mineral location or lawful entry thereon, under the land laws of the United States, such person has the right to continue in possession so long as he continues to occupy the same to the exclusion of others, and **diligently and in good faith prosecutes thereon the work of endeavoring to discover such mineral therein.**

Now, that means this: That the act of 1910 which requires due diligence as a criterion whether or not a man should hold a placer claim was not new law, but merely declaratory of the law that had been laid down by the Supreme Court of California for many years, and had been approved by the supreme Court of the United States in at least one case.

MR. GILLETT: May I ask you one question, Mr. Ball? All those cases you referred to were cases where there were individual claimants, both claiming the land?

MR. BALL: Yes.

MR. GILLETT: Now, did you know of any law, or any rule of the department, that would hold in passing upon a patent that if a man for two months during the time he was on this land was idle he couldn't get a patent after he discovered oil?

MR. BALL: You are getting me now into the realm of interpretation.

MR. GILLETT: No, I am asking you whether you knew of any case in which this requirement of diligent prosecution had been invoked against a claimant where there was no outsider interfering with his rights, and when he was dealing alone with the Government.

MR. BALL: Until the present cases came up the matter of possession as against the Government, as far as I know, had not been raised. But if diligent prosecution of work leading to discovery was necessary to hold a claim against an adverse claimant, it would seem at least reasonable that it should be necessary to hold a claim against a Government withdrawal.

That matter of what constituted due diligence is a matter of going back to court decisions. That is getting into interpretation.

DR. BRIDGE: Mr. Chairman, may I ask you a question?

JUDGE SHORT: Yes.

DR. BRIDGE: The first decision Mr. Ball referred to was, I assume, in that case in which you were associated.

JUDGE SHORT: Referring to the cases cited by Mr. Ball, I must plead guilty to having been connected with nearly all of those cases.

I am quite sure, however, there is not any serious difference between Mr. Ball and myself in these matters. The only trouble is that I am not able to make Mr. Ball understand me as well as he is able to make me understand him. Now, there is no question but that to hold these oil lands or locations prior to discovery against an adverse locator, usually called a "jumper," that a certain measure of diligence was required, and that diligence, of course, was reasonable diligence under the circumstances and in view of the situation.

Mr. Ball wants to know what protection the locator had who was not proceeding with his work in those instances in the Midway field during 1910 when water was not available. There were two things that protected him; in the first place, there was the moral sentiment of the neighborhood that would tolerate no one going on and interfering with the possession of a man or a set of locators where he or they were doing all they could do. Public sentiment just wouldn't tolerate any such thing. Every mining man is familiar with that.

In the next place the man who was on the ground and who was not progressing with his work because he could not get water was making just as much progress as an adverse claimant or jumper could do if he jumped the claim. So, since the jumper could not make any greater progress than the locator in possession, there was no danger of jumpers.

Therefore, the question arises, if the United States, where a locator and claimant is in possession and where no great progress can be made, for instance on account of the absence of and inability to get water, or other like insurmountable difficulties, and therefore where nobody could jump his claim, whether the United States would under such circumstances be justified in assuming the position of a jumper? Legislating a man out of his claim, suing him in court and getting a receiver appointed for his property. That is the question.

With relation to the locators and those who were developing these properties, nobody believed that anything of the kind was intended or would be done, and the records of the committee hearings before Congress show that nothing of the kind was intended to be done either by the President or by the Congress, and nevertheless this appears by the court decisions to have been the result inadvertently brought about.

The records of the decisions of the court further show that the United States Government, its agents and representatives on the ground, allowed these developments to be proceeded with, referring to those made before any withdrawal, and where the locators were in possession at the date of the withdrawal—the Government allowed the locators and developers to spend millions of dollars in the development of these claims without the slightest indication that the United States regarded them as unlawful or that it ever intended to proceed in hostility to those claims or deny the right to patent.

Mr. Ball does not assert and nobody will assert that the United States Government, in justice or in equity, ought to proceed as it is doing under the undisputed facts as found by the courts in which these cases have been tried.

Mr. Ball I know understands this situation, and I know he sympathizes with the position and difficulties of the oil men and has been very fair to them in the past and no doubt will be in the future.

The position is not that the United States could not forfeit these lands and the improvements placed on them by the locators and developers and sue them and recover for the proceeds of the oil extracted from the lands and drive them into bankruptcy.

Judging by the present decisions of the courts construing the effect of the presidential withdrawal and the legislation by Congress, we assume that this could be done. Those who ask that this be done ask that it be done in the interest of the United States navy. The United States is not only going to need fuel oil for the navy, but it is going to need patriotic citizens of the United States, who trust in and believe in the honesty, the integrity of their Government, and who are loyal and patriotic because they believe it to be a just and honest Government. There is no reason in this world why a government, acting for all of the people, should not deal just as honestly with any one citizen as the laws of the country require one citizen to deal with all of the citizens or with the government representing the citizens.

Referring to the situation of the navy, I do not think there is any real conflict between the oil locators and the navy. Some day there is going to be a real conflict upon the question of the industrial necessities of the country and the retention of oil for the navy.

With reference to the Geological Department, with which Mr. Ball until recently was connected, I think I express the sentiments of every man here when I say that during the administration of George Otis Smith every citizen has received the benefit of the truth, and nobody has been played as a favorite, either the Government or any citizen.

I think there is nothing that I could say of any official that would express a higher opinion of his honor and integrity than a simple statement of this character.

In this connection, under the advice of the Geological Department of the Government, the President has withdrawn over three million acres of land from location as oil land. And as to these three million acres, Mr. Smith has stated that it was withdrawn because the Government believed it contained valuable quantities of petroleum oil justifying its development.

For the purpose of illustration, assume that in this instance Mr. Smith was 90 per cent wrong, and that there is only 10 per cent of this land that will be demonstrated to be good oil producing land—even that will leave three hundred thousand acres. There is only forty thousand acres involved in this entire dispute, and probably the real net amount of land involved that has been developed and that in the absence of relief legislation would not be patented does not exceed twenty thousand acres. Keep in mind that there is no dispute between the United States Government and the oil operators of California, except as to land that the oil operators have developed and upon which discoveries exist and where developments have been made at great expense.

If it should turn out that only three hundred thousand acres out of three million acres that has been withdrawn is good, productive, undeveloped oil land, it is interesting to consider what this would mean with relation to the fuel supply for the navy. If only one well were put down on five acres, when you could reasonably drill twice that number, and you would have on three hundred thousand acres some sixty thousand wells. With an average production of fifty barrels per day, and the average production would probably be twice that amount, you have a total production of three million barrels of oil per day, and therefore two days' production would be sufficient for the use of the navy fully developed in times of war; in other words, practically ten times the amount of oil at this date used by the navy would be produced in two days!

The real and obvious truth is that the undeveloped but undoubtedly productive oil lands of this country will produce ten times as much oil as will be used by the navy within any reasonable period of years. And probably not one-tenth of the oil produced from undeveloped lands in the next fifty years will be used by or will be needed by the navy, because oil for at least fifty years will continue to be one of the nation's great sources of power and energy.

The lands in Naval Reserve No. 2 are all so far developed and are so far producing and must continue to produce that they in no event could represent a reserve supply of oil for the navy. It would simply be a question to take away the dollars and cents involved from those who have in good faith and enormous expense developed these properties and donate their investments and their developments and their discoveries to the navy.

I think Naval Reserve No. 1 is not largely in dispute, because it is not largely developed. The navy reserve in Wyoming is not in dispute because it is not developed. There are hundreds of thousands of acres of undeveloped but productive oil lands in this country that are not in dispute. Therefore, until we get to a point where we are going to use more than two million barrels of oil per day, where we use less than

that at the present time in a year, there is no reason for any dispute between the oil operators and the navy.

As to the undeveloped oil lands, there is very likely to be a serious dispute as to whether or not this oil shall be kept in the ground and in storage for future wars, or whether the industries of the country shall receive it and use it.

This question we will allow other people to thrash out because it is or will be a large question of public policy. But when it is asserted that there is a legitimate controversy or a real controversy between the oil operators and the navy, that is utterly untrue, because there is no such dispute. It may be that there is a dispute, but it is a dispute without a difference and arising out of a misapprehension of the real situation.

What the navy wants is undeveloped land, and what the oil operators want is land that has already been developed by them or their predecessors in interest. This they have done by the sweat of their faces and by the expenditure of money and the labor of their hands, and we therefore repeat, the land should not be taken away from them, and I think that when the situation is understood in connection with the position of the oil men and their rights, there is no conflict.

I wish to submit this resolution, which I would like this section to adopt and refer to the Resolutions Committee of the Mining Congress:

Be It Resolved, That this Congress is deeply interested in the just operation of the mining laws. As a result of certain orders of withdrawal by the President and legislation by Congress, many persons who at great expense, and, as adjudged by the courts, in good faith have developed the oil lands of the country, are threatened with ejection and forfeiture of their developed lands and their investments, in all such cases we urgently urge prompt and appropriate relief legislation so that those who have in good faith developed such lands shall be protected and shall receive prompt and appropriate relief."

I am assuming that this body is not sufficiently informed to state what that relief should be, but I believe there can be no dissent from the sentiment that appropriate relief should be granted by Congress, and granted promptly.

Dr. Bridge moved the adoption of the resolution, which was seconded and unanimously carried.

Whereupon an adjournment was taken to November 15, 1916, at 2 o'clock p. m.

Wednesday, November 15, 1916.

AFTERNOON SESSION.

Dr. Norman Bridge, of Los Angeles, California, Presiding.

CHAIRMAN BRIDGE: Gentlemen, I expect that on account of some noise in the building that you can hear better if you will sit farther forward.

For convenience of Dr. White and others who are detained in the other section for a little time, and are anxious to hear the paper of Mr. McDowell, we will postpone that until some of the other papers are read. The first paper, therefore, that we will listen to is that by Dr. Walter F. Rittman, "Through the Use of Petroleum."

Dr. Rittman's paper will be found on page 524 of this report.

DR. BRIDGE: We now will have—we will postpone the discussion on these papers, if you please, until they are all presented, then we will listen to discussions of them all.

We will now have the paper that was postponed, the paper of Mr. J. C. McDowell, of Pittsburgh. We regret very much that a bereavement in his family has made it necessary for Mr. McDowell to go back to Pittsburgh. This paper will therefore be presented by a friend who now has the floor, Mr. Edward J. Disher.

Mr. McDowell's paper will be found on page 284 of this report.

DR. BRIDGE: We will vary the order that we established at first regarding these papers as to discussion. I suspect that Dr. White will have to go back to the section over which he is presiding, and we will be glad if he will take the floor and discuss this paper now.

Dr. White's paper will be found on page 550.

DR. BRIDGE: We will now have the paper of Mr. Welch, followed by that of Mr. James, then we will take up further discussion of these papers.

MR. R. L. WELCH (Chicago, Ill.): Mr. Chairman, ladies and gentlemen: I am grateful for the opportunity to listen this afternoon. I am more thankful for the opportunity of hearing these papers than for reading one myself. I consider it a great pleasure to be on the same program with Dr. Rittman. Something over eighteen months ago I couldn't help but think what an affinity the human mind has for error. At that time we had a tremendous overproduction of oil, as you all know, or perhaps two years ago. At that time Dr. Rittman was at Washington, and he was then as far ahead in his ideas as he is today.

It is a great thing that a man doesn't have to work for the Government in order to serve the human race, because one of the painful things in our history is that the Government of the United States dispensed with the services of Dr. Rittman, something which no other government in the world would have done. But it is certainly a great thing for the human race and for the country that he continues with his wonderful mind to serve the human race.

As Dr. Rittman stood here and talked to us, I wished that we could visualize a prize-fight between Dr. Rittman's mind and an idea to see how long the idea would last. There is something about the operation of the human mind that is interesting, and I am sure if Dr. Rittman delivered an address in a foreign language which none of us understood, that we nevertheless would gather from his remarks invigorating ideas that form the mere operation of his mind. It is a great thing to be on a program with him.

A lawyer is unfortunate; he never leads, he always follows. Scientists and geologists lead. Lawyers never lead, we always snoop around and try to find out what has happened, then we try to make the law.

A law, a proper law, is founded upon natural law. If a law, if a statutory law stands the test of time it is in harmony with certain natural, fundamental laws, and if it does not stand the test of time it is out of harmony with those laws.

It is a serious question at the present time in this country what is the natural law of business. Is the Sherman law, especially as it has been applied to the oil industry, in harmony with the natural law of modern industrial life? I have prepared a very short paper, I want to say for your comfort upon that subject, and I will take the liberty of reading a portion of it. I want to say to you that it is short.

Mr. Welch's paper will be found on page 407 of this report.

DR. BRIDGE: We will now listen to an address by Mr. H. G. James, of Kansas City, Mo., on "Federal Co-operation with the Oil Industry."

MR. JAMES: Mr. Chairman and gentlemen: I feel like a boy I heard of once. You have been sitting here for the last two or three hours and I assume feel like the boy did. The chairman called upon a delegate to make some remarks; arising, the man looked over the audience and asked what he should talk about, and the little fellow had an idea immediately, and said: "Please, Mister, talk about a minute."

I have a long paper here, but I am going to read only part of it.

Mr. James' paper will be found on page 491 of this report.

DR. BRIDGE: These subjects are open to you people for discus-

sion. Will someone please discuss the first paper? Dr. White has already discussed it.

Does any gentleman wish to be heard on the paper of Mr. McDowell? If not, does anyone wish to discuss the paper of Dr. Rittman? If not, does anyone care to discuss the paper of Mr. Welch? Does anyone care to discuss the last paper?

MRS. EMILY F. WELLS: I wish to suggest to Mr. James that the last legislature of Oklahoma at the last session passed a law for the conservation of gas, and since then we have been going ahead and we have got gasoline from the gas. It is probable that most of the audience are acquainted with the process of extracting gasoline from natural gas, which is extremely simple; we put the gasoline into a pump and it comes out by blending with naphtha, about fifty-fifty; it comes out about 21 per cent gasoline. It seems to me that if every state would pass a conservation law that that would overcome the problem of the loss of gas.

MR. JAMES: It isn't a question of passing laws. It is a question of co-operation. It isn't a question of Oklahoma passing a conservation law. It is a question of Oklahoma meeting the honest developer half-way and not trying to take the life blood out of him by a gross production tax which the oil men of that state were compelled this year to pay aggregating \$960,000 after paying the usual taxes paid by all other property owners. It is not a question, gentlemen, of the state passing a law regulating the oil industry. It is a question of the state passing a law to co-operate with and build up this great industry. We have gone into Oklahoma, we have brought millions of dollars into Oklahoma, and all we have ever gotten from the state was misuse. Nor have we had any co-operation or encouragement from the Federal Government. When we went into Oklahoma to exploit this great industry, what did we encounter? Every time we went down to Washington we were prejudged before we got there. We were hirelings of the Standard Oil Company, and unable to get an unprejudiced hearing. It was always a question of the Indian first and the oil man and developer last. If we developed the oil industry in Oklahoma we did it in spite of official Oklahoma, and we did it by surmounting the hurdles of the Federal Government in the early days of the field. The oil business, like everything else, if it would enjoy its greatest possibilities, must have federal and state co-operation. I want to say to you it is a hard thing to secure co-operation. Witness the Rittman process. It has suffered for want of friends. The great need of American business today is the right sort of fellowship among its masters—a constant, healthful, legitimate uplift, not a jealous, demoralizing down pull.

Meeting adjourned.

OIL AND GAS SECTION.

Thursday, November 16, 1916.

MORNING SESSION.

Dr. I. C. White, presiding.

DR. WHITE: I have been drafted into presiding for a short time this morning, so that you will please come to order. The Secretary of the Congress has a word to say.

MR. CALLBREATH: I would like to say, gentlemen, that I am a little disturbed at the fact that we have had to shift around here so many times, but I guess it is because we have got too many rings to our circus. The Metal Section and the Coal Section are both meeting this morning in the Grand Ball Room, if any of you are interested in those sections.

I want to particularly call your attention to the banquet this evening. There are two subjects to be discussed at the banquet, two of the most

important internal questions which the American people have to solve. One of these is the question of the relations of labor and capital, and the other is the public lands question of the west. Upon those two questions we have two of the ablest men in the country to speak, Col. Pope in the industrial field, and Judge Short, of California, in the field of the public lands, and I feel that we should give both those gentlemen a proper reception.

DR. WHITE: Some are under the impression that they have to wear evening dress, or at least a Tuxedo. Is that necessary?

MR. CALLBREATH: Not at all. It is a business gathering. There may be some people that feel they can't go to a banquet without a dress suit on, but there will be two people without dress suits to one that wears full dress, so I think that need not deter anybody from coming.

We have one paper just received from Mr. Franklin D. Roosevelt, Assistant Secretary of the U. S. Navy, and another from Mr. Ralph Arnold, but my idea is the more time spent in discussion and the less time spent in reading the papers, the more valuable it is.

DR. WHITE: Gentlemen, an institution with which I am connected, the Geologists Society of America, has an invariable rule with reference to the reading of papers. Where they have a printed program and the author is not present, it requires a unanimous vote to get that paper read except by title. The reason being that anyone who has gone to the trouble of coming to a convention of that kind, or a meeting, has rights inherent over anyone who is absent. And there is usually a surplus of papers. Some of them have to be postponed or not heard when they all come, so that anyone who is not present when the place for his paper comes on the program, the paper is sent to the rear of the list, simply read by title, and then at the close when all others have been read of which the authors are present, if there is time left, such papers are then read, if anyone wishes to call them up.

So as Mr. Arnold is absent and his paper is largely one of statistics, which many are not very greatly interested in, his paper will go to the rear of the list according to the ruling of your temporary chairman, unless you vote otherwise.

The next paper is one on adequate acreage and oil conservation by Mr. Max W. Ball, of Washington.

Mr. Ball's paper will be found on page 322 of this report.

DR. WHITE: This interesting paper of Mr. Ball's is now open for discussion.

MR. TITUS: Mr. Ball stated that from 25 to 85 per cent of the oil is left in the ground under the present method of production. What I would like to know from Mr. Ball is, if he can suggest any way of recovering that large percentage of oil which is now lost. Is it due to improper methods, or is there any better method known of producing oil than is presently in use?

MR. BALL: Well, as I said, I didn't intend—I don't think what I said constitutes an indictment of the oil operators. It is not a matter of the carelessness or the ignorance of the operators, but of conditions which force him to drill as he does.

Now, I am not petroleum engineer enough to give you the detail of the 25 to 85 per cent lost underground. My position is simply this, that if the acreage is not large enough the ingenuity and the resourcefulness of the oil operators can be depended upon to find a way to save that 25 to 85 per cent by means that we now know, or by means which the operator himself will develop if he is given an opportunity to do so.

DR. WHITE: Has any other gentleman views on this subject?

MR. TRUMBULL: Answering the question regarding saving part of the 25 per cent remaining in a sand, I believe that during the last year or so, some of the old exhausted Pennsylvania oil fields have been

experimented upon and the operators actually are sub-flooding those old fields and getting a large part of the remaining 25 per cent.

We of course all agree with Mr. Ball that a larger acreage will eliminate many of the unreasonable, the uncertain things pertaining to oil field development. The very evolution of the oil industry is going from necessity to force or produce larger holdings in the fields that may be opened in the future. By the very methods of their discovery a field is going to be in the hands of a few, or possibly one concern, instead of scattered to the many, in the States where the lands are in private ownership. In the public land states we don't know what is going to happen.

In our State of Wyoming we are greatly concerned over the ultimate use of the gas in some of our large fields. It isn't known, probably, that Wyoming has tremendous gas areas, but we have. One field that we know enough about now to say that it has an area of at least six square miles, a hundred feet sand, a rock pressure of 650 lbs., and we can't turn that into a penny. It is a long way from everywhere, and a large part of the ground belongs to Uncle Sam and has been withdrawn "in aid of legislation." If there were any way under heaven to assure capital that it would be protected in a long use of that gas, capital would be found to carry it to the nearest towns, which are a long way off. But at the present time there is no assurance for capital that if it put in the pipe line it will get the use of the gas, because perhaps Uncle Sam will take a notion to divide that six square miles up into quarter sections or quarter quarters and distribute it to a multiplicity of owners or lessees, and prohibit them from pooling their holdings or production.

DR. WHITE: I should say the most—one of the most notable examples of the desirability of having a large acreage under one management is in Mexico, with which Dr. Bridge here is familiar, since he is an officer of the company that owns the property, the famous Casiano Pool, which covers only a thousand acres, held by the Huasteca Petroleum Company, a subsidiary of the Mexican Petroleum Company. I believe the Mexican Petroleum Company itself now is a subsidiary of the Pan-American. Dr. Bridge is an officer in all these companies.

This famous well didn't exactly escape from control, but it refused to be controlled. They shut it in, but it wouldn't stay shut, since the oil began to spout up through fissures in the ground over an area of 2 to 3 acres around the well. In these Mexican wells, as some of you may not know, the mother rock is a limestone with enormous reservoir capacity, faulted and fissured and possibly caverned and domed. This great well, which started off with many thousands of barrels per day, refused to be controlled when shut in, the pressure developing about 600 pounds to the square inch, until their manager conceived the idea of opening the valves and relieving a part of the pressure. He opened it so that there was only 290 pounds pressure when I saw it first in 1911, and it was then over a year old, and under that pressure it was producing about 22,000 barrels a day.

No. 6, half a mile from No. 7, had previously been drilled in and before completely shut in was producing about 15,000 barrels a day, and that was the reason they thought they would drill in No. 7, see what they had, and then shut it in.

As I say, the shutting in process wasn't a success, and that well has been flowing ever since it started, September 11, 1910. They laid a gas line in the meantime to Tampico, and in order to force the gas through to Tampico, they closed the valve a little more and it is under 325 pounds pressure now. Under that pressure it produces over 20,000 barrels a day, although six years old the 11th of last September, and has put into tankage over 50 million barrels of oil.

See what this well has done. If that thousand acres had been cut up into a great number of leases, as might have been done under conditions like we have in this country, what would have been the result? Probably that whole oil pool which I have estimated will produce over

100,000,000 barrels, and that may not be half of what it will do, would have been dissipated or largely destroyed. Yet you have one well which has produced over 50,000,000 barrels, and is still going on at the rate of 20,000 a day.

I should say it also produces from 7 to 8 million cubic feet of gas daily, and the only use the company can make of it is in their pipeline stations between Casiano and Tampico, 75 miles distant, in furnishing fuel for pumping the oil through. The company had in fact already made arrangements to lay a pipe-line to the City of Mexico, about 175 miles distant, but the revolution came on, when conditions were so unsettled it was all they could do to keep these wells in operation that they had already drilled, and hence that waste continues. Dr. Bridge showed you on the screen the other night those dozen torches, each burning from five to eight hundred thousand feet daily, and that waste is still going on. Of course, it can't be helped until political conditions in Mexico will permit its utilization.

There is a large amount of gasoline in that oil; the company, I believe, had contemplated erecting a gasoline compressing plant in that region, but has never been able to get a permit, or felt safe to put it up under present political conditions. So that as these large leaseholds work out in Mexico successfully, they certainly ought to work out in other regions. Just how you will get to the plan of having large leaseholds is a question, but it is certainly a very desirable condition from the standpoint of conservation.

DR. BRIDGE: Mr. Chairman, I agree with Mr. Ball very largely about the great misfortune of the small holdings in the development and mining of oil. He has given the facts and they can't be controverted, and to me it is a very sad situation.

Public sentiment will probably never lead us to insist on preventing men from taking at their own risk small holdings, developing them in a wild way, and wasting their substance in the hope of some gain. We know that the oil business has come today, very unfortunately, to be a business where it is very hazardous to embark in the development and production of the petroleum except with large capital, and that is the gist of what Mr. Ball said, and the moment you begin to preach that gospel people will tell you that you are a monopolist.

I suppose I have as little business to preach that gospel as anybody else in this room, but my grief about the business of mining, whether oil or nuggets, is that so many people lose their money. Some do it through ignorance, most probably do it through carelessness. They do it through ignorance that might be avoided if we could inject into the oil business the advice and the wisdom that were expressed by Mr. Hurley the other day, as to when to start out, how much it costs to produce what we get, what the overhead costs are, and all that sort of thing.

To me it is a discouraging situation, and I see it exactly as Mr. Ball has stated it, and it is a great shame that the oil is lost, and that the gas is lost.

One of the saddest things in my own experience about Mexico, after the consideration of the revolution, is the loss of that gas that Dr. White spoke of. If there was a stable government there we would long ago have been delivering it to the City of Tampico, and they could have the gas for a very low price and become a great manufacturing city.

I think something could be done by legislation to prevent the waste such as Mr. Ball has outlined, but any attempt at legislation is going to be met by the assertion that the people who ask for it are developing a monopoly.

If it were possible for the people of small means to unite together and make large companies and do the things suggested, with money enough to carry through a competitive business with large acreage, that would be the best thing to do, but the moment any company or any

man makes a large amount of money in any kind of business, a multitude of small operators, people with small money, all fancy that they can do the same thing, and they cannot. But it is the right of an American citizen to try.

MR. TITUS: I think we have all been impressed with the fact that Mr. Ball is absolutely correct in his statement. I have seen some ridiculous things in the oil fields of this country. I have seen oil fields divided into little plots of 30 or 40 feet square, sold as separate holdings, which of course is ridiculous.

But there is another side to the lesson which he has taught us this morning, and that is this: There is at present pending in Congress what is known as the Ferris bill, a bill which undertakes to lease the public oil lands as well as other lands, and as we are talking about oil I should confine my remarks to the oil features of the bill, which undertakes to provide a method for leasing public oil lands of the United States. That bill has already passed the House of Representatives, and will appear before the Senate in some form or other and will become the law.

Now, that bill provides, as was pointed out to us two days ago, that a man who takes a lease of government land within ten miles of any other gas or oil well, can only obtain, at the maximum, a patent to 160 acres of land. I didn't state that exactly correct. I mean to say that a man who takes a permit, what is called a prospecting permit for the exploration of oil land, when he has yielded oil, gets a patent at the most for 160 acres of land. And the speaker who explained that to us also stated that he thought that was a very small amount of acreage to be obtained, and yet it hasn't been suggested in Congress, and I have been present at most of the debate upon this bill; it has hardly been suggested or at least seriously, that that acreage was entirely too small to encourage the development of the public domain in the way it should be encouraged.

I think it would be an extraordinarily good thing for this convention to do, if representation could be made to the Public Lands Committee of the House of Congress who have this bill in charge, that the acreage should not be divided up in such a small way as that, but that some other method should be provided whereby a company could get a larger acreage, because if that bill passes as it is now written, and as it has already passed the House, it to my mind will only perpetuate the disasters which Mr. Ball has pointed out.

Now, again, there are other features of that bill which are worse yet, and that is there is a provision there—I don't remember the exact wording of it, but which absolutely prohibits any one person to be interested in more than one tract of land within a certain area. Perhaps you remember the details of that. In other words, this bill is going to make permanent this waste which Mr. Ball has pointed out, and it would be against the law, mind you, it will be a crime even to try to prevent that waste.

Just think of the iniquities of the kind of a bill which would prevent a combination or co-operation of small producers in one of these fields, and yet that bill is going to pass. It has already passed the House, and will undoubtedly pass the Senate unless some effort is made to stop it, and it will become a law, and this waste which has been discussed will be enforced by the law of the land. It applies to all the public land, particularly Wyoming and Montana. While I am not interested in it myself, I really think that some measures ought to be taken to stop that if possible.

DR. WHITE: Have you any suggestions to make?

MR. TITUS: Well, perhaps Mr. Ball might like to close the discussion.

DR. WHITE: Mr. Ball, if nobody else desires to speak you may have a minute to close the discussion.

MR. BALL: I don't think I have anything to add to what has already been said.

DR. WHITE: Have you any remedy to suggest, by which this larger acreage could be obtained? For instance, this matter that the gentleman has just spoken about, what remedy would you set forth?

MR. BALL: Mr. Titus has talked on a subject in which I am not very much interested, because I am in the Department. I am not at liberty to speak out.

DR. WHITE: Mr. Titus, have you any suggestions as to the size of the acreage that should be allotted?

MR. TITUS: Yes, I have. I think the acreage should be increased in that bill very tremendously. Now, I was present in 1914 when this bill first came up in the Public Lands Committee of the House, and there were one or two, perhaps more, men who objected to this feature of the bill which prevents small operators from combining, but it was brushed aside by the House Committee as being a monopolistic argument that should not be allowed to prevail. And I don't know what headway could be made there, but it does seem to be a dreadful thing that Congress should hang on this country a system of that kind, which will absolutely compel the most enormous kind of waste, and no remedy to prevent it. The bill even not only makes it unlawful, but it makes it a crime for men to do the things which ought to be done.

Now, Congress meets again in December. The bill has gone through the House. It is going to be taken up in the Senate, and while there isn't any chance perhaps for any public hearing on that bill, if this Congress here could pass some kind of a resolution and have it presented to the Chairman of the Committee, sent to the Secretary of the Interior, to the different departments that are interested, it might be that an amendment could be had to that bill, even at this late day, which would save that situation.

DR. WHITE: What would you suggest as the minimum, a square mile, 640 acres?

MR. TITUS: Well, personally I think that is a fairly liberal acreage, yet. It is not too large, it is really not large enough, but I doubt if you could get it larger than that.

DR. WHITE: If this Oil Section desires to take any action in the matter, the Resolutions' Committee of the Congress is now in session, and if Mr. Titus is familiar with this question there is no objection to your expressing your wishes and having him present it to this Resolutions' Committee and get it before the general session that meets at 2 o'clock, when they act on all resolutions. Does the Oil Section desire to take any action in the matter?

MR. GILLET: Mr. Chairman, I can say a few things in reference to that matter that might throw some light on the question. The bill which passed the house has been amended in some particulars by the Senate Committee making it still more objectionable than the bill that passed the House. The bill that passed the House decided that no land could be given by the government in excess of 640 acres.

But it seems to me that there is only one way that this can be determined. The fields all differ in size and character. No two fields as explained yesterday, are exactly alike. It seems that every particular field presents a question that ought to be examined and carefully looked into by the Geologic Department, and the question of drawing the leases could be figured in reference to that particular field so as to meet the necessities of it. You can't make a hard or fast rule, it seems to me, to govern all fields alike when the fields are not all alike, and it ought to be left to the Geological Survey and to the department to investigate these fields where oil has been discovered, get its size, how it is situated, and then make leases accordingly, under

rules to be adopted by the Interior Department. I don't think Congress can legislate in advance on methods in this section and that, and this field and that field.

I don't know of any amendment that could be made except to leave it in the discretion of the Interior Department, to prepare such rules and regulations and issue such leases that will fit the particular field. And that is something that can be determined only upon a proper investigation. It seems to me that that is the way it ought to be done.

The matter was discussed by Mr. Oliver, from Kansas, in 1915, before the Public Lands Committee of the State. He testified and introduced that map over there which Mr. Ball referred to, and he made the argument absolutely conclusive, it seems to me, on the waste and the way to stop it. It wasn't heeded and many were afraid of large leases, on the ground that the Standard Oil or some other great company might get too large a control.

I think the Geological Survey should be probably the first department to consult in this matter. I think they have the same views entertained by Mr. Ball, and some amendment could be offered to take care of the oil leasing bill so as to make it a splendid bill, and give people an opportunity to go on and properly develop the field without being charged with crime. As suggested by Mr. Titus, the bill makes it a crime for people to get together and combine or own a certain amount of stock in another company. It seems everything has been done for the purpose of preventing the things that ought to be done. I have paid considerable attention to the matter, and I have been interested in it for two years.

I think the Geological Survey is the proper department to take part in starting it, and the Interior Department it seems to me, could be safely intrusted with handling the bill in a way that will be to the best interests of the people and give us the most effective way of taking the oil out.

There is an argument against everybody in this country today who wants to do business in the way conditions demand that it should be done.

DR. DAY: Mr. Chairman, I certainly will agree that Mr. Ball has given us an extremely valuable paper, something to think about with a great deal of care, and I believe the Section here feels very, very grateful to Mr. Ball for that, and every thought that it gives out naturally will help somebody else to think in regard to obtaining larger tracts of land in the development of oil.

Behind the necessity for the oil producer to get his oil out as quickly as he can, because somebody else will get it, is the fact that oil as it comes out of the ground bears no label of the land it comes from. The Supreme Court has declared that oil and gas are mineral wild animals, and they belong to any one that gets them. Now you can't label that oil as to whose land it comes from. If you could you would have some help, but if it is possible to get at that some other way, that might help. And a good way to get a person to do a thing is to pass some kind of a law which will give him something worse to do, and he will take the thing you want him to do to get out of the worse thing.

If you look at the chart you will see that they propose that wells shall be drilled, say 1,000 feet apart. In other words, one well is drawing from a diameter of 1,000 feet. Now, that is to say that we recognize that that well can take the other fellow's oil from that distance if it happens to belong to the other fellow. That is, in a way, labeling that oil as to who it belongs to.

Suppose, then, that you say, to get away from this wild animal feature, namely, the oil flowing under the law where it actually occurs, that every square foot of land in a radius of 500 feet of a certain well shall flow in a direct ratio from the well to a certain extent

in the output of that well, no matter who owns the land. Another man drills a well 500 feet away, and he gets an equal amount from me and offsets the other, but you have secured to each square foot of land within 500 feet radius of each well, a certain proportion of oil which begins to flow at the 500 foot mark. You will of course vary that for different fields. And you will hardly carry it on the land which is geologically shown to be non-productive.

DR. WHITE: Well, it is hard to leave this interesting subject, but we must go on. Now, the paper of Mr. Roosevelt is short. It remains with the Section whether they will read it now, or let it go till later. If there's isn't any motion to have it read, why, we will pass on.

MR. TITUS: Mr. Chairman, might I revert to the other matter just a moment? I would like to make a motion to get this matter before this committee, that is, that a committee be appointed to draft a resolution, which resolution should be presented to the Resolutions' Committee, and if passed by them should then be presented to the Chairman of the Public Lands Committee of both houses, and also to the Secretary of the Interior, and possibly other departments, and that the effect of that resolution be a protest against the small acreage allowed in the present bill, and also protesting in toto against the provision in the bill which prevents small operators from combining, and it is the last feature which I think is even worse than the other.

DR. WHITE: What is your pleasure, gentlemen?

MR. TITUS: I make that motion, that a committee be appointed to draw that resolution.

MR. WELLS: I second that motion.

DR. WHITE: You have heard the motion and the second. Any remarks?

Motion carried.

DR. WHITE: I will appoint Judge Short, Governor Gillett and Mr. Titus.

The next paper, "Modern Oil Storage," by G. B. James, of Chicago, will now be presented.

Mr. James' paper will be found on page 307 of this report.

DR. WHITE: Our time is passing, and we will postpone discussion to hear Dr. David T. Day, of Washington, D. C.

The paper by Franklin D. Roosevelt, "The National Need of Petroleum Reserves," was then read.

Mr. Roosevelt's paper will be found on page 393 of this report.

Whereupon the paper by Mr. Ralph Arnold was read and will be found on page 473 of this report.

The meeting then adjourned.

UNIFORM MINING LAW SECTION.

MONDAY, NOVEMBER 13, 1916, MORNING SESSION.

The Uniform Mining Laws' Conference was called to order at 10:45 o'clock a. m., Monday, November 13th, in the La Salle Hotel, Chicago, Illinois, Mr. Thomas Jeremiah, Chairman of the Illinois Mining Investigation Commission, in the chair.

The first order of business was the reading of the call sent out by Governor E. F. Dunne to the governors of the coal-producing states in the United States, as follows:

"Coal mining is one of the great industries of the United States, and is one of the most hazardous, if not the most hazardous, of them all. The number of accidents, fatal and others, which occur yearly, monthly

and practically daily, is appalling, and is a reproach upon American industrial methods. Occasionally a catastrophe of unusual magnitude startles the Union, in which scores and even hundreds of lives are sacrificed in a single coal mining accident. Scientific methods enforced by law can go—and experience has shown do go—far toward eliminating the danger of such occurrences. A duty rests on those of us who are in positions of responsibility to bring about conditions of safety in the mines, so far as lies in our power.

No competition between the different states of the Union should be allowed to exist based upon cheapness of production at the cost of human life and limb, and which tends to discourage progressive legislation; no premium should be placed upon the financial conditions of recklessness in mining methods. Uniform legislation in those states in which the coal mining industry is a factor, should be brought about as speedily as possible. The benefit of uniform legislation has been felt on more strictly commercial subjects, such as negotiable instruments, sales, bills of lading, etc., in which we have more or less uniform laws as between the different states. A much greater necessity exists for the establishment of uniform mining legislation.

To this end, may I ask you to designate a commission to meet with similar commissions from other mining states at the La Salle Hotel, Chicago, on the 13th day of November, 1916, at 10 o'clock a. m., to continue in session until such legislation shall have been agreed upon by the convention to be recommended to the legislatures of the several states concerned? The commission from Illinois will consist of nine members, whom I have heretofore named, in pursuance to law; three of them are coal mine operators; three miners; and three citizens not affiliated with either employers or employees in the mining industry. May I recommend, if you will honor me by acting on this invitation, to name a commission, that you have it similarly constituted?"

Mr. J. G. Grossberg (Ill.) assigned the subject, "Statement of Reasons for Calling Conference," stated that Illinois, some years ago, had adopted the means of promoting safety in mining through legislation by the commission method, the strong incentive arising out of the Cherry disaster in 1909, with its death toll of several hundred. A Mining Investigation Commission had been appointed, consisting of nine members, three members suggested by the Illinois Mine Workers' organization, three members by the Illinois Coal Operators' Association, and three disinterested members. The form of commission was in existence to date, serving practically as a board of arbitration. The method of procedure was for the miners' representatives to submit their proposed recommendations, the operators' representatives theirs, while the three disinterested members sat as arbiters. Every report that had been submitted by the commission had been unanimous, and practically every word that had been recommended had been written upon the statute book.

The increasing difficulty encountered by him as a member of the commission was that measures of safety calling for expense, whether proposed by operators, miners or independents, had "come to the mat" with this question: "Will the industry bear the additional expense?" The primary consideration, of course, was the safety to human lives; next, conservation of property. In order to secure the greatest efficiency in the matter of safety both to life and property, standardized mining legislation should be adopted. One reason why Europe had advanced so far in mining legislation was due to her more centralized government, which condition does not prevail in the United States. Here each state is sovereign, and each state in great degree must work out its own problems; yet in order to increase efficiency, some standardization of at least the larger aspects should be had. That was why Governor Dunne, who is a humane man and a man at all times interested in the matter of measures of safety, had issued this call to con-

sider uniform mining legislation. It is to be remembered that the killing of a man not only means an additional burden on the community in taking care of his family, but it means the possibility of that family, deprived of its provider, becoming an addition to the criminal and vagabond element.

The working out of these problems of standardization would begin probably with technical men, who attend various conferences that consider safety measures. Personally, he would suggest that before this conference adjourned, a board be selected of nine, seven or five, whether from delegates to the conference or from the men attending the Mining Congress, competent to handle the matter from the technical and legal aspects. This board should be given plenty of time to work out a standardized system of legislation between now and next year. Illinois has an appropriation for its commission. It is possible that some portion of that appropriation might be used to some extent for the labor of the commission appointed by the conference. If that is inadequate, he was certain the state would make a reasonable appropriation for the expense involved. The original appropriation made the commission was found far in excess of its wants, but it showed the willingness of the state legislature to back up a reasonable measure for the purpose of safety in mines. He felt confident that whatever the personnel of succeeding commissions or of the coming legislature, Illinois had set the precedent and would do everything in reason to back up and promote legislation in the interest of safety, and therefore would probably contribute its share toward the expense of such a commission.

His main suggestion as to the work of the conference would be that after discussing the various laws and suggestions made during the sessions, a commission be named, say of nine members, representing the different states, or, one from each state, to be as nearly as possible balanced in some manner like the Illinois commission, representing the miners, the operators and the public, and that the commission work out a standardized code of mining laws to report to the conference next year; if possible, these men to be compensated for their time in order to secure the best results. If any difficulty arose concerning compensation from any state for its representatives, possibly the different miners' and operators' organizations would contribute their share of it.

He welcomed the assembly in behalf of Illinois and in behalf of the Mining Investigation Commission; he trusted they would find their visit a pleasure and their labors interesting and instructive.

Professor H. H. Stoek (Illinois), Chairman of the Program Committee, announced that everything possible would be done to arrange the time of the Uniform Mining Conference so as not to conflict with important sessions of the American Mining Congress. Inasmuch as Mr. Van H. Manning, whose paper was first on the program, was delayed by a late train, Mr. Robert H. Harlan, Member, International Executive Board, United Mine Workers of America, Seattle, Washington, read his paper.

Mr. Harlan's paper will be found on page 598 of this report.

Some discussion arose as to the method to be pursued in discussing the papers.

Mr. H. M. Wilson believed that the commission recommended by Mr. Grossberg should be appointed as soon as possible.

Professor H. H. Stoek suggested that the time was inopportune for the appointment of such commission, as its appointment should follow the reading of the several papers prepared. However, it might be well to have the Chair appoint a resolutions' committee, preferably with one representative from each state.

Mr. J. P. Reese believed that an opportunity should be afforded the American Mining Congress to get the benefit of the papers read, so that the mining men in general could discuss them. He further believed that the suggestion of a commission of nine members to formu-

late a tentative standardized code should be endorsed by the American Mining Congress.

Mr. E. W. Parker suggested that the discussion following the reading of the papers be limited entirely to the subject matter contained in the paper.

Mr. S. A. Taylor suggested that a committee be named, obligated to listen to each paper and cull out what they wanted to embody in resolutions. Since many of the delegates might be absent at various sessions of the Mining Congress, the appointment of this permanent committee would ensure continuous hearing of the papers and discussion arising therefrom.

Mr. H. M. Wilson approved the suggestion.

Mr. G. S. Rice suggested that each state have one representative on the resolutions' committee.

Mr. A. J. Moorshead considered this number too unwieldy.

Mr. H. M. Wilson suggested the committee number five members.

Moved and seconded that the chairman of the Mining Investigation Commission, with the advice of the commission, appoint the Resolutions' Committee.

Mr. Grossberg proposed the amendment that the Chairman appoint the committee. The amendment accepted, seconded and carried, whereupon the chairman appointed the following:

A. J. Moorshead, operator, Illinois.

Robert H. Harlan, miner, Washington.

G. W. Savage, miner, Ohio.

Thos. Kennedy, miner, Pennsylvania.

Edward Gray, operator, Iowa.

Mr. Kennedy asked Mr. Harlan if he proposed to include the anthracite coal regions of Pennsylvania in the proposed standardized coal mining code.

Mr. Harlan replied that he had not given that matter the thought it deserved, but he realized the anthracite conditions were almost totally different from bituminous conditions.

Mr. Kennedy stated that for years the anthracite miners, and in fact the state generally, had taken the position that the mining of anthracite coal was a subject for special legislation, and to that end, there were two distinct mining codes, one governing soft coal, the other governing hard coal. Further than this, the anthracite region had what is known as the miners' certificate law, and he didn't believe the Illinois law pertaining to the examination of miners measured up to the standard of the Pennsylvania Act. In 1897 or 1898, a man had been imported into the anthracite region for the purpose of testing the miners' certificate act. He secured work without a certificate, and the question was raised as to whether or not a soft coal miner was competent to mine anthracite coal. The case was taken to court, and finally reached the Supreme court. Since then, the anthracite region had consistently held that the soft coal conditions were entirely different, and still held and would likely continue to hold the position that anthracite mining required special legislation. However, it was possible that further discussion might bring out some ideas for general laws that might apply commonly to both regions.

In regard to state mine inspectors being kept out of politics, Pennsylvania had dealt with that question, and the present plan seemed to meet with the approval of all concerned. The candidates for state mine inspectors' positions were examined by a state board, requiring a grade of 90 per cent to obtain a certificate. To obtain office, the holders of certificates must be chosen by the electorate of the county.

In 1913, a commission similar to the Illinois Commission had been appointed to revise and codify the laws. Two reports were submitted, the miners submitting the minority report, which included the present method of selecting mine inspectors. Dr. J. A. Holmes, after reading it carefully, declared it to be the best mining law in the country.

Mr. Kennedy said that personally he did not know much about the bituminous code of Pennsylvania, but he understood the soft coal men considered it the best bituminous code in existence.

Mr. Harlan stated that he deplored the influence of politics in the selection of such important officials as mine inspectors, and believed the certificate and election plan of Pennsylvania far more promising of good results.

Mr. Grossberg, in commenting on Mr. Kennedy's statement that special conditions prevailed in the anthracite region, stated that other states also mined hard coal. A uniform code could classify mining. For example, the building code included theatres, warehouses, office buildings, etc.

Mr. E. H. Weitzell (Colo.) said he supposed there was no State in the Union affording such various conditions as Colorado. They had had the experience of passing a mining law about three years ago. After it had been passed in the House, it was referred to a sub-committee of the Senate, representing the miners and operators, and about three weeks of discussion of ten or eleven hours a day, revising, changing, endeavoring not to impose hardships on any one district, were needed to complete the final draft. Yet it had not proved satisfactory, and needed changing again. In fact, it seemed impossible even in one state to get a satisfactory mining law. While he believed there were some questions that might be subject to federal legislation, and some conditions such as ventilation, traveling ways, etc., that might be almost general, yet it seemed hardly possible to hope to cover the whole question by federal legislation or uniform state laws. In Colorado, Utah and New Mexico, the mines have atmospheric conditions to contend with that eastern mines know nothing about. It was necessary to put radiators in some mines, while 50 miles away the mines needed no radiators. The provision for using permissible powder worked a hardship on some operators who had no reason for using it.

The death rate in Colorado had decreased very rapidly of late, particularly during the last year. Although the inspection service was most competent, he believed the compensation law a wonderful help, as it stood to reason that men were more careful when accidents cost.

Mr. G. S. Rice expressed his regret that such emphasis was laid upon the difficulties in the way of proposed uniform mining legislation. He believed methods would be found to overcome them. Great Britain and France had been able to accomplish something toward uniformity in general provisions regarding ventilation, gas and the like.

Mr. Jas. Dalrymple (Colo.) stated that in his opinion if it was intended to propose uniform mining legislation for local conditions, the project was practically impossible. He had worked in mines of varying conditions and appreciated from practical knowledge the hopelessness of local conditions governed by uniform laws. He believed this useless debate should end, and some information be given as to just what the conference hoped to accomplish.

Mr. H. M. Wilson replied that the commission to be appointed later would deal with details.

Mr. Van H. Manning, Director, Federal Bureau of Mines, Washington, D. C., having arrived, was introduced to the conference, and read a paper which will be found on page 585 of this report.

Adjournment was taken at 1 o'clock p. m.

NOVEMBER 13, 1916, AFTERNOON SESSION.

The afternoon session was called to order at 4:20 p. m., Mr. Thomas Jeremiah presiding.

Mr. S. A. Taylor (Pa.) read a paper which will be found on page 581 of this report.

Mr. G. W. Savage (Ohio) said in reference to the Ohio commission's work that it had taken up the old mining laws, redrafted and added some new amendments and presented the mining code as it now exists to the legislature, which had passed it. He believed that if the miners and operators would confer on cases of this kind, they could agree to a law that would protect the life and health of the miner as well as conserve the property of the coal operator. He thought the time had arrived when they should try to do it. He knew what it was to go before Legislatures, the operators coming in with their lobby, fighting the miners' propositions, and vice versa. He believed that a commission could establish a basis for mining laws in every state of the Union. Matters affecting local conditions could be adjusted in those states. He did not think a commission could possibly recommend a law that would cover every mining district, but it could establish a basis of good laws for every section. If the proper commission was selected, and had authority delegated from the different states, and took matters up as they should, he had no doubt but that in a year's time they could report something tangible upon which the conference could base a general mining law.

Mr. E. T. Bent (Ill.) said that Illinois had tried the commission plan, which had proved so satisfactory that the Legislature had continued it. He thought the whole theory of the Illinois laws a mistaken one, as the mining laws should be generic, not specific, and the mine inspectors, controlled by the Mining Board, should make rules flexible enough to meet changing conditions that exist in the different fields.

Mr. G. S. Rice stated that it would be very difficult to get together a commission from all parts of the country representative of all diverse conditions. It was his thought that it might be possible through the action and request of this body and of the American Mining Congress to petition Congress to pass a bill calling for the appointment of five or six or more men to be appointed by the President, such commission to visit the principal mining centers and give hearings, the hearings being public. After a due time had elapsed, the commission would present to the legislatures of the various states a proposed codification of mining laws which would apply generally throughout the country, leaving such details as seem fit to the states to be handled by the states. He agreed with Mr. Bent that mining laws were made too specific—they should be made more general and greater leeway left to the mining departments of various states for interpretation. Some mining laws precluded improved methods because of limitations laid down.

Mr. A. J. Moorshead (Ill.) prefaced the reading of his paper by saying that Illinois was well known throughout the country for its mining legislation, its particular efforts in that direction having been forced on it by disaster, which was a sad but true commentary, applicable also to other states. He said that a great deal of pains had been taken by the original Mining Investigation Commission in revising the laws. A compilation of all state mining laws had been drawn up for comparison, and in addition, the commission had the benefit of advice from Mr. Carl Scholz, who had then but recently returned from abroad, where he had studied mining conditions.

Mr. Moorshead's paper will be found on page 361 of this report.

Concluding, Mr. Moorshead stated that he believed that a mining law could be made general enough to cover the various conditions of mining, so that a mine examiner in Illinois, with his certificate should be competent to go into the mine whether in Pennsylvania or Washington.

Mr. Stoek explained that one good feature of the Illinois commission plan was the possibility of carrying on investigations. For example, the powder manufacturers of the United States had been invited to appear before the commission and present their ideas of what would be a fair powder law.

Mr. Stoek read the paper of Mr. Michael Scollard of Indiana.

Mr. Scollard's paper will be found on page 577 of this report.

There being no discussion on Mr. Scollard's paper, Mr. Grossberg suggested that two things be done: (1) Elect a permanent chairman, as Mr. Jeremiah was compelled to leave the city; (2) appoint a committee of three to work up plans for the proposed interstate national commission, in order that a report could be made prior to final adjournment.

For permanent chairman Mr. Rice Miller (Illinois) nominated Mr. A. J. Moorshead.

Mr. A. J. Moorshead nominated Mr. Schmick of St. Louis.

Mr. Moorshead's nomination being seconded and nominations closed, Mr. Moorshead was elected permanent chairman.

Mr. Grossberg withdrew the second part of his motion concerning the appointment of a committee upon learning that committee of five appointed previously was to make the report he desired.

Adjournment was taken at 5:20 o'clock p. m., to meet the following morning at 9 a. m.

TUESDAY, NOVEMBER 14, 1916.

Morning Session.

Session was called to order Mr. A. J. Moorshead presiding.

Mr. Grossberg read the following paper by Judge J. W. Thompson of the United States Bureau of Mines, who was unable to be present:

Judge Thompson's paper will be found on page 269 of this report.

Mr. Grossberg, commenting on Judge Thompson's statement regarding the diversity of construction placed by the different state courts in sustaining or rejecting various acts on constitutional grounds, said that his own experience led him to believe that of late years, courts have shown a growing tendency to sustain discretionary powers given administrative officials or commissions, and in this connection, he would suggest that if a commission were formed or brought about by this body, and it should come to draft a uniform law, it would be best, as nearly as possible, to leave local conditions to the discretion of the state commission or possibly state inspectors, rather than inject a diversity of laws into the different states.

Mr. J. P. Reese stated that in his opinion it was time some individual liberty should be taken away from the miners, and punishment devised for men disobeying safety rules which endangered not only their own lives but the lives of those near them.

Mr. H. M. Wilson objected to the irrelevancy of the discussion and suggested that the chair limit the discussion to the subject of the paper just read.

The chairman replied that technically Mr. Wilson was right, but that the human element was so closely connected with accidents that the matter must be solved before prevalent safety could be attained.

Mr. Harlan said that he was well aware of the human element in connection with accidents, but believed that the miner's apparent carelessness grew out of his feeling that the operator was not sufficiently interested in safety. He believed that if the operator took every possible precaution, the miners would be so touched by the deep interest manifested that they would exert themselves to observe every safety rule.

At this point, the chair commented on the very small number present, saying that he thought it wise to adjourn until the following morning.

Mr. Grossberg moved that the meeting continue in order that the

committee of five could hear the remainder of the papers and be preparing a report. Motion seconded and carried.

The chair was directed to visit the session of the American Mining Congress and bring in the missing delegates.

In his absence, Professor H. H. Stoek was named temporary chairman.

Mr. James Dalrymple stated that he believed Mr. Reese had opened up a very important question; that if the miner expected 100 per cent safety, he would have to furnish 99 per cent of it himself, provided, of course, the laws were reasonable and miners furnished with necessary material for adequate protection. In his state, the timbering has to meet with the approval of the inspector or deputy, and it is put on record at the mine. If the miner does not timber as per agreement, the case is reported to the superintendent. If it is the miner's first offense, and his previous work has been satisfactory, the superintendent may or may not cause him to lose that day's work. On second offense, the man is either discharged or given a lay-off of ten days. For the third offense, he is discharged.

The mining law in Colorado is printed in ten different languages, so that every miner can read the requirements. It was hardly fair to compare European fatalities with American fatalities for the reason that the old country miners universally spoke the country's language, while in America ten to fifteen nationalities could be working in one mine.

Mr. Weitzell stated that they were offering prizes as an incentive to the men to take safety precautions. Each month, at the mine having the best record, the foreman receives \$15, each assistant \$10, each fire boss \$10 and boss driver \$5. In addition, a banner was hung up at the office. One mine in five months had no accident, and no man laid off a single day. On one occasion, three mines made 100 per cent. Another plan was now being tried, viz.: if a man laid off for disregarding a safety rule, a yellow descriptive slip hung over his check. Prizes were offered also for the best suggestion in behalf of safety.

Mr. G. S. Rice commented on foreign mining, saying that he did not believe it fair to compare the death tolls in view of the widely different methods pursued. For example, in France the operators were compelled by law to fill in the mine for two reasons, viz.: (1) To get complete recovery of coal, and (2) to prevent subsidence of surface. In one mine, they had to quarry rock outside and bring it in for filling, requiring as many men doing dead work as men working in coal.

Mr. Grossberg suggested that in order to make progress, the program of prepared papers should be resumed.

Mr. H. M. Wilson moved that the papers be read in order, the debate following each paper as read, discussion to be limited to three minutes, the gross debate to fifteen minutes for each paper.

Mr. Savage disagreed, saying that no man could express himself in three minutes.

The chairman, Mr. Moorshead, stated that he wished everybody to be satisfied, and believed that ten minutes' debate allowed each speaker would be sufficient, and yet warrant progress. There being no objections, this rule was adopted.

Mr. H. H. Stoek (Illinois) announced that Mr. Shiflett, Chief Mine Inspector of Tennessee, was detained by illness and for the same reason had not been able to prepare his paper, but had presented his views on the subject of uniform mining legislation to the Governor of Tennessee in the form of a letter, the pertinent part of which was read as follows:

While I agree with the honorable Governor of Illinois that every possible effort should be made to protect life and limb, and that a commission such as he designates from all the mining states should be appointed to consider the matters referred to in his letter, from which there is no doubt much good could be brought out. However, I do not believe that a uniform mining law as outlined in Governor Dunne's letter would be practical. I think each state,

and in fact every mine should be under special laws and rules that may be applicable to conditions in each and every mine as conditions in no two mines are alike. Realizing this years ago, I prepared a measure which is now the mining law of Tennessee, a greater part of which is a departure from any other mining law in existence, that is, the Chief Mine Inspector has authority under the laws of Tennessee to formulate special rules regulating the development, management and governing the employes and management of every mine. No other mining laws in the U. S. give the Chief Mine Inspector such authority or imposes on its chief mine inspector such a responsibility.

I do not believe that any commission of mining men, no matter how intelligent, could prepare a uniform mining law that would meet the diverse conditions that arise from day to day in the mine, and after years of study and practical experience with mining, I am of the opinion that if you appoint such a commission as suggested by Governor Dunne, I would appoint mining men that are favorable to the mining laws of Tennessee.

Yours very truly,

(Signed) R. A. SHIFLETT.

Further than an inquiry as to the names of the delegates suggested by Mr. Shiflett in his letter, no discussion was held.

Mr. Grossberg read the following paper written by J. A. Garcia, Chicago.

Mr. Garcia's paper will be found on page 281 of this report.

Mr. Paul's paper will be found on page 572 of this report.

Mr. Stock, commenting on Mr. Paul's paper, said that it contained one idea that had not received due attention, namely, the recognition of the mine inspection service on a commission considering mining laws. The Illinois Commission, realizing the need for consultation with the inspection force, had requested the State Mining Board to appoint a committee to deliberate with the commission.

Mr. J. P. Reese remarked that the inspection force should be taken out of politics. For example, the twelve inspectors in Illinois would soon be displaced because of the new incoming administration. The Pennsylvania plan of electing certificated men was preferable to the political spoils system.

Mr. Savage said that the commission plan was all right if composed of men interested in coal mining. In Ohio, the Industrial Commission did not include one mining man, yet the commission controlled the mining department and mine inspectors.

The chair announced that he preferred not to serve on the Resolutions Committee and named Mr. J. G. Grossberg in his stead.

Adjournment was taken at 4 p. m. to reconvene the following morning at 9 o'clock.

WEDNESDAY, NOVEMBER 15, 1916.

Morning Session.

Conference was called to order at 9:50 o'clock a. m., Mr. A. J. Moorshead presiding.

Mr. R. W. Ropiquet (East St. Louis, Ill.) read a paper.

Mr. Ropiquet's paper will be found on page 250 of this report.

There being no discussion of Mr. Ropiquet's paper, the chairman announced that since an important meeting of the American Mining Congress was now in progress, the conference would adjourn until 2 p. m. to meet in Room 1708.

Adjournment was taken at 10:45 a. m.

WEDNESDAY, NOVEMBER 15, 1916.

Afternoon Session.

The conference reconvened at 2:20 p. m., Mr. A. J. Moorshead presiding.

The chairman stated that the Resolutions Committee was now ready to report.

Mr. J. G. Grossberg, chairman of the Resolutions Committee, read the following resolutions separately and moved their individual adoption, asking that the committee be authorized to change the phraseology later on, since the work had been very hurriedly done.

Resolution No. 1.

The name of the organization shall be "Uniform Coal Mining Laws Association."

Its adoption was moved, seconded and duly carried.

Resolution No. 2.

The organization shall proceed to the election of permanent officers, consisting of president, vice president, secretary and treasurer, to arrange for the next annual meeting of the organization, and to carry on the business of the organization in the interim.

Resolution No. 3.

This body when convening in annual session, shall consist of commissions of nine from as many of the coal producing states as will be represented by the members appointed by the governors of the different states, and this body recommends that these commissions shall consist of nine members each, three miners, three operators and three presenting the public.

Resolution No. 4.

It is the sense of the conference on Uniform Mining Legislation that it is entirely feasible to draft a uniform coal mining law covering the fundamental operations and conditions of mining in the different states, leaving the local conditions to be handled in each state.

It is the sense of the conference that a commission of nine members be selected to consist of three representatives of the miners to be appointed by the International Executive Board of the United Mine Workers of America; three representatives of the coal operators to be appointed by the American Mining Congress; and three representatives of the general public to be appointed by the director of the Federal Bureau of Mines as soon as he has been notified of the appointment of the miners' and operators' representatives.

We earnestly request Congress to appropriate requisite funds for carrying on the work of the commission.

Mr. Grossberg said it was the understanding of the committee that if adopted, Resolution No. 4 would be immediately submitted to the American Mining Congress so that action could be taken by the Congress before adjournment.

Mr. Reese asked if the commission would be a separate and distinct organization from the American Mining Congress.

Mr. Grossberg replied that it would be, because the membership of the American Mining Congress was limited, and the committee believed the commission should be separate and apart in order to have wider representation.

Mr. Rice said he did not understand how it was expected such a large body could conveniently assemble, as there were thirty-five states mining coal and the representation on that basis would number three or four hundred.

Mr. Harlan replied that the plan was based on the Illinois plan, with its three groups of representatives, and it was hoped that out of the apparently large number, enough would be able to attend to give equal representation of the three groups. It has been suggested that the session of the commission be held at the same time and place of meeting of the Mining Congress because of the large number of mining men attending.

Mr. Grossberg said that it was expected the Commission of Nine would do the actual work.

Mr. Reese maintained that the commission should be a part of the Mining Congress because of its power and influence.

Mr. Harlan replied that the miners were not members of the Congress, although he understood a formal invitation would be sent the Union in the near future.

Mr. H. M. Wilson suggested as an amendment: "Which association shall, so far as practicable, meet as a section of the Mining Congress."

Mr. Reese said he would withdraw his objection to the body not being a part of the Mining Congress.

Mr. Grossberg said that the committee believed it wise to leave the matter of affiliation with the Mining Congress to the discretion of the Executive Committee.

Mr. Manning (Washington, D. C.) said he was strongly of the opinion that the commission should be connected with the American Mining Congress, as it had offices in Washington, and the secretary devoted most of his time to matters pertaining to the mining industry. Mr. Callbreath would be of great assistance, particularly in obtaining an appropriation from Congress.

The chairman asked if the endorsement of the commission by the American Mining Congress would not be sufficient.

Mr. Grossberg asked if there were any objections to leaving the matter of connection with the American Mining Congress to the discretion of the executive officers of the commission.

Mr. Bent stated that he thought it vitally important that the services of the secretary of the American Mining Congress be secured in connection with the commission.

Mr. S. A. Taylor said he had already prepared a resolution to present a little later. His idea was a little different. He was satisfied that the work the Bureau of Mines had done in reference to a code of laws for metal mines should be carried out in this instance. He doubted if the committee had a true idea of the amount of work involved in codifying the mining laws of the states. He suggested that the American Mining Congress be asked to co-operate to the extent of having its secretary present a bill to Congress asking for the authorization of certain work and an appropriation therefor.

Mr. Taylor read the following resolution:

"We authorize the Secretary of the American Mining Congress to prepare a bill and have it introduced in Congress authorizing the Bureau of Mines to codify the laws of the various states and to prepare a formal law to present to the various mining states, carrying with it an appropriation of \$12,000 for two years."

Mr. Taylor said that in his opinion, if the proposed commission acted as an advisory body to the Bureau of Mines, far greater headway would be made.

Resolution No. 2, concerning permanent officers for the Uniform Coal Mining Laws Association, was duly adopted.

The following resolution was adopted:

"It is the sense of this body that Governor Edw. F. Dunne, who called this conference on Uniform Mining Laws, and the governors of several states who appointed representatives to attend it, have rendered a distinct public service in furthering the cause of uniform coal mining legislation and in promoting general safety and efficiency in coal mining."

The following resolution was read:

"The usefulness of any law is no greater than its enforcement. The safety of many thousands of lives and many millions in property is dependent upon a proper enforcement of the mining laws.

It is therefore the sense of this conference that the mine inspection service, like the Army and Navy, and police and fire departments should be scrupulously and rigidly kept out of politics.

In view of forthcoming changes of administration in a number of states, the press are requested to give this resolution the widest possible publicity."

Mr. H. M. Wilson suggesting leaving out the words "police and fire departments."

Mr. Grossberg said that the idea was not implied that the police and fire departments were out of politics, but that they should be.

Mr. Wilson withdrew his objection, and the resolution was duly adopted.

The discussion of Resolution No. 4 was again taken up.

Mr. Harlan (Washington) explained that the committee believed the inspection service should be represented on the commission, but deemed it not fair to dictate to the Federal Bureau in the matter. The committee had also spoken of an engineer being one of the three independents, but decided to leave the matter to the discretion of the bureau. They had named the American Mining Congress to appoint the three operators because there was no organized national body of operators.

Mr. Bent (Illinois) asked if it was the thought of the committee that the Federal Bureau would appoint members from the bureau or outside.

Mr. Harlan (Washington) replied that it was the thought the bureau would select a man from its corps of engineers. At all times the co-operation of the Federal Bureau would be expected and desired.

Mr. Manning stated that the words "Director of the Federal Bureau" should be changed to "Secretary of the Interior," as the Bureau of Mines was a section of the Interior Department.

This change was duly made.

Mr. Bent (Illinois) suggested that the Director of the Federal Bureau be an ex officio member of the commission.

Mr. Rice (Pennsylvania) stated that the commission appointed by the Indiana Legislature requested a mining engineer named by the bureau, but he was an outside man not connected with the bureau.

Mr. Taylor said that he believed the commission should be known as the consulting body to the Federal Bureau. A large part of the Pennsylvania operators did not recognize the union, and this feature might interfere with its work as a separate commission.

The Chairman suggested that a committee of three be appointed to withdraw for ten or fifteen minutes to revise the resolution.

Mr. Harlan objected to another committee redrafting the resolution.

Mr. Grossberg suggested the following amendment:

"It is the sense of the conference that the commission of nine members be selected whose duty it shall be to draw up and recommend a standardized code of mining laws for adoption to the several states."

Mr. Wilson objected, saying that Congress never appropriated money to other than Federal departments. It was idle to talk of getting Federal assistance outside of the Federal Bureau of Mines.

Mr. Wilson moved "That the Secretary of the American Mining Congress be authorized to prepare a bill to be introduced into Congress authorizing an appropriation of \$12,000 for the codification of coal mining laws of the various states, and that the above committee shall act as an advisory committee to the Director of the Bureau of Mines in carrying out its duties."

Mr. Grossberg said that he did not agree with Mr. Wilson that the proposed commission be simply an advisory body to the Federal Bureau. It must not be forgotten that the actual legislation would have to be enacted not by Federal Congress, but by the several states. The proposed commission would really be advisory to the states in recommending the tentative mining code. To state specifically that it should be an advisory body to the Federal Bureau of Mines would undoubtedly create opposition in some quarters. There was still alive the feeling of state sovereignty, and it would hardly be wise to present to the state legislatures a bill labeled, "This bill is drawn by the Federal Bureau of Mines—please pass it." Some states would declare it a violation of their individual rights. It was the idea of the commission to avail itself of the assistance and co-operation of the Federal Bureau, and to have the Secretary of the Interior name the Director as a member. But instead of having the commission advisory to the bureau, he believed it wiser to have the bureau advisory to the commission.

Mr. Harlan said he approved Mr. Grossberg's position. He doubted if an appropriation could be secured from Congress, in which event the miners' and operators' organizations would have to bear the necessary expense.

Mr. Grossberg offered the following amendment specifying the duties of the proposed commission: "Whose duties it shall be to draft and recommend to the next annual session of this body a uniform set or code of mining laws to be recommended for adoption by the several mining states."

Mr. Wilson offered the following motion: "It shall be the duty of this commission to codify the mining laws of the several states and prepare a draft of the uniform code of mining laws, and we earnestly request Congress to appropriate \$12,000 to the Federal Bureau of Mines to carry out the work of the commission."

Mr. Grossberg replied that he had no objection to the first part of the motion, but did not approve of the second part. He therefore offered the following motion: "The duties of this commission shall be to draft a report to the next annual meeting of this organization and a code of uniform mining laws to be recommended for adoption by the legislatures of the several coal mining states."

Mr. Bent suggested that the commission consist of ten members, the tenth being the Director of the Federal Bureau serving as ex officio member.

Mr. Wilson suggested that the paragraph asking for an appropriation from Congress be amended to read: "We earnestly request Congress to appropriate requisite funds to the Federal Bureau of Mines for carrying on the work of the commission."

The motion as amended seconded and carried.

Mr. Grossberg moved that the Chairman appoint a committee of three, the Chairman also serving, to appear before the American Mining Congress immediately upon adjournment of the session to present resolutions for the formation of the commission with the request that they act upon the matter before final adjournment.

Motion seconded and carried.

Whereupon the Chairman appointed Messrs. Grossberg, Harlan and Taylor.

Mr. Harlan asked to be excused, as he was leaving town very shortly.

Mr. Taylor stated that he was not a delegate, and therefore could not serve.

Mr. W. R. Crane was appointed in Mr. Taylor's place.

Mr. Grossberg moved that a resolution be adopted extending the thanks of the conference for the courtesies shown by the American Mining Congress. Motion seconded and carried.

The resolution concerning make-up of proposed commission was read as finally amended:

"It is the sense of this organization that a Commission on Uniform Coal Mining Legislation be selected to consist as follows:

"Three coal miners to be appointed by the International Executive Board of the United Mine Workers of America, three coal operators to be appointed by the American Mining Congress and three representatives of the general public to be appointed by the Secretary of the Interior as soon as he has been notified of the appointment of the miners' and operators' representatives, the Director of the Federal Bureau of Mines to be an ex officio member of the commission.

"The duties of this commission shall be to draft and report to the next annual meeting of this organization a tentative code of uniform coal mining laws to be recommended for adoption to the legislatures of the several coal mining states.

"We earnestly request Congress to appropriate the requisite funds to the Federal Bureau of Mines for the purpose of co-operating in carrying on the work of the commission." Duly adopted.

The election of permanent officers of the Uniform Mining Laws Association being next in order, Mr. Kennedy (Pennsylvania) nominated Mr. A. J. Moorshead. Motion seconded and carried.

Mr. Kennedy nominated Mr. Robert Harlan (Washington) as Vice-president. Seconded and carried.

Mr. Kennedy nominated Mr. Grossberg as Secretary-Treasurer.

Mr. Grossberg asked to decline for two reasons: First, he believed the offices should be distributed, and his election would mean two officers from Illinois; second, he did not believe he had any talent for the detail duties of Secretary.

Mr. Grossberg's nomination was seconded and carried.

Mr. Grossberg announced that the committee of three would meet immediately upon adjournment.

Adjournment sine die was taken at 4:20 o'clock p. m.

ANNUAL MEETING OF MEMBERS

Tuesday Evening, November 14, 1916.

East Room, La Salle Hotel, Chicago.

Secretary Callbreath called the meeting to order at 7:30 p. m.

SECRETARY CALLBREATH: In the absence of the higher official, may I be permitted to call this meeting to order? The annual members' meeting has been called in accordance with the by-laws, to meet at 7:30 this evening. The usual order of business is listening to the financial statement of the Secretary and the election of the Board of Directors.

The first thing in order this evening will be the selection of a Chairman of this meeting. Who will you have for your Chairman?

DR. PURDUE: I nominate Mr. George E. Collins, of Colorado. The nomination was seconded and carried.

CHAIRMAN COLLINS: Fortunately, the duties of Chairman do not require any speech. I think this meeting is only called for the purpose of adjourning until tomorrow, is it not?

SECRETARY CALLBREATH: That is the real purpose, except that it has been thought wise that we shall select now a Nominating Committee who might have under consideration the names of the men whom they will nominate as members of the Board of Directors to be voted upon at the meeting of tomorrow evening.

CHAIRMAN COLLINS: Gentlemen, shall we listen to the statement of the Secretary or shall that be postponed until tomorrow evening?

SECRETARY CALLBREATH: The fact is, Mr. Chairman, that I am not prepared to make that statement now. I have been away from the office for three months and I have not even looked over the accounts. An auditor has gone over the books, but I have not looked over his statement yet. I hope you will pass that until tomorrow evening, when I will be ready to make my report.

CHAIRMAN COLLINS: If the ladies and gentlemen are agreeable, the Secretary will be excused from making his statement until tomorrow afternoon. Is there a motion to that effect?

DR. PURDUE: I move that we defer the hearing of the Secretary's report until tomorrow evening.

MR. H. EVSMITH: I second the motion. The motion was carried.

CHAIRMAN COLLINS: Nominations are now in order for the Nominating Committee. How large is it usually, of how many members does it usually consist?

SECRETARY CALLBREATH: It usually consists of three or five; sometimes five and sometimes three.

CHAIRMAN COLLINS: Three sounds good. How many directors are to be elected this time? How many of the present directors retire on this occasion?

SECRETARY CALLBREATH: Those who retire at this meeting are M. S. Kemmerer of New York City, E. A. Montgomery of Los Angeles, California, W. J. Richards of Pottsville, Pennsylvania, and one vacancy. We also have received the resignation of Dr. William B. Phillips, who was elected last year for three years as a representative of Colorado. After his election he resigned the presidency of the Colorado School of Mines, moved to Texas, and, therefore, sent in his resig-

nation as a member of the Board. We should elect four directors for a term of three years and one director to take the place of Dr. Phillips for a period of two years.

CHAIRMAN COLLINS: Suggestions would be in order. Can you make any suggestions for the Nominating Committee, Mr. Secretary?

SECRETARY CALLBREATH: Mr. Chairman, I would like to make this suggestion: Some gentlemen from the iron interests of northern Michigan and Minnesota have become affiliated with the organization today and they are very anxious that somebody representing the iron industry should be put on the board. I feel myself that that is a very wise suggestion. I think that this committee, this Nominating Committee, should consist of some of the gentlemen who are present here in order that their interests may be considered.

CHAIRMAN COLLINS: You mean some gentlemen present this evening?

SECRETARY CALLBREATH: Not necessarily, but somebody who is present at the convention and who can attend the meeting tomorrow evening, somebody who can meet with the other members of the committee.

CHAIRMAN COLLINS: With that in view, Mr. Secretary, can you suggest to this meeting any persons who would be desirable to serve on the Nominating Committee?

SECRETARY CALLBREATH: I think, Mr. Chairman, that I ought to be excused from that. There are two things that I have always tried religiously to keep my hands off; one was the selection of the meeting place of the convention, and another was the election of the directors. I have been obliged to dip in the first one. My purpose for keeping clear of that was the fact that where there was rivalry between towns asking for the convention that the Secretary ought not to be placed in the position where he could be charged with favoring one as against the other and thereby creating any animosities during the session. I have felt when there was no rivalry and when requested that I might take a hand in the selection of the city where the convention could be properly cared for.

I have, however, religiously kept my hands off of the election of directors. I feel that the directors, who are to select the Secretary, should be elected without any voice from the Secretary. The Secretary, whether he is interested or not, ought not to be put in the position where he might be charged with having some influence in that respect. In other words, I don't want to be put in a position of trying to secure my own election and, therefore, I think it ought to be left out of my hands except, possibly, where advice is needed by the committee. Otherwise, I would not like to be put in that position.

CHAIRMAN COLLINS: You have heard the statement of the Secretary. I would like to have suggestions for the Nominating Committee. Whom will you gentlemen have?

MR. H. EVSMITH: Mr. Chairman, I represent North Dakota. I live in Duluth. There are a number of gentlemen from Minnesota present at this convention, but I do not see them here this evening. Their choice is George H. Crosby of Minnesota.

CHAIRMAN COLLINS: For Director?

MR. H. EVSMITH: Yes.

CHAIRMAN COLLINS: We are talking about the Nominating Committee now. We would like to have suggestions as to whom you would like to have on your Nominating Committee.

SECRETARY CALLBREATH: I would suggest in that case that Mr. Evsmith be on the Nominating Committee, where he would be in position to suggest Mr. Crosby as a Director of the Congress.

MR. EVSMITH: That was my idea, Mr. Chairman, if I am elected to serve on the Nominating Committee I will support Mr. George H. Crosby as a Director.

CHAIRMAN COLLINS: We have Mr. EvSmith suggested as one member of the Nominating Committee. Are there any other suggestions for the Nominating Committee?

DR. PURDUE: I suggest Mr. S. A. Taylor.

CHAIRMAN COLLINS: Any other suggestions for the Nominating Committee to report to the meeting tomorrow night with their recommendations?

MR. J. S. GRASTY (Virginia): I suggest Dr. Purdue.

CHAIRMAN COLLINS: Dr. Purdue, from Arkansas. Any other nominations?

DR. HENRY MACE PAYNE: Mr. Chairman, I believe the Committee was to be three in number?

CHAIRMAN COLLINS: That was my suggestion to this meeting, but this meeting was to settle the question as to how many members we were to have on our Nominating Committee.

DR. HENRY MACE PAYNE: I move that the nominations be closed.

CHAIRMAN COLLINS: It is moved that the nominations for Nominating Committee be closed. Is there any second?

MR. J. S. GRASTY: I second the motion.

Upon the motion being put by the Chairman it was declared carried.

CHAIRMAN COLLINS: It is unanimously carried. The Nominating Committee will therefore consist of Mr. EvSmith, Mr. S. A. Taylor and Dr. Purdue. The chair will request Mr. EvSmith to act as chairman and to see that the other two members of the Committee meet as soon as possible and submit nominations tomorrow evening at the meeting of the members.

Is there any other business which should come before this meeting? Have you any other business to present, Mr. Secretary?

SECRETARY CALLBREATH: I would only like to express my pleasure of the fact that we have a lady member present who is attending the meetings and who is intensely interested in the work of the Congress, Mrs. Staight, of Cleveland, Ohio, and her son, who have been faithful members for a long time. While they do not preside at meetings and make speeches, we have no warmer friends than Mrs. Staight and her son. I would like to express my appreciation of her presence at this meeting.

CHAIRMAN COLLINS: We are honored in having Mrs. Staight and her son here. We will not ask Mrs. Staight to respond. Perhaps she would prefer not.

Is there any other business to present?

SECRETARY CALLBREATH: I think not, except to adjourn.

CHAIRMAN COLLINS: Then the motion to adjourn this meeting to tomorrow evening at 8 o'clock will be in order.

MR. T. L. LEWIS: Mr. Chairman, I move that we adjourn this meeting, to meet again in the Red Room tomorrow evening at 8 o'clock.

DR. PURDUE: I second the motion.

The motion was carried.

Whereupon an adjournment was taken to 8 o'clock November 15, 1916.

ADJOURNED MEMBERS' MEETING.

Wednesday, November 15, 1916.

Red Room, La Salle Hotel, Chicago.

President Carl Scholz presided, and called the meeting to order at 8 o'clock p. m.

THE PRESIDENT: Gentlemen, the adjourned meeting of the members of the American Mining Congress will come to order.

The first order of business is the financial statement of the Secretary and Treasurer.

SECRETARY CALLBREATH: Mr. President, Gentlemen of the Congress: This report covers a period of fourteen months, from September 1, 1915, to October 31, 1916, our convention last year having been held in September.

Secretary's Financial Report.

September 1, 1915-October 31, 1916.

Cash on hand September 1, 1915..... \$ 389.75

Receipts.

Membership fees	\$ 210.00	
Membership dues	3,287.67	
Life membership	100.00	
Special contributions	10,901.17	
Holmes Memorial	887.00	
Advertising in Journal.....	5,128.61	
Subscriptions to Journal.....	704.71	
Interest on bank balance.....	.43	
Note, Munsey Trust Company.....	\$500.00	
Less discount	7.50	492.50
Banquet, San Francisco.....		495.00
		<hr/>
Total receipts		22,207.09
		<hr/>
Total to be accounted for.....		\$22,596.84

Disbursements.

Secretary's salary	\$ 6,500.00
Secretary's traveling expenses.....	1,246.73
Assistant Secretary's (Wolcott) salary and expenses	185.75
Stenographic and office help.....	2,055.40
Office rent, Washington and Denver....	870.00
Freight and storage, removal Denver of- fice to Chicago and Washington.....	201.84
Telephone and telegraph.....	169.25
Postage	631.45
Printing, stationery and office supplies..	922.90
Office equipment	25.00
Incidental expenses, including audit of books	84.83
Reporting convention	180.00
Badges	66.00
Commission on membership.....	10.00
Banquet, San Francisco, including menus and extra help.....	492.50
Dues refunded	6.00
Payment of note.....	500.00
Interest on notes.....	39.50

Expenses of Journal—

Editor's salary	\$1,437.50	
Editor's expenses	120.12	
Printing and engraving.....	4,635.90	
Commission and expenses securing advertisements	807.14	
Articles for Journal.....	20.00	
		<u>7,020.66</u>

Total expenditures	\$21,207.81
Less Secretary's expenses short paid	14.00

Total disbursements	<u>21,193.81</u>
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Cash on hand October 31, 1916..	\$ 1,403.03
In National Metropolitan Bank, Washington.....	\$ 325.33
In Munsey Trust Co., Washington.....	70.80
In First National Bank, Denver, Colo.....	6.90
In office (deposited Metropolitan November 3).....	1,000.00
Total	<u>\$1,403.03</u>

Expenses covered by—

Vouchers Nos. 112 to 182—Munsey Trust Co.
Vouchers Nos. 198 to 255—National Metropolitan Bank.

Respectfully submitted,

J. F. CALLBREATH, Secretary.

HOWARD C. BECK
Certified Public Accountant

Baltimore, November 11, 1916.

I hereby certify that I have examined the books and accounts of the American Mining Congress, J. F. Callbreath, Secretary, covering the period from September 1, 1915, to October 31, 1916, and find that the total transactions were as follows, all disbursements being evidenced by vouchers and canceled checks:

Cash on hand September 1, 1915.....	\$ 389.75
Total receipts	<u>22,207.09</u>

Total to be accounted for.....	\$22,596.84
Disbursements	<u>21,193.81</u>

Cash on hand October 31, 1916.....	\$ 1,403.03
National Metropolitan Bank, Washington.....	\$ 325.33
Munsey Trust Co., Washington.....	70.80
First National Bank, Denver.....	6.90
In office, deposited November 3, 1916.....	1,000.00
	<u>\$ 1,403.03</u>

As per bank pass book and statements, less outstanding checks. The balance due the Secretary for his salary account to November 1, 1916, is \$14,200.

Respectfully submitted,

HOWARD C. BECK,
Certified Public Accountant.

THE PRESIDENT: Gentlemen, what shall we do with the Secretary's report?

MR. TAYLOR: I think we ought to know how much we owe the Secretary, as it has been in the past, I think we ought to know it.

THE PRESIDENT: Mr. Secretary, a member requests that you give the amount that is owed you by this Association.

SECRETARY CALLBREATH: Fourteen thousand two hundred dollars.

MR. TAYLOR: It is not very much better than it has been, is it?

SECRETARY CALLBREATH: Yes; it is better. We have not only reduced the amount owing the Secretary during the last year, but we have got \$1,400 in the bank. There has been quite a little more money sent in that is either in transit or likely to come in during the present month. Therefore, the financial statement at the close of this year is so much better than it has ever been before that your Secretary entertains a real belief that the Mining Congress is hereafter going to go. I want to say, Mr. President, that these accounts are based upon the monthly account statements, which I think I might outline for the benefit of the members who may not have been here at previous meetings. The system is that all money is paid out by check and voucher. The checks and vouchers are all of the same number. All checks are signed by the Secretary and by the President. Each month a statement is made out showing the amount of cash received, the amount paid out, and duplicate vouchers with the monthly statement are sent to the President's office for his examination. We have here in addition to the monthly statements the bank balances, the check books, the canceled vouchers and the bank books of the banks in which our accounts are kept, subject to your examination.

THE PRESIDENT: Now, for the benefit of the members, I might say that those statements are submitted to me regularly monthly and are carefully gone over. The surprising part to me is how little money we have been spending with the amount of work that has been done.

Gentlemen, you have heard the Secretary's report. What is your pleasure in regard to it?

MR. TAYLOR: I move the adoption of the report, Mr. President.

MR. GRANBERG: I second the motion.

THE PRESIDENT: Motion has been made and seconded that the report of the Secretary be adopted. Are there any remarks?

SECRETARY CALLBREATH: I would be greatly pleased if you gentlemen would undertake an examination of these books to see that they are correct. As a matter of fact, I have seen but very little of the books. I have been away from Washington a great deal of the time. I have only been there two or three days during the last four months. This account came to me this afternoon from the auditor, who is a very careful accountant. I am ready to endorse what he says that the books show. But I feel, as I have asked on several other occasions, that it would be wise if the association would each year go over the accounts in order that if there be a mistake it may be rectified. At least, I would be better satisfied myself.

MR. S. A. TAYLOR: Mr. Chairman, I can corroborate what you said. The year I was President I had the same experience. I checked over the vouchers with Mr. Callbreath in the same way as related by Mr. Scholz, when I was President. However, I think it might be very interesting to some of the members if they would take the time to look over some of the accounts and see how much work we had done with the small amount of money that we used.

However, I am gratified to know that the Secretary feels sanguine over his financial statement. I would personally like to see that deficit in his salary wiped out before feeling particularly sanguine over the financial statement.

THE PRESIDENT: There is a question before the house, now, gentlemen. You want to decide now whether you want to pass the motion to adopt the report or wish to set it aside for some future time and have an Auditing Committee look over the Secretary's report. There is a motion before the house. What is your pleasure? Any further discussion?

MR. TAYLOR: Question.

Upon the motion being put by the President, it was carried unanimously.

THE PRESIDENT: Unanimously adopted. What other reports are we to receive, Mr. Secretary?

SECRETARY CALLBREATH: There are no other reports. I think we ought to say something, Mr. President, about the special contributions in that justice may be done to those who have made substantial contributions in the very recent past. If that is in order, Mr. President?

THE PRESIDENT: Yes sir.

SECRETARY CALLBREATH: Mr. Harry L. Day of Wallace, Idaho, recently sent in his check for one thousand dollars. Mr. L. A. Friedman, of Lovelock, Nevada, sent in his check for a thousand dollars. Mr. M. S. Kemmerer sent in his check for a thousand dollars. The Anthracite Bureau of Information have ordered that they send us a check for a thousand dollars. I think that covers the personal contributions that have been made directly into our funds. Mr. Walter Douglas gave us a check for one thousand dollars last spring, for special work looking to the creation of a Bureau of Mining Economics, upon which a considerable amount of work has been done. I think we should discuss the Mining Congress Journal regarding which our members ought to know more fully the details.

The balance of these contributions have been made by different coal operators' associations. For instance, the Illinois Coal Operators' Association has contributed two thousand dollars a year for a number of years past. The Indiana Association has contributed a thousand dollars a year. The Northern Ohio people contributed five hundred dollars. The Southwestern Association contributed a thousand dollars a year, and the New Mexico Association has contributed five hundred dollars. That contribution has not been made as yet this year, but it will be made in the very near future. Now, we have more money coming in in the future. I might say that the Indiana contribution was made to the office within a few days, so that we have a good deal more money than the account shows at this time, this being up to the first of November. I feel that some special reference to the personal contributions of members who have taken enough interest in our work to make substantial contributions ought to appear in the record.

THE PRESIDENT: I think that is a very proper statement to go into our records.

SECRETARY CALLBREATH: I am sorry that Mr. Friedman, who is ill and in the hotel, is not with us.

THE PRESIDENT: As being the father of the Mining Journal, at least the one who urged its creation, believing that it was the most essential thing to keep the membership informed of the work going on, I feel that we should have a full discussion regarding its merits and regarding whatever value it may have to the Congress and that this discussion might as well be had now as later.

I am disappointed that the Mining Congress Journal did not prove to be a revenue producer from the very beginning. However, it was not with that in view exactly that it was started. I felt that to have a meeting once a year was not sufficient to keep the members in touch with the work that was going on. From the subscriptions that we have received and the comments made, as well as the opinion expressed at the time of the creation of the Journal, I feel that it was a point well taken that we should publish a journal which would go to every member and to many outsiders with a view to bringing them in closer touch with the association, into fuller knowledge of its work, and in that way

secure members. It stands by itself as a means of disseminating information of value to the mining industry. I think it has proved its work along that line. As I said before, it was disappointing to me that we were unable to make it a revenue producer from the very beginning, although I think indirectly it has been a revenue producer. Of all the papers, trade papers, that I receive I read the Mining Congress Journal first, because it gives me in concise form information that I can't find elsewhere without a great deal of difficulty. I feel that we owe a great deal to Mr. Callbreath and his associates for getting up a journal with so much merit and with such a small number of assistants and with as little help as they have had at their command. I want to engage the interest of all the members of the Congress with a view to having them give the journal more notice and to aid us by obtaining advertising space with a view toward making it a revenue producing medium.

MR. TAYLOR: What is the distribution? How many copies are you publishing now?

THE PRESIDENT: A member desires to know how many copies you are publishing monthly.

SECRETARY CALLBREATH: We print twenty-five hundred copies monthly.

MR. TAYLOR: Twenty-five hundred that go out monthly?

SECRETARY CALLBREATH: This last issue we printed ten thousand copies but we carried special advertising. Of course, the enormous extra cost incident together with the extra and special postage that we had to pay made it quite a burden so that we didn't get so very far ahead with it except that we have carried the advertisements of a great many different concerns. Many contributors to the convention fund were given space for which the Journal receives no returns. The extra burden of all that and the extra burden of the larger circulation and the extra postage which we had to pay because we couldn't get the Journal through at the second class rate, will practically eat up the extra money we received for the advertising. However, we felt that the larger circulation justified us in doing it.

MR. CRESSEY MORRISON: Mr. President, I would like to say a word about the Mining Congress Journal. When it first came out I noticed that it was the very thing that I wanted. I might mention that it gave to me more concise news than any other publication and I think so much of it that I have every line of the publication read, capped and marked the minute it comes in, and then go over every bit that has been marked. Frequently not only those things which have been marked as of possible interest, but I read all the others so that there is nothing in it that I miss. I find it extremely useful and if I got nothing else out of the Mining Congress but the Journal I should be very glad of my association and very glad to pay the fee. I cannot say enough about the Journal. I think it is one of the best publications in the trade.

SECRETARY CALLBREATH: Thanks have been accorded to me in connection with this publication which I greatly appreciate, but I would like to pass on the honor to the man to whom it is due. I have done some work on the Journal, as much as I could do. I have written some of the editorials, but in the manifold duties which are upon me I have only been able to write for it at times when I could write. Sometimes I have been able to write the editorials and sometimes I have had to let somebody else do it. I have wanted to write the editorials largely myself, but as I said, I have not been able to do it. The mass of information which is gathered in the Journal, the credit for that is due to our editor, Mr. Paul Wooton, and I would be very glad to have you listen to him, if the chairman will allow it, and have him tell us something more about the Journal.

THE PRESIDENT: We will be glad to hear from Mr. Wooton.

MR. PAUL WOOTON: There is a great pleasure, Mr. President, in writing for such appreciative readers as are the members of the American Mining Congress. So many of you have gone to the trouble of sending us letters saying nice things about the Journal that I want to take this opportunity of thanking you collectively. I want to thank Mr. Morrison, specifically, for his very kind tribute tonight. It makes our work worth while.

I am the News Editor of the Journal. Mr. Callbreath looks after the writing of the editorials and I try to handle the news end. I am a newspaper man, having been in that business nearly all of my life. I am at present Washington correspondent of the New Orleans Times Picayune, in addition to this work I am doing for the Mining Congress Journal. I pointed out to Mr. Callbreath, a year and a half ago, that the mining industry was one of the few industries not paying close attention to the news developing in Washington. He thought we could develop the Journal so as to supply this need. We have gone ahead with that end in view. We are paying particular attention, as all those who read the Journal know, to the vast amount of work the Government is doing in behalf of mining. The Government spends \$60,000,000 a year in scientific and technical work. Of course, much of this expenditure has no direct bearing on mining, but a considerable portion of it is used for purposes having some bearing on mining. It seems to me that with such a large amount of money being spent in behalf of the miners, either directly or indirectly, this news ought to go promptly to those engaged in mining.

The Journal is not a competitor of the technical mining papers as most of them are really engineering papers, their greatest interest is in the engineering side of mining. They print some Washington news but it is in very condensed form and it is hardly adequate, it seems to me. The mining industry, until this Journal was established, had less opportunity to read Washington news than did any other industry of importance. The lumber papers offer a good example. One lumber paper, with which I am familiar, prints eight pages of Washington news weekly. That compares with a very few paragraphs in the mining papers devoted to Washington news. But, as I say, the mining trade papers are largely devoted to engineering problems and technical news. Therefore, the Journal hardly can be considered a competitor of other mining papers. The fact is they are mutually helpful.

"I believe it has been the experience of newspapers generally that it takes a couple of years, or even more, to get them on a paying basis. With trade papers I think it takes longer. Of course, the Journal carries no market quotations. The need for the Journal, therefore, is not so apparent as for publications carrying information for which there is a pressing demand. Therefore, the Journal will be a little slower, I think, in reaching a profit-earning point than the average trade paper.

We have not had the support we should have had from some of the manufacturers of mining machinery, and other advertisers, it seems to me. At the same time I realize they have to be conservative in going into new publications. I believe as they come to understand that our paper is being read and as they learn that users of mining machinery are interested in the Journal, more of them will use our columns.

If there is any question that anyone would like to ask about the Journal I would be glad to answer it, if I can.

MR. MORRISON: I would like to ask what method of solicitation for advertising do you use? Here is a publication that goes to every coal operator directing mines. It ought to be the best medium for advertisers of any in the field.

MR. PAUL WOOTON: I have no connection with the business management of the Journal, but I know in a general way what is being done in regard to advertising. We feel that our circulation is among the

very best customers the advertisers could wish for and we think that they will come to realize this. We have been a little unfortunate in advertising men. A good advertising man is hard to get. We have tried out a number of men. It resolved itself into trying to find the proper man. We have had to pick out the most likely applicants. In that way we have been put to considerable expense. Men would go out and would not get returns and their expenses, of course, would be lost without any return to us. However, we think we have been very fortunate recently in securing a Chicago company to look after the advertising, and I believe that the advertising from now on is going to meet nearly all the expenses of the publication. Mr. Callbreath can tell you something more about that.

MR. MORRISON: I suggest that you write me a letter and tell me what the rates are. I know three companies that are likely advertisers and I will undertake to get one of them.

MR. PAUL WOOTON: That is very kind of you, sir.

MR. MORRISON: I believe you have the best medium for advertising there is in the field. That is my opinion of it.

MR. PAUL WOOTON: I am glad to hear you say so.

MR. MORRISON: I am going to see these three people about it and let them know about it and I will leave it to you to write me to remind me of it and to give me some information.

MR. PAUL WOOTON: I will certainly do that.

MR. MORRISON: I will get one of them anyway.

MR. PAUL WOOTON: Under present conditions we are not justified in hiring anyone to help me gather the news, but as it is we get most of the mining news in Washington. We watch Congress very carefully. Anything of interest to the mining industry is certain to come to our attention. Through daily contact with members of Congress we usually learn in advance of any legislation that is being contemplated. Then we cover the Geological Survey and the Bureau of Mines in detail. Incidentally, I lost one of my good news sources when Mr. Parker went to the Anthracite Information Bureau. Very little happens in the Geological Survey or the Bureau of Mines that is of interest to the mining industry that is not available for publication. Then there is the Land Office, which develops a good deal of news, the Board of Appeals of the Interior Department, the Patent Office and the Interstate Commerce Commission and other bureaus.

At the Interstate Commerce Commission I am told that it is not understood why it is that the mining industry files so few complaints. The lumbermen have weeded out most of their rate inequalities. They have filed complaint after complaint until they have their rates very well adjusted. Since the mining industry has so very few complaints it is wondered whether it is due to the fact that the miners are perfectly satisfied with their rates, meaning that there are no unjust discriminations against the movement of ore and coal or whether the miners are not paying attention to their traffic situation. I am rather of the opinion, from other information that I have received, that there are many discriminations on rates on mineral products that should be taken up. I know that some of the coal companies have taken up rate matters quite in detail, but I think many operators neglect their traffic questions. By publishing traffic news pertaining to the mining industry some may be reminded to straighten up their own rates.

Then there is the Treasury Department. The Customs Division and the Bureau of the Mint and other bureaus develop some news.

The Department of Commerce is gathering a huge volume of valuable statistics. It receives many reports from foreign countries where mining is conducted,

There is a world of information in Washington and we could devote very profitably some more space to it, but we have been limited, of course, by the lack of money.

MR. MORRISON: I think, Mr. President, that the field is very well covered, but there are other sources of information which I think should be taken care of. I think a good deal more emphasis should be put on customs decisions on ores that are coming into our country.

MR. PAUL WOOTON: Yes, sir, I think that could be done very profitably.

MR. MORRISON: There was a very fine question just decided by the Board of Appraisers. If you could cover those things everybody using or dealing in ores would know about it. I think the Bureau of Standards, which has not been mentioned—

MR. PAUL WOOTON: Yes, we keep an eye on the Bureau of Standards.

MR. MORRISON: ——— should be a source of information. I think the Forest Service of the Department of Agriculture, with all of its withdrawals, should be a source of information. I think there is in this country a growing interest in the affairs at Washington, not only on the part of individuals, but on the part of associations like the one I am connected with. I find that we have rather ramified interests. Now, the advance information of the intended publication of a document by the Bureau of Mines, which I get, is immediately answered by an inquiry to the Bureau of Mines to list me for that document, so that the moment it is out I get it. If I did not have that source, the Mining Congress Journal, I would naturally get a postal card from the Bureau some time later and I would be a month behind. People nowadays must not be a month behind, but must be up to the minute. So that I think really it is a great work and I think your sense of news, which is very well cultivated, is leading you into a real field of usefulness. So the remarks I made before I stand by. I stand by the further remark I made in regard to advertising.

MR. PAUL WOOTON: If there are any further questions you desire to ask, I would be very glad to answer them. Of course, I have not attempted to list all of the sources of information in Washington. I watch the Treasury decisions Mr. Morrison mentions and you will occasionally see that we have something from the Forest Service.

THE PRESIDENT: I would like to answer Mr. Morrison's questions on two points, first on the question of advertising and the co-operation of our members with a view to soliciting advertisements.

When the Mining Congress Journal was born in Phoenix two years ago all those present promised definitely that they would write to their respective supply houses and firms from which they were purchasing machinery and tell them that they were members of the Mining Congress and were interested in the welfare of the Journal. As far as I know, only one man has redeemed his promise, and that is myself. Some letters were written by others, perhaps, but if they were we heard very little about it, because I requested especially that copies of the letters be sent to me so that I would know what was done, but as yet I have not received a single copy. Therefore, the question which Mr. Morrison raised is a live one. If we do it now it will not be too late to mend the damage which has been left unattended in the past, and I would suggest that we urge upon our members to do that thing. We all buy from different houses, different manufacturers, all kinds of supplies going into the industries. I know that the people who sell our equipment are interested in the welfare of the mining industry. Therefore, they should be willing and are willing, as I judge from the responses that I received, from personal appeals I made to these people

to help us. If they just know what we are after they will come across with it. A little persistence will go a long ways in bringing us results.

MR. MORRISON: Mr. President, in answer to your suggestion, I would like to say that now would be a much better time than before the Journal had proved its value. I think that you should authorize your publication office to begin a systematic personal correspondence with the strong people in the association, urging them to do the very thing that you are suggesting. I think that you can induce them to write even a half-dozen letters, and if you can get them to write even that amount of letters at the present time each, the manufacturers of machinery and the supply houses would soon realize that here was a clientele that were interested and they would be very anxious to assist the Association. I believe the Journal should be a source of revenue and could be made to be a source of revenue. I wrote a letter myself some time ago to the Association and suggested I might be useful in that regard. I got a very courteous reply, but I wasn't followed up. I was particularly busy at that time and didn't pay the attention to it that I should have. You know how times are with people. I know that if I had gotten three letters, a letter once in every so often, saying, "Here, you said you would do something about this. Why don't you do it?" I know that I would have gotten busy. If you get a letter of that kind reminding you of what you said, saying, "Why don't you do what you promised? We love you just as much as ever, but please do something for us," if I had gotten a letter like that, for instance, I would have done something and we would now have the cash in the box and showing in the report as a result. I believe if you follow up that matter now and authorize a courteous sort of appeal to the friends of the Association that you know will stand for a nice, pleasant letter like that, saying, "Get busy and do something," I think they will do it.

THE PRESIDENT: I think the suggestion is very timely, Mr. Morrison, and I will not only suggest but instruct the Secretary to get such letters out and lay them before the President for signature, to be sent out as soon as they are received, or for him to send them out himself, if he can get the same results.

There was one more question raised by Mr. Morrison in his statement to which I would like to reply, and that is the question of effective work at Washington. I have been going to Washington now for the last fifteen years, almost at every session of Congress, after one thing or another. My first visit to Washington was after Congress had passed a bill which was so absurd that I could not believe that it was possible that such a thing could happen. I have told this story at every annual meeting we have had and I am going to tell it again for the purpose of driving home the evil of not having proper representation at Washington.

We are operating a number of mines on leases in Oklahoma, on Indian lands. At that time, fifteen years ago, we were under the direct supervision of the Interior Department. Mr. Allen Hitchcock was Secretary of the Interior. A complaint had been made to him that the coal companies were careless in permitting the firing of shots. So the Department of the Interior, in the absence of the assistance of and proper information from the Bureau of Mines, drew a bill which called for the following: That in each mine operating on Indian lands there shall be fired each day no more than one shot. (Laughter.) Well, the absurdity must appeal to all of you. When the bill came down and the legal department sent it down to me and said, "Are you complying with this bill?" I said, "No. One shot a day would mean three tons of coal, or four at the most." So I very promptly went to Washington to interview Mr. Hitchcock. I obtained an audience with him and when I explained what I wanted he sent for one of the assistants in the legal department. He looked the bill over. I said, "What does this mean?" He said, "You can fire one shot a day in each mine." When I explained

to him that in some of the mines we were firing five hundred shots a day and that one shot would only mean three tons, or possibly four tons of coal and that I was making myself liable to 499 penalties each day, he looked at me in astonishment. He said, "Well, I guess this means that you must fire all your shots at one time, fire five hundred shots at one time each day." Well, I said, "Will you modify the language of the bill to that effect?" He said, "Oh, no, I can't do that. You go ahead and do it, however, and I will take care of the penalties."

Now, that emphasizes the fact that if we don't plead our cause no one will plead it for us, and if I do say so, I have been a continuous visitor in Washington during almost every session of Congress since that time and I think I have benefited myself to a very large extent by doing so. That is one of the reasons why I feel that the coal people should know what is before Congress. I felt also that the coal people should join what was then a congress of metal miners to plead their cause before Congress in an effective way, by co-operative effort, by concerted action. I wanted to tell this story because it emphasizes the need of having representation in Washington. Now, Mr. Taylor, do you want to say something?

MR. TAYLOR: I just want to make one remark regarding what our members can do with regard to advertisements. I made it a rule that whenever I received a letter from any person regarding an appliance or anything to answer that letter, even if it is only the acknowledgement of a receipt of it, and in several cases I have had letters back from the parties thanking me for the acknowledgement of their letter. I think that in the multiplicity of stuff that comes into our offices that we are likely to throw a lot of it into the waste basket, but I think wherever a letter accompanies a communication regarding any of our advertisements, it would be but a very little job and one that would help the magazine very much, if we would simply acknowledge it. (Applause.)

SECRETARY CALLBREATH: Mr. President, may I say a word? We started the Journal just at the time when the manufacturers were trying to get rid of their advertising contracts already made. During that first year it was almost impossible to get new advertising contracts. We understood also that it was difficult to get the first man in because advertisers like to go in the company of fellow advertisers. If you have a nice creditable showing from one company all other companies in that line will want to get in the same place. If you have four out of five and there are five companies the fifth company feels that it has got to get in as well. We had to build up the business to start with. During that first year it was almost impossible to do it. During that first year the Journal ran behind almost four thousand dollars. Last year the deficit, I think, will be less than two thousand dollars. It is only shown as \$1,187.34, but in that there is no charge made for office rent, for my services and for stenographic work and incidentals. The deficit as shown by the difference between the receipts and the paid bills is not a fair and reasonable one, but I think it is fair to say that the deficit will be less than two thousand dollars. During the last four or five weeks we have been fortunate in securing contracts which will make the Journal practically self-supporting during the next year. We have a contract with the Wuerzinger Publishing Company, which company the gentleman sitting in the front seat here represents and he is in charge of it. That is the first step, we think, towards putting the Journal on a self-supporting basis.

The next step is to make it pay the advertiser. We have no right to take the advertisers' money unless we see to it that they buy something of worth to them. I know that we cannot do that unless those people who back our Journal, the members of the Mining Congress and others who subscribe to it, those particular members especially who buy mining machinery will see that an even chance and an opportunity to bid is given to those people who advertise in the Journal. It is not

required, nor is it necessary, nor could it be asked that an operator shall buy of our advertisers, but it is required of him that he give that advertiser a chance to compete for his orders. Every operator is going to buy his goods and his machinery where he can buy them at the very best advantage. He does not consult the Mining Congress Journal or any other journal or periodical as to where he shall buy his goods. If the advertisers are given that chance, if the subscribers to the Journal will give them that chance, there is no question but what the Mining Congress Journal will soon become self-supporting. In that way we will be able to devote the Journal to a great deal more news of interest to the miners. We can follow up what Mr. Morrison has suggested. We hope to be able to throw light on the various bills affecting the mining industry before Congress and in that way prevent bills from being passed which are an absurdity, as your President just remarked. We hope to report the work of the Bureau of Mines, the Geological Survey, the Federal Trade Commission, the Treasury Department, the Department of Commerce, and the Department of Labor, and cover them completely. As it is now we cover them and get all the information and news which is of general interest to the mining industry. We hope to cover them more in detail, especially with regard to the things which are going to come up, in order that you may keep posted as to just what steps are being taken in the various departments.

I have been very greatly gratified at the kind expressions of opinion in regard to the value of the Journal. Some of us are pretty busy and we don't very often read the trade journals. They are sometimes laid by to look at some other times. But eventually we hope to make the Journal so interesting to you that you can't help reading it, that it will pay you to study it, and we hope that through your assistance that the advertisers who patronize our columns will find it to their benefit to advertise in the Journal. If we do not give them value received for their money we have no right to take their advertisements. I feel very strongly that the Journal can be made to be a source of some little profit. But my thought is that we ought to put it right back into the Journal, practically what we get out of it, for the purpose of making it better serve the great co-operative movement so much needed by the mining industry.

THE PRESIDENT: I would like to add just one more comment on the Journal question to these various criticisms and suggestions that have been made. About Christmas time I receive cards from the Ladies' Home Journal, the Youths' Companion, and a great many other publications, with the suggestion that a subscription to their magazine would be an appropriate Christmas remembrance. The value of any advertising medium depends upon its circulation. If some of our members and friends would subscribe to the magazine and send it to their friends it might not only cause them to become interested and give us other subscriptions, but might be the means of securing a greater membership in the Congress and it would keep people in touch with the facts that we are anxious to bring to their attention.

Is there any further discussion on the Journal?

MR. WUERZINGER: Mr. President, I would like to supplement Mr. Callbreath's and Mr. Scholz' remarks in regard to the Journal. I believe they forgot to mention that it would be well to tell the advertisers when you write them that you saw their advertisement in the Mining Congress Journal.

Another thing I would like to mention is the contemplated installation of the Service Bureau in Washington, for the benefit of the advertisers as well as of the members. A similar bureau is being worked quite successfully with another association which publishes a monthly journal. When you operators are in the market for machinery, etc., if you will advise our Service Bureau in Washington that you are

in the market for this or that piece of machinery, we will in turn be able to advise our advertisers, and in that way call attention to the fact that the members are co-operating with the advertisers of the Mining Congress Journal.

THE PRESIDENT: Mr. Wuerzinger's suggestion is a timely one and one that we might well heed. I would suggest that in one of the early issues a statement be contained to that effect.

The next item in the proceedings is the report of the Committee on Nominations, of which Mr. Evsmith is chairman.

Mr. Evsmith read the report of the committee.

REPORT OF NOMINATING COMMITTEES.

To the American Mining Congress:

Mr. Chairman and members of the American Mining Congress, your Committee on Nominations after a careful canvass of the situation, desire to present for your consideration to fill vacancies in the Board of Directors, the names of the following gentlemen: W. R. Richards, Pottsville, Pa.; M. S. Kemmerer, New York City; Irving T. Snyder, Denver, Colo.; George H. Crosby, Duluth, Minn.; to serve for three years and until their successors have been elected and have qualified. Of these four, the first two are renominations and too well known in the work of your organization to need any mention here, except to say that they are active and substantial supporters of the American Mining Congress. Mr. Snyder of Denver is at the head of important gold mining operations in the west and vice president and general manager of the Vindicator Consolidated Mines of Cripple Creek. Mr. Crosby of Duluth is to represent the great iron and copper mining interests of the Lake Superior region. He has been one of the most aggressive developers of iron ore lands and is also substantially interested in metal mining.

Respectfully submitted,

HANSEN EVSMITH,
S. A. TAYLOR,
A. H. PURDUE,
Committee.

THE PRESIDENT: Gentlemen, you have heard the report of the Committee on Nominations; what is your pleasure?

MR. HODGE: Mr. President, members of the Congress: As a representative of the Lake Superior District and very much interested in its welfare, it gives me real pleasure to second the nominations made, especially in the case of Mr. Crosby. He is a real man of real force and if elected to a real office in a real organization he will perform acceptable and fine service. I have known Mr. Crosby for twenty-four or five years and he is what we would call in automobile language a "super-six." He is of that type. He is a live wire. He will do great credit to this organization. (Applause.)

MR. E. W. PARKER: Mr. President, what Mr. Hodge has said about Mr. Crosby I believe I can say about the other nominees with whom I am familiar and particularly with regard to Mr. Richards. Mr. Richards, as you all probably know, is the president of the biggest anthracite mining company in Pennsylvania and the other qualifications mentioned by Mr. Hodge are his. Moreover, Mr. Richards is, as I stated in my address this morning, the originator of the first-aid work in coal mines in the United States, a great distinction I think. I am in favor of Mr. Richards and would second his nomination.

MR. GEORGE E. COLLINS: Mr. President, I move that the nominations be closed. And that the report be accepted and that the

Secretary be instructed to cast the vote of the Congress for the men nominated.

MR. S. A. TAYLOR: I second that motion.

Upon the motion being put by the President it was declared carried.

SECRETARY CALLBREATH: Mr. Chairman, I have cast the unanimous vote of the members of the American Mining Congress for Mr. W. J. Richards, Mr. M. S. Kemmerer, Mr. Irving T. Snyder and Mr. George H. Crosby to act as Directors of the American Mining Congress for three years and until their successors are duly elected and qualified.

THE PRESIDENT: The election of the four gentlemen named is hereby declared.

Is there any further business before this meeting?

MR. S. A. TAYLOR: I understand that there are several invitations for the next place of meeting. I don't know whether they have been received or not, but I think it might be well for the Secretary to state if they are received how they will be disposed of.

SECRETARY CALLBREATH: We have had invitations, I think from a dozen cities, Boston, Baltimore, I think Philadelphia, Atlantic City, Columbus and from St. Louis, and I can't mention the others. There are a number of others. I think one from Cleveland.

MR. E. W. PARKER: Did I understand you to say Columbus, Ohio?

SECRETARY CALLBREATH: Yes.

MR. E. W. PARKER: We had one from them once before, didn't we? (Laughter.)

SECRETARY CALLBREATH: Yes, I believe so. A few moments ago, just before the meeting, I received a wire from the Secretary of the Chamber of Commerce of Birmingham, Alabama, inquiring as to the requirements in case they should be selected as a place of meeting.

The convention work here will cost a little more than five thousand dollars. That does not include any part of the Secretary's salary. It simply includes the necessary disbursements. It does include my traveling expenses, going and coming from Washington, and the work and money that has been spent for postage, stationery and that sort of thing, telephone and telegraph but in the convention city nothing has ever been charged for the Secretary's salary. Therefore, the city having the convention has the benefit of my services, whatever they may be worth.

May I say one word more. The Bureau of Mines is anticipating the dedication of the more than one million dollars' worth of buildings in Pittsburgh sometime next September. Mr. Manning has sent a special request not only to the American Mining Congress, but to all other mining organizations of the country to meet at that time in Pittsburgh, in order that the dedication of those buildings might bring together as large a body of mining men as it is possible to bring together at one point. I think it has been decided that the American Institute of Mining Engineers will not be able to accept the invitation. Of course, it is a question as to how desirable it is for us to meet there. The objection lies in the fact that frequently if there are so many other things going on it is impossible for the delegates to the convention to settle down to the business in hand. I think we ought to devote as much time to business and as little time to pleasure as we can at the convention, because that is the purpose of the gathering. But that is one of the other invitations that I forgot to mention.

DR. PURDUE: Mr. President, with regard to going to Pittsburgh, I would just like to say that I have had quite a good deal of experience in other associations that met at the same place and at the same time with different associations. The result always is that the energies of the members of all the associations are dissipated so that the work in hand is not as effective as it is when we are meeting separately. For that reason I think that it is advisable to go somewhere else than to Pittsburgh at that time.

Now then, as to Birmingham. It is easy for a man up here in the north, for a scientist, to meet scientists and to be up to date in the sciences, because he is always coming in contact with other scientists, and it is no trouble at all to keep up his enthusiasm, his studies and his knowledge of the work. But when you go south of the Ohio river it is not so easy. The scientists are quite rare down there and it takes a great deal of backbone and stamina for a man to keep up his work. The same thing is true of the mining industry. The industry south of the Ohio river is not developed. There are not very many industries. There are very few of them. So that the people down there engaged in the mining business being isolated lose sight of the opportunities they have before them, and the inspiration that comes from seeing those opportunities and going at them to realize them. It is no exaggeration; the possibilities of the mining industries of the south are very, very great, indeed. I do not believe really that there is another state in the union that has more varied possibilities than the State of Tennessee. The same is largely true of Alabama. It is true of Kentucky. It is more or less true of Georgia, the Carolinas and Virginia. So that the south is the part of the country that needs the American Mining Congress, and I hope, being from the south, as I am, that it will be decided to hold the next convention there. I hope that satisfactory arrangements can be made with the Chamber of Commerce of Birmingham for the entertaining of the Congress there at the next meeting, and that this Congress will accept the invitation and go to Birmingham.

THE PRESIDENT: Are there any further suggestions as to the next point of meeting?

MR. TAYLOR: I didn't make that suggestion to call forth any elaborate speeches on this matter, but a number of persons have asked me at different times how the place was decided, and I thought it might be well for the Secretary to make that statement, that it is decided by the Board of Directors after the various invitations are placed before them.

SECRETARY CALLBREATH: Let me say, Mr. President, there was a time when the principal feature of each convention was the fixing of the place of the next convention. Politicians gathered in by the score, chambers of commerce sent delegates, and that was the most important thing under consideration, and everything else was lost sight of. It was decided to have that order changed so that the matter should be left to the Board of Directors. The plan is now to take the proposition of the different cities, those who come with the proper arrangements, and let the Board of Directors decide it by a letter vote.

THE PRESIDENT: I might add that the decision is not made usually until about April or may be left to within five or six months of the time of the convention. It is always decided, however, five or six months before the convention, so that the necessary time may be had for arrangements.

SECRETARY CALLBREATH: I think, Mr. President, if it would be possible to decide it immediately it would be very much better. I have tried at this convention to have the papers all in hand and have them printed and in the hands of our members so that they may be read by title and time given for discussion. If we can decide it early

enough we ought to say that no man shall have a paper in the convention unless it is in the hands of the Secretary thirty days before the meeting. If he can't do that he should be kept off the platform. If you do that your papers will be prepared. If they know these requirements and the papers can be ready the speaker can give the salient points in a few words and in that way we get plenty of time to discuss all of the important points in the paper. I hope that the place of meeting can be set at an early date.

'THE PRESIDENT: Is there any further business to come before this meeting?'

SECRETARY CALLBREATH: Mr. President and members: One of the plans which we have for the future, which we believe gives promise and justifies the hope that the Mining Congress will be a very powerful organization is the plan for the creation of a Bureau of Mining Economics. You know the railway people of the country have a bureau of railway economics. It is non-partisan, paid for by the railroads upon some proportionate basis, but it costs about a hundred thousand dollars a year. They have a number of high grade men who gather statistics about every phase of transportation and if a member of Congress wants to know anything concerning transportation, that bureau will gather the figures, and present to him a complete statement as quickly as it is possible to do it. Therefore, there is a real service that is rendered by that bureau. Doctor Douglas, when he was more active than he is now, was very much interested in that. The matter has been under consideration since the Philadelphia convention and the plan which we now have in mind has grown out of various committee meetings and discussions on this subject. The present plan of the Congress is to ask the mining industry to contribute on the basis of ten cents on each thousand dollars of annual production. The Bureau of Mining Economics is to be a source of information covering all the subjects involved in the mining industry so that any member of the Mining Congress may have adequate information before hand in regard to proposed legislation. You will be promptly and fully advised just what the character of the bills are, just what those bills mean, how they relate to other bills, and every bit of information that one interested in that business might desire to have to decide whether he should favor or oppose the proposed legislation.

In addition to that we hope to carry on a Bureau of Publicity through which the public may be advised of the facts.

I feel that a bureau of information along that line, a publicity bureau, will render an enormous service to the mining industry. I believe we can be equipped to do that if we can get the bureau of mining economics started upon the plan proposed by this committee. It will render a service to the mining industry, the value of which we can hardly contemplate.

I want to make one more statement while I am on my feet. Having given you a little idea as to our plan for the Bureau of Mining Economics, I want to say something as to why I feel hopeful in regard to the establishment of that bureau. A year ago we had no convention fund, because San Francisco, having so many other conventions, was unable to raise money for the support of the convention. Therefore, we had to add the convention expense to a deficit which already existed. The Mining Congress at that time had a deficit of practically four thousand dollars. The convention in San Francisco cost the Congress nearly five thousand dollars, so we were practically nine thousand dollars behind at the beginning of the present year. During the present year we have not only wiped out the deficit of five thousand dollars caused by the cost of the convention, but we have cleaned up two thousand dollars of the deficit caused by the Mining Congress Journal. We now have the Mining Congress Journal where it is in a fair way to at least pay its own way

and we have more promises for active support from people who are able to give it, many times over than we have ever had before. Therefore, I have absolute confidence that the Mining Congress will not only do what it has done but many times more and many times more justify your active co-operation. (Applause.)

THE PRESIDENT: I would just like to make one more remark, and that is of all the men I have known, and I have come in contact with a great many, there is one who is irreplaceable, you can't stop him, and that is my friend on the left. If it had not been for Mr. Callbreath the Mining Congress would not have been here today and, frankly, I would not have been willing to accept the presidency for the first year, but to see the earnestness of the man prompted me to go on for one year, the second year and the third year. I must agree with him that the prospects for the future are better than they have been in the past. That is no different from what we expect. Ten years ago we expected a good deal less than we received today and ten years hence we are going to get a good deal more. So we are simply in the natural step of progress, but perhaps would not have gone nearly as fast if it had not been for Mr. Callbreath. In fact, I know it would not have gone nearly as fast because he has been at it day after day and many times he was so worn out that I often compared him in my own mind, but I never told him, with the effort of one man that has gone from here and that is Dr. Holmes. I was many times in Dr. Holmes' house and found him going to sleep at his dinner table and he went to sleep in his den talking to me. I am afraid that if Mr. Callbreath does not let up he will get into the same habit. And it was on his account as much as anything else that many members have worked as actively as they have and I am glad to say that it has been my pleasure to contribute in a small way to the success of the work in the same manner. (Applause.)

Is there any further discussion before this meeting? Are there any other subjects to bring up? This is the time, gentlemen, because we do not get together very often for the purpose of discussing things of importance. This is a family gathering. I have not even risen from the chair because I wanted you to feel that it was a family gathering and not a formal gathering.

MR. S. A. TAYLOR: Mr. Chairman, if there is no further business I move we adjourn. There are some members here who haven't eaten any dinner yet.

MR. E. W. PARKER: I second that motion, principally because the members of the Resolutions Committee, who have as well not eaten anything but who will continue their work at the supper table.

THE PRESIDENT: Out of special consideration to the members of the Resolutions Committee and others who have not had their dinner we will now vote on the motion to adjourn.

Motion to adjourn was carried and the meeting adjourned.

ANNUAL BANQUET.

Thursday Evening, November 16, 1916.

Ballroom, La Salle Hotel, Chicago.

Colonel George T. Buckingham, of Chicago, acted as toastmaster.

PRESIDENT SCHOLZ: Ladies and gentlemen, fellow members of the American Mining Congress: It is my duty as well as my pleasure to call to order this, the last meeting of the nineteenth annual session of the American Mining Congress, and it also marks my last session as presiding officer of this organization. I want to extend a word of thanks to the delegates and members who came here at a great sacrifice of time and money, and to the Chicago committee for their

entertainment and arrangements, which we greatly appreciate. We have kept the best for the last, if you will leave out the first speaker on the program. I think that you will agree that this entertainment was one that all of us enjoyed, and I can promise you that the speeches which are going to be made by a gentleman from the west and a gentleman from the east will be of much value to us. I think that the Committee on Arrangements in selecting me to take part in this program selected me simply because I live half-way between San Francisco and Hartford, Connecticut. I also want to thank the ladies for their presence. At the last meeting in San Francisco I commented on the fact that there were present more ladies than gentlemen, a condition which we do not have here in Chicago, but what we lack in numbers we make up in quality. And I want to express my thanks to each lady individually and as they pass out I want to shake them by the hand. (Laughter and applause.)

The Frisco meeting was the pivotal point in the mining industry. And when I spoke of the conditions which surrounded the coal operators in the central and western states the gold and metal miners looked upon me with suspicion and I could see from the gowns of the ladies present, which were very high from the bottom up and very low from the top down, but all high-grade quality, that perhaps they were able to foot the bill in a manner that we in the coal business could not do, but even that time has changed. Fashions usually travel from the east to the west, but this time the fashion has traveled from the west to the east. I refer to prosperity, because what two years ago was abject poverty in this district has today become a great prosperity, so much so that a large number of gentlemen who had promised to be here are today sitting behind their desks tearing their hair trying to figure out how they can fill the orders which they have for coal. This reversal of condition has effected many changes, including the election of a republican governor in this state, as I learn from my neighbor on the left, and that I didn't know until today, because I had been out in the country. (Laughter.)

This is distinctly a period of preparation and we have selected as toastmaster a military man, a colonel, because we all believe in defense. I have just received a tug on the back of my coat now that I must not speak to you at this time, because I have got apiece to read. Therefore, I take pleasure in introducing to you Colonel George T. Buckingham, who is to take charge of the meeting and guide you to the end. (Applause.)

THE TOASTMASTER: Mr. President, ladies and gentlemen, one of the mysteries of the twentieth century is why your committee did me the honor to select me as your toastmaster. I profoundly appreciate that honor, but I don't know now what actuated your committee. I think the most plausible explanation is that I know less about mining than anybody else in the United States (laughter) and that, therefore, I would be unable to contradict any statement that might be made by any of the distinguished speakers (laughter), and harmony would, therefore, prevail. It is possible, however, that the explanation might be better illustrated by an incident that happened to Uncle Joe Cannon in his youth. I know this is the truth, because he told me so himself. (Laughter.) He was at that time at the age of eighteen and he held a job as a clerk in a grocery store on the banks of the Wabash River. At that time he worked on the eight-hour system, eight hours before dinner and eight hours after (laughter), and since the Adamson law was then in a distant future, he got the same price for working that eight-hour period that he would if he had worked all the time. (Laughter.) Among the other duties that he had was that of being assistant postmaster. The mail came in there and he distributed it to the people,

and in anticipation of the arrival of the mail the sages of the village always gathered around the red-hot wood stove. One of the patriarchs of that community was an old fellow named Sharp who had the excellent distinction of having a brand of chewing tobacco that exactly harmonized with the color of his long beard. (Laughter.) Mr. Sharp was always sitting about this stove waiting to see what would happen, and on the occasion I have reference to there came a man named Stanley, who was an itinerant lecturer. Stanley had gone about from one place in Indiana to another on foot, carrying a carpet-bag and delivering an erudite lecture on the cosmos origin of the human race, or some such subject, for which lecture he received the munificent sum of four dollars. Stanley came into the postoffice for his mail and asked Uncle Joe if he had a letter for him. He was handed a letter and he took it and looked at it and he said, "Ah," and he read a little more and he said, "Oh." Sharp said, "What seems to be the matter, Mr. Stanley?" and Mr. Stanley said, "Here is an honor that I never expected to have. I have been asked to speak in Bosting. That is a great honor, you understand. It is a wonderful honor to have an audience in the city of Bosting, to go there and deliver my celebrated lecture. They have asked me to come there. I never expected to have that honor. But it is a long ways to Bosting and I don't know whether I ought to go down there or not." "Well," said Mr. Sharp, "I think you ought to go." "Well, do you really think that it is a good thing for me to go there? Are you serious?" "I believe it is." "Why do you think so?" "Yes," said Mr. Sharp, "I think you ought to go there by all means." "Well, what is the reason that you are so anxious that I should go, Mr. Sharp?" "Do you want the real reason?" "Yes, I do," said Mr. Stanley. "Well, I never did like them d—d Boston folks nohow." (Laughter.)

You didn't come here, however, to hear a toastmaster talk, but to hear the things that are on this splendid program. One of the first subjects to be discussed is by a son of Illinois, and all of you who have not the pleasure to reside in this splendid commonwealth of ours will perhaps be interested to know the name Illinois stands for something. When the great explorer Chevalier d' La Salle pointed the prow of his Indian canoe from old Mackinaw into the setting sun and started for the Savannahs of the West, he found a river flowing in this fertile land and on the banks of that river he found a tribe of aborigines who called this river and themselves "Illini," and when they were asked what that signified they said to him that in Indian language it meant "the men," the men of courage, strength and character, prominent among the rest of men. And we like to think and we like to tell our visiting neighbors that for two hundred and eighty-three years that have elapsed since that time the quality of the manhood of our commonwealth has not deteriorated. Sometimes we lawyers are not able to prove the assertions we make, but I am in the happy position tonight to be able to prove my assertion. So the first thing that will be discussed here is a problem of great import and it will be presented by a distinguished son of Illinois, my Exhibit A to the proposition that our manhood still stands. (Laughter.)

I take great pleasure in introducing to you one who needs no introduction from me or from anyone, your distinguished President, Carl Scholz, of the state of Illinois. (Applause.)

PRESIDENT SCHOLZ: I can't help but notice the embarrassment in which I find myself after this splendid introduction. I really

had requested that I be permitted to forego this speech that I am to read, because it is on all your tables and you could take it home and read it better than I could do it for you, but, in order to go through the program and carry things out to the end, I will read it. If you get tired, the man will ring the bell, but until he does I will go on.

Recently the nation's industrial, social and political affairs have undergone most radical changes from that which was. These changes are now an established fact, yet it cannot be said that we sought to procure them or even desired them. They were forced upon us, being the resultant, here, of forces operating wholly outside our geographical boundaries. While in no vital sense responsible for the new order of things in our own house, we must make the best of it and out of it.

To understand how greatly our most important relations in life have been subject to revolution, a study in contrasts is necessary.

Less than two years ago the whole mining industry was in distress. In the metalliferous districts many mines were closed down and, indeed, only those properties which were strong financially were producing. Many of them did so at a loss. Hope of a profitable market price was abandoned and effort to obtain better results on investment were directed toward milling and smelting processes. This was a commendable course, no matter what its origin, but the financial status of many companies made this far less than a general remedy. Indeed, it required a courageous man to send good money into a metal mine seeing the limited chances it had of returning and bringing the other money out with it.

Then the European war came. For the moment business was paralyzed by the shock. But so soon as it became known the war was to be confined mainly to land, shipping became confident and ventured. Then the products—

MR. E. W. PARKER: Mr. Toastmaster, Mr. Toastmaster, may I interrupt?

THE TOASTMASTER: Gentlemen, gentlemen, I do not like to have the President of this Association interrupted in the middle of his paper.

MR. E. W. PARKER: Mr. Toastmaster, if I may be permitted, I would like to have a few moments of the President's time.

THE TOASTMASTER: Very well, then. The President will sit down while you exercise your prerogative.

MR. E. W. PARKER: Because I always like to speak, I have asked for a portion of Mr. Scholz's time. Now, time is a subject which poets and writers and songsters and speakers has discussed for ages. No one other subject has received more attention than time. Time and again when they speak of spring, they refer to the gentle springtime. A favorite song with many is "In the Good Old Summer Time." One poet even wrote a poem about the banks on which the wild thyme grows. (Laughter.) Another has said that time was made for slaves, and certainly the object of this attack (or spasm) has been a slave of duty, a slave to his friends, a slave to his business, a slave to this organization, and surely if time were made for slaves, then time belongs to him. There is a little poem in regard to time which was really written to a girl, but on account of the youth and beauty of the present subject of my remarks it is appropriate, I think, upon

this occasion. If I may be permitted, I will recite it. It runs like this:

“Stay, ruthless time, touch softly on the brow,
 With feathered wing the one so loved, who now
 Holds forth the hand to greet you as you pass,
 Checking the sand fast hurrying through yon glass;
 Leaving a year's more love to swell his store,
 Enriching that which he possessed before.
 Stay, time, and ponder for a moment rare
 Upon the life of one with whom to share
 A tithe of all His gracious gifts, ever fair.
 And honor worthy of the proudest claim.
 A life of love, truth, spirit, all I name
 Could not set forth the hold he has on thee.
 Pass then with soothing touch and leave to us
 The cares which we must bear, but leave him free.”

Mr. Scholz, we hope time will indeed deal gently with you, and in behalf of your friends of the American Mining Congress, I wish to present to you a little piece of time. (Laughter and applause.) This little piece of time, which someone has called a timepiece, is presented to you. It is also known as a repeater, useful at election time. It is engraved on the inside and I think I remember what it says. It is:

“Presented to Carl Scholz, three times President of the American Mining Congress, in recognition of his services to the Mining Industry.” (Applause.)

PRESIDENT SCHOLZ: Mr. Parker, ladies and gentlemen: This is, indeed, a surprise and words fail me to express myself, appreciatively and adequately, because this was a thing which I didn't look for and one which I greatly value. I will say, however, that I must have been a prophet or a son of a prophet, because I predicted there would be a bell ringing. (Laughter.) The bell has rung. I ask the toastmaster to finish the program without interrupting another time for a discussion on time. I do not think I could do the paper justice now. You have a copy before you and if you will read it, just a few sentences of it, I will be well repaid for the trouble of preparing it. I can't very well express myself now and I will ask you not to expect anything more of me.

THE TOASTMASTER: You will observe by looking at this program that there are three subjects for discussion tonight, and that reminds me of a thing that I heard down in Memphis one time about a colored camp meeting. There was an eminent colored divine down there who used to address his flock and he began about like this: He said, “Dear brethren, my subject tonight divides itself into three parts. The first part consists of the things that you don't understand. The second part consists of things that I don't understand. The third part consists of the things that none of us understand. (Laughter.) And by the grace of God, brethren, we will tackle the last subject boldly first.” (Laughter.) We have now arrived at the second subject on the program, which is the one I don't understand. In the twenty-five years that I have attempted to practice law in Illinois I never yet have found anybody else that understood that particular subject, namely, the land laws of the United States. (Laughter.) But we have with us an eminent gentleman who comes nearer approximating that ideal of understanding than any other man known to this Committee, and I am sure that you will find the latter part of this program, his address and the rest very interesting.

In that respect you might find yourself like the eminent citizen of Chicago who received a black-hand letter. The letter said, “Dear Mr. Jones: Unless you deposit five hundred dollars beneath the hollow stump at the corner of the barn lot before Tuesday night the black-hand will carry away your wife and you will not see her any more.”

To which Mr. Jones replied: "Dear Mr. Blackhand: I have your favor of the fourth. I am unable to deposit the five hundred dollars. The latter part of your communication interests me greatly and I will be glad to hear more about it." (Laughter.) That was not your toastmaster nor any of your officers nor anybody here who wrote that letter.

I take pleasure in introducing a gentleman to discuss a most important subject. He has mastered that subject as nearly as any human can be master of that subject. We have a distinguished lawyer and jurist from the state of California, and by forty-eight hours of training and repression I have gotten myself to the place where I can pronounce California without frothing at the mouth. (Laughter and applause.) I am sure that he will interest and entertain and edify you, and I take great pleasure in introducing the distinguished guest who is a resident of the town of Fresno, California, but against whom no other thing can be said in this or any other assembly. The Honorable Frank H. Short, of California. (Applause.)

HON. FRANK H. SHORT: Mr. Toastmaster.

Judge Short's address will be found on page 620 of this report.

THE TOASTMASTER: I told you he would do it. I have no doubt you found that a most interesting address, and when he referred to that ideal condition of unlimited coal to sell, and the Arctic Circle eighty degrees below zero to sell it in, the smile upon your President's face was positively luminous. (Laughter.)

The next subject to be discussed is the greatest subject in America and will be discussed by one of the greatest citizens of America. His name suggests to me an episode in the history of our proud state, which is interesting to say the least. You will recall that our first territorial delegate and the first presiding justice of our Supreme Court was Judge Nathaniel Pope of Illinois. It was he who succeeded in adding to the commonwealth of Illinois the fourteen northern counties, including this spot where you sit, so that but for the Pope we would now be sitting in that great state of Wisconsin instead of the imperial commonwealth of Illinois. About the time that he was justice of the Supreme Court there was another great character living in Illinois named Joseph Smith, who styled himself The Prophet of God, and who was the head of the Mormon Church. He got into difficulties with the authorities down here at Nauvoo about the year 1841. I did not see this, so that I can't testify from my own personal knowledge, but on hearsay evidence. (Laughter.) This case was brought before the court and it is recorded that when the attorney-general rose to address the court, there being present a great number of ladies, he began in something like this order: "I now rise in the presence of the Pope," and he bowed to the court, "and in the presence of the angels of light," and he bowed to the ladies, "to state the case of the Prophet of God." (Laughter.)

In the middle ages it was the custom when great controversial questions arose to submit them to the Pope for solution and we found that that was not a bad plan to be carried into our modern practice. They submitted their questions to Pope Pius and Pope Innocent and others of that name. The Pope we have here tonight is neither Pius nor Innocent. But he comes from the grand old commonwealth of Connecticut and from the splendid and historic city of Hartford, whose citizens in the olden days hid the charter in the hollow oak and lied about it like horse thieves in order to protect their cherished liberty. (Laughter.) This subject will be discussed, therefore, not by any Pope of any church, but by another who holds his official dignity from the masses of the American people. I take great pleasure in introducing to you at this time that splendid patriot, that captain of industry, that typical American, Colonel George H. Pope, of the commonwealth of Connecticut, who will now address you. (Applause.)

MR. GEORGE H. POPE: Mr. Toastmaster, ladies and gentlemen of the American Mining Congress: I am at a loss to understand how your toastmaster learned so much about me as to give me such a character as he has done. (Laughter.) It is with some embarrassment that I stand up here after such an address as you have just listened to, eloquent and witty, to deliver or read a prosaic paper on a topic in which I am intensely interested. But you will realize, I hope, that I am only a layman in this work and interested in giving the best that I have for its good.

Colonel Pope's paper will be found on page 516 of this report.

THE TOASTMASTER: I am sure that I voice your united sentiment when I extend to these distinguished guests from the Atlantic and from the Pacific our sincere appreciation of their admirable addresses. And now, Mr. President, into your competent hands I return this splendid meeting. (Applause.)

PRESIDENT SCHOLZ: As I return to the ranks of a private in the work of the American Mining Congress, I want to announce the election of the new President in the person of Mr. Walter Douglas, of New York. He is so well known to you that nothing further need be said about him and I only bespeak for him the same co-operation which has been afforded me.

I herewith adjourn the nineteenth annual meeting of the American Mining Congress.

Adjournment sine die.

CO-OPERATION IN THE MARKETING OF COAL.

An Address Delivered Tuesday, November 14, 1916, by Ralph Crews of the Chicago Bar, Before the American Mining Congress.

It was with genuine pleasure that I indicated my acceptance of the invitation of your Secretary to be present on this occasion, and address the members of the American Mining Congress upon the subject of "Coöperation in the Marketing of Coal."

One always speaks with pleasure on a subject which has aroused his interest and compelled his enthusiasm. Professional necessity aroused my interest in the subject a number of years ago; the subject itself, upon careful investigation, compelled the enthusiastic support which I have since accorded it. It occurred to me, while I was pursuing my investigations of various phases of the subject, that I was really quite a pioneer, blazing a trail through the undergrowth of prejudice and misunderstanding which infested our industrial life to such an amazing extent; I have awakened, however, to a realization—and never more clearly than today—that countless others were pursuing similar paths, cutting away the undergrowth of prejudice and misunderstanding, until today we are rapidly emerging upon the broad highways, where industrial success can best be achieved in the bright sunshine of knowledge and understanding, with the old distrust and suspicion among business rivals rapidly being supplanted by a broader and better understanding on the part of each of the aims, purposes and motives of the other.

I have found awakened interest in the subject of coöperation, as an industrial problem, to be due to a number of causes; with the growth of the nation there is a growing demand for efficiency in its industrial relations; with the growth of the desire for efficiency there has come the realization that efficient methods can be promoted only by *knowledge*, and never by *ignorance*; and by the further fact that there has been a gradual change in the authoritative conception of the meaning of the law under which you have operated your business during the last few years, until at the present

time the assertion may be safely ventured that there are some certain features of that law that you may regard as sufficiently established to enable you to proceed with respect thereto with definiteness and with certainty.

Development of the Law.

As you know, the Sherman Anti-Trust Act was passed by Congress July 2, 1890; by its terms it inhibited contracts, combinations or conspiracies in restraint of trade, and declared the monopoly created, or attempted to be created thereby, to be unlawful. This statute received but scant attention from the law officers of the United States and from the courts until about the beginning of the Roosevelt administration, when it began to exercise the compelling influence over the industrial affairs of the country that it has since exerted; upon account of the sweeping language employed by Congress and the all-embracing scope of the terms employed it was for some time regarded as doubtful as to what acts were within its prohibitions. The so-called "twilight zone" resulting from this doubt and uncertainty has been steadily narrowed by recent decisions of the Supreme Court, particularly in the Standard Oil and tobacco cases, until today most of the questions arising under the anti-trust act are readily solvable by a lawyer closely in touch with the spirit of the act as interpreted by the Supreme Court. It is hoped and believed that when the Supreme Court shall have disposed of several great cases now pending before it, little, if any, uncertainty will remain with respect to the application and meaning of the Sherman Act.

From a survey of those great cases which have marked the development of the law on this subject, it is apparent that certain questions may be taken as definitely determined; for instance, it may be said that price agreements between competitors are universally regarded by the courts as inimical to the public interests upon account of a tendency toward oppression, and are regarded as within the scope and spirit of the prohibition of the anti-trust law. How then, you inquire, may competitors lawfully coöperate in the marketing of coal? There is nothing in the letter or spirit of the law which compels competitors to *compete in ignorance*. There is nothing that prohibits or in any manner tends to discourage the acquisition by the individual of such information as may enable him to more intelligently and efficiently conduct his own business, *so long as the acquisition of that information is not accompanied*

by any restriction as to how the business shall be conducted. The individual may look to a competitor for such information as lawfully as he may look to any outside source. From that premise follows the conclusion that there is no limitation imposed by law upon the volume or character of information that may be lawfully exchanged between competitors.

Form and Purpose of Associations.

The spirit of coöperation has seized hold of this fundamental fact, overlooked during the years when there was regarded as existing no middle ground between corporate consolidation or price agreements, on one hand and ruthless and cut-throat competition on the other; and there has been evolved from that basic idea a form of association, varying according to the needs of the particular industry which it serves, generally regarded as lawful, and shown by practical experience to be of great service to industry.

These associations today are numerous throughout the country, in the coal trade as well as in many other lines of industry. They operate, as a rule, through the medium of a secretary, who usually devotes all of his time to the work of the association. Many of these secretaries have developed the gathering of data, the compilation thereof and its dissemination to a point of efficiency that is little short of marvelous. These associations have become so numerous that there was held last summer in the east a meeting of secretaries of such associations. This meeting was held because of the opinion entertained by many that an exchange of experiences among such secretaries would be generally helpful.

Such an association should have a written constitution and by-laws, and careful record should be made of all of its acts. The operations of such an association are illustrated by the following declaration of purposes of a large trade association now in existence:

“The primary purposes of this association shall be:

“(a) The establishment of cordial personal relations, and hence of confidence among the several houses.

“(b) The mutual education of one another concerning costs of production and distribution.

“(c) The elimination of wastes, both in production and distribution.

- “(d) The removal of false impressions regarding the prices or business practices of other houses.
- “(e) The dissemination of correct information concerning actual market prices, and the prices at which sales have been made.
- “(f) The maintenance of qualities to the full standard of specifications, and the proper branding of goods.”

The quoted purposes fairly exhibit the reasons for the existence of the association. The burden of the work to be done falls largely upon the secretary, whose selection should be made with great care. His personal relation to the success of the plan is very great; his hands should be strengthened in every possible manner and he should receive the whole-hearted support of his membership; without such support the association cannot succeed.

The work of the secretary falls largely into one of two classes: “(b) Mutual education of one another concerning costs of production and distribution”; or “(e) the dissemination of correct information concerning actual market prices and the prices at which sales have been made.”

Accurate and Uniform Cost Accounting.

The benefits which the members derive from the former of said stated purposes flow from the application of an *accurate and uniform* method of *cost accounting*; such benefits start with resulting economies in actual production of coal in the mine, and gradually extend throughout the entire organization, until their beneficent influence enters into the determination of the question of the price at which the product will be sold. Men are not inclined, knowingly and consciously, to give away their property, although I venture the assertion that there has been more bituminous coal given away in this country in the last ten years than any other commodity of any class whatsoever. Given definite and accurate information as to market conditions, and definite knowledge as to the cost of the product, and the operator generally will be slow to produce more coal than he believes he can sell at cost or better.

No discussion of the benefits of cost accounting will be complete which does not refer to the excellent work on that subject heretofore accomplished by the Federal Trade Commission.

Federal Trade Commission.

The calling into existence of that Commission may well be regarded as the greatest achievement of the Wilson administration. The Commission encourages coöperation among business men, and likewise encourages coöperation between such business men acting in the form of some proper association and themselves, and any plan of association contemplated by any gentlemen in the coal trade, or in any other trade, can, without the slightest hesitancy, be submitted to the Federal Trade Commission, with the certain consciousness that such action will be met by the Commission in the same spirit. For the first time in the history of our Government there is an important branch of the Government having to do with the relations of business to the anti-trust laws that is not organized and equipped as a *prosecuting machine*. It is true that there are phases of the reserve power of the Federal Trade Commission that give it ample authority to prosecute any case where it deems prosecution necessary; but such powers are subordinate to the main purposes of the Commission, which are to render sane assistance to sane and honest business, and to discuss their problems with business men freely, frankly, and without reservation; and any plan which is fully and frankly submitted to the Federal Trade Commission will receive a fair consideration by that Commission.

There has been a good deal of discussion as to the power of the Commission, by way of approval of plans. It cannot grant immunity; it cannot legalize an illegal plan. The protection that is extended by the Federal Trade Commission inheres in the fact that its relation to industry from now on will be similar to the relation of the Interstate Commerce Commission to the railroads; and while there is nothing in the Interstate Commerce Act or in the anti-trust laws which divorces the railroads from the jurisdiction of the Department of Justice, never of recent years has there been a prosecution of railroads that was not instigated by the Interstate Commerce Commission; and so it will prove to be, in my judgment, with respect to the Federal Trade Commission and industry. Questions arising under the anti-trust laws will be before that Commission for its determination upon behalf of the Government.

The Commission has been recently organized into departments. Among others, there is a department for corporation reports. "This department shall not merely gather and compile statistics, but shall classify the information and give it back to the world at

frequent intervals in such manner and form that it will help the industry. Among the activities of this division will be the securing of general facts regarding each industry, and putting these facts into the hands of those interested. This, it is predicted, will tend to prevent over-production or the investment of new capital in an industry in which supply may have outrun demand. (I am quoting from the published notes with respect to the purposes of this particular department.) It will help business men to reduce cost of operation by standardizing products, and by standardizing account systems."

The Commission has published a pamphlet, dated July 1, 1916, entitled "Fundamentals of a Cost System for Manufacturers," which is replete with interesting information upon the subject of cost accounting methods. In the statement to the public, accompanying such pamphlet, Honorable Edward N. Hurley, Chairman, says:

"To the American Manufacturer:

"The Federal Trade Commission has found that an amazing number of manufacturers, particularly the smaller ones, have no adequate system for determining their costs *and price their goods arbitrarily*. It is evident that there must be improvement in this direction before competition can be placed upon a sound economic basis." (Italics ours.)

In such pamphlet, under the heading, "Uses and Advantages of a Cost System," the Commission says (page 30):

"The prime object of a cost system is to determine costs, to analyze and compare them, and to use them as a basis for making prices. But the uses and advantages go further. A manufacturer from reliable records is able to make clearer and more intelligent statements to his bank and thereby obtain a larger line of credit than he could without them."

It thus appears that in this Commission we possess a Governmental agency, organized for the purpose of standing between the business interests of the country and the reckless, ignorant application of the anti-trust laws; and that said Commission is definitely committed to the legality and advisability, first, of the adoption by competitors in a given line of industry of a uniform method of cost accounting, and, second, that such uniform method of cost accounting should be a factor in arriving at the selling price.

“(e) The dissemination of correct information concerning actual market prices,” etc.

A trite expression, commonly accepted as being accurate, is to the effect that “knowledge is power.” Assuming that statement to be correct, it must necessarily follow that “ignorance is weakness.” Must we not concede that the condition of ignorance is the condition which now universally obtains in the marketing of coal, except in those districts where coöperation exists?

There are two compelling factors in determining your selling price: First, the cost of production; second, market conditions. What possibility has a coal operator, in the absence of coöperation, to possess accurate knowledge with respect to market conditions? None whatever. “Market conditions,” generally speaking, consist of the prices at which all competitive coals are being sold. False reports as to the prices which are quoted by competing houses are widely current; and too often they receive credence, and efforts are made to meet prices which never existed; thus reducing the whole level of prices.

The Case of the Steel Corporation.

In the abundance of judicial decisions a reference may be found to the legality of the practice here under discussion. You will recall that a bill was filed by the United States against the United States Steel Corporation in the District Court for the District of New Jersey. In the bill of complaint thus filed, in the course of a reference to conditions obtaining in the steel trade, the Government says:

“It is not here alleged that merely assembling and mutually exchanging information and declaration of purpose amount to an agreement or a combination in restraint of trade.”

In the decision of the case the Court took occasion to refer to this allegation in the following language:

“With this concession we are in full accord. In these days every large business has its societies and associations, and these meet periodically to exchange information of all kinds, to compare experiences, to take note of improvements in machinery or process, to discuss problems, and generally to profit by the interchange of ideas and the study of observed facts. When the business is manufacturing, of course, all this has a direct bearing on the subject of prices, and these conferences may therefore consider that subject specifically.”

Conclusion.

It may be observed, in conclusion, that authoritative sanction is therefore seen for the observation with which we began these remarks, to-wit, *that the law imposes no limitation upon the volume or character of information that may be lawfully exchanged between competitors with respect to the marketing of coal.* The subject was specifically discussed by the Honorable Edward N. Hurley, at present Chairman of the Federal Trade Commission, before the Associated Advertising Clubs of the World, at Philadelphia, on the 29th day of June, 1916, at which time he said:

"The activities of trade associations and similar business organizations are manifold. Groups of associated business men that are putting forth special efforts to improve systems of cost accounting, bettering their processes of manufacture, standardizing their output, obtaining credit information, and endeavoring to advance the welfare of their employes, are bound to be most important factors in our country's development in the course of the next few years.

"Special commendation should be given to associations that are endeavoring to build up industries in these constructive ways. Successful production and successful merchandising *require* many steps in the process of changing the form of the raw materials, and putting the product on the market at a figure adequate to cover the cost of production and the cost of selling and net some profit to the producer, without charging the consumer an excessive price; *and neither the individual manufacturer nor the Government alone can work out the many serious economic and business problems involved, so successfully, as can a group of associated producers or merchants, laboring together in coöperation.* These associations, when conducted intelligently and rationally, with the thought of bringing about improved business conditions, will make it possible for our industries to compete in price and quality in the *markets* of the world.

"There should be a greater degree of organization and of mutual helpfulness in all lines of trade and industry, so that American business may be welded into a commercial and industrial whole; the part of the Government being to coöperate with business men, *on request*, to bring about the results that will benefit business and hence promote our national welfare."

Chairman Hurley had been so pronounced in the favor which he accorded to the coöperative movement that many were wondering whether his views might be regarded as fairly representative of

the Administration, or whether they were to be construed as in any manner personal to him, and, in connection with the address to which we have last referred, Chairman Hurley made a statement which for all time put that question at rest. He said:

“President Wilson’s views on trade associations may be of particular interest to you. In a letter addressed *to me*, under date of May 12, 1916, he said, in part:

“Your suggestion that trade associations, associations of retail and wholesale merchants, commercial clubs, boards of trade, manufacturers’ associations, *credit* associations, and other similar organizations should be encouraged in every feasible way by the Government *seems to me a very wise one*. To furnish them with data and comprehensive information in order that they may more easily accomplish the result that they are organized for is a proper and *useful government function*. These associations, when organized for the purpose of improving conditions in their particular industry, such as unifying cost accounting and bookkeeping methods, standardizing products and processes of manufacture, *should meet with the approval* of every man interested in the business progress of the country.’”

THE STATE GEOLOGIST AND CONSERVATION.

Address Delivered by A. H. Purdue, State Geologist of Tennessee, Thursday, November 10, at Nineteenth Annual Convention of American Mining Congress.

By conservation nowadays is meant the best use of our natural resources, without waste. Probably the responsibility of conservation rests more upon the state geologist than anyone else, because he is the one, more than any other, whose duty it is to study and inform the public upon the occurrence, quality, quantity and uses of the natural resources of the state he serves.

Inexhaustible Resources.

Natural resources may be divided into two kinds: Those that are inexhaustible and those that are exhaustible. Of the former are such as sand, clay, road materials, building stone and water power. But while these and others are inexhaustible in quantity, they do not occur universally, so may become, and in most places do become, products upon which it is vitally important that the public be informed.

Here it might be well to call attention to the fact that geologists somewhat, and the public to a large extent, lose sight of the common things, in their anxiety to discover and develop the rare ones. Often a bed of shale for brick making, sand for building, gravel for concrete, or limestone for cement, fertilizer, or other purposes, is of more local importance than a bed of coal, iron ore, or some other of the less common products. A bluff of stone may stand unused for years, before someone will see its value, perhaps for railroad ballast or concrete work, and not only realize from it a fortune himself, but supply a needed commodity to industry. In studying these inexhaustible materials, as well as the exhaustible ones, the state geologist must consider their quantity and quality, and the possible uses to which they can be put.

This involves such things as the conditions of supply and demand; mining or quarrying; transportation facilities for getting out the raw material, and those of converting it into the manufac-

tured product; and such other things as bear upon its profitable utilization. The state geologist must carefully determine whether on the whole these conditions are favorable or unfavorable, for his conclusion may decide whether or not a deposit that can be worked with profit will be used at once or left unused for many years to come. It is sometimes tempting for the geologist, whether acting as an official for the public or an expert for a company, in those cases where he is doubtful as to the value of a deposit, to take the easiest way out and report unfavorably. May it not be that good property is thus often condemned? Should we not, when placed where we must pass judgment upon deposits of doubtful value, intensify our investigations to the limit of time and means and make sure of our ground, if possible? If the value cannot be determined with certainty, then the favorable and unfavorable features should be fully presented.

Exhaustible Resources.

In studying the exhaustible materials, the state geologist has a double duty. In the first place, it is a part of his work to make known the areas in which such actually, probably, or possibly occur, to indicate their quantity and character, and to make suggestions as to their development. This part of the state geologist's work has been heretofore and is yet considered his main duty. But with the probability of some of our most important products becoming exhausted in the not distant future, the geologist's duty in conserving known material is next in importance to discovering what is unknown. To this end he should exercise the powers of his office to prevent waste of exhaustible raw material of all kinds. For example, if there is no other bureau whose duty it is to see that the least amount of coal consistent with good mining is left in the ground as pillars, etc., it plainly is the duty of the state geologist to exert himself toward bringing about mining methods by which the largest possible amount can be recovered. The same line of action will apply to oil, natural gas, the metalliferous ores, and all other exhaustible material.

Again, the state geologist should, at least to a reasonable degree, be alive to the use of by-products. This, to be sure, will take him into the field of metallurgy and chemistry, but most geologists are informed on the elements of these subjects, if they are not experts in them. We can hardly remain unconcerned and permit by-products to be wasted, on the assumption that those operating the mines

should employ experts to get the most out of the raw material. If the experts are not employed, the duty of the geologist becomes all the more incumbent, for the loss, while one to the operating company, may be primarily one to the public. It may mean the waste of valuable material the public can ill afford to spare.

Recently there has been impressed upon me the lesson that it is a duty of the state geologist to look carefully into developed mines, not only to ascertain if there is not a waste of the ore for which the mine is worked, or of some possible by-product, but of material that is too important to be classed as a by-product. To cite a case in hand: In the case of the Embreeville iron mines of Tennessee, mines that have been operated intermittently for something like seventy years, it appears that there have been wasted during all that time large quantities of zinc ore, the presence of which was only recently discovered by an employe of the mining company now owning the property. This has, during all these years, been mined with the iron, dumped with it into the furnace, and driven off as volatile matter into the air. It is not at all improbable that the value of the zinc thus wasted is greater than that of the iron recovered. For this mine has proved to contain large deposits of zinc, and is now worked for zinc, with iron as a by-product. The mines at Leadville, Colorado, have had a similar history. It is as necessary to keep our eyes upon a developed mine as on unprospected ground.

Soil and Timber Conservation.

While this congress does not immediately concern itself with soil conservation, the title of this paper requires me to say that in those states that are subject to rapid erosion there is no more important duty of the state geologist than to do what he can to reduce the waste from soil wash to the minimum. No one knows so well as he the slow process of soil formation, and the rapid rate at which the hillside accumulations of many thousands of years are removed by uncontrolled running water. The education of those who till the soil to the great importance of preserving it from wash is an overwhelmingly discouraging undertaking, but notwithstanding one which we cannot shirk.

In the conservation of our resources, the state geologist, possibly above all others, should look into the future and be controlled by its prospective demands. Our rapidly increasing population; the near occupancy of all our farming and pastoral lands; the pos-

sible, even probable, depletion of the soils, natural fuels and useful minerals—all these should have his most serious attention. In those states where forestry legally comes within the duties of the state geologist, an additional responsibility of the greatest importance and one that often requires much diplomacy is placed upon him.

Legislation and Conservation.

The comprehensive efforts of the state geologist for conservation ultimately require him to do what he can for constructive statesmanship. It is best to attempt conservation through the education of those who earn their livelihood from our natural resources, but at times it becomes necessary to supplement this by legislative enactment. This does not of necessity mean that those engaged in placing natural products on the market are vandals, or even that they are indifferent to waste of material. Among our most ardent and practical conservationists at present are men engaged in farming, mining and lumbering. The necessity for legislation may, and often does, mean that the complete and economic utilization of a natural resource requires conformation to a broad and well worked out plan that must be put in operation in state-wide, or it may be inter-state, proportions. In such cases it becomes incumbent upon the state or the nation to impose such restrictions as are consistent with the most complete utilization of such product, the rights of the public, and fairness to capital.

Of such nature is the problem of water power development in the states that possess it in large amount. This is a natural resource, the future importance of which probably the most sanguine do not realize. There are two ways of having it developed. One is the haphazard way by which any power site can be occupied without regard to whether the available power is all utilized or not, without regard to whether or not it can advantageously be linked up with other sites on the same or neighboring streams, or without regard to where transmission lines go. This means the future non-utilization of a great deal of energy that will be sorely needed. The other is the systematic plan in which all these things are worked out in detail. This means the ultimate utilization of most of the available water power, and this can be secured only by the assistance of the state through legislative enactment. As all with experience know, this is so difficult to do that it is well-nigh hopeless. Likewise, conservation of forests, fuel supply, and possibly the soil, need to be encouraged by legislative enactment. In part or all of

these, depending upon the scope of his duties as defined by statute, the state geologist is expected to take the initiative, by deliberately calling the attention of those charged with administrative and legislative affairs to those resources which the state can aid in conserving.

The Scientific Spirit.

The object of most legislators in supporting geological surveys is to develop the natural resources; that is, to increase the wealth of the state. We have no fault to find with this attitude, and we willingly exert our energies to that end; but geological work, whether for economic or scientific purposes, requires the strictly scientific spirit as its impelling force, without which no results can be relied upon. For this reason we must ask the public to indulge us if, occasionally, a bulletin appears that does not seem to have economic importance. Such may in the end prove to be of the greatest economic value. The state geologist should be a man who can make his work practical, but he should at the same time be a scientist with irresistible inclinations toward the purely scientific problems that confront him. Only such a geologist can effectively serve a state.

THE INTERNATIONAL MIND—AMERICA'S OPPORTUNITIES AND RESPONSIBILITIES IN WORLD RELATIONS.

Address Delivered by C. L. Dering of Chicago Thursday, November 16, at Nineteenth Annual Convention of American Mining Congress.

When I was asked if I would speak to you tonight, I was very glad to say yes, for I felt, if you will pardon the egoism, that I had a message to deliver.

A message, if you please, that has been brought to you by others, that I myself have dwelt upon at times, but a message it seems to me that will bear repeating for the emphasis which that repetition brings.

It is a pleasure indeed to come here and tell you what to do. To spring theories on you that I have nurtured and petted and watched grow through many years of trials and tribulations.

I think it is Tom Sawyer, your friend of old Mississippi river days, who says, "To be good is noble, but to teach others to be good is nobler and less trouble."

And you remember what Mulvaney says in "Soldiers Three"? "Theories are all right but they won't do to color clay pipes with." And so as the making of a soldier was to his mind not the application of the theories of a "leftenant" fresh from Board School and Tottenham Barracks, but the application of a ramrod "tinderly" applied to the most exposed portion of the recruitie's anatomy, so perhaps the theories I have to offer may best be those that have been tested in the fires of experience and welded and tempered by thoughtful consideration.

First, let me say that I am no reformer, at least, not as that word is generally understood.

I speak of those reformers who enjoy the conviction that they know what men ought to do and what they ought not to do. That the men themselves do not see these things does not in the least daunt them and they set themselves to work to make the rest of mankind holy even as they are. These social doctors admit at once

that they are of finer fiber and mentally superior to their fellows and propose to make the whole human fiber into their pattern of cloth.

Like inexperienced doctors of medicine, they seek remedies, not causes, and like those other charlatans and quacks, since "dissolute disease will not obey their medicines," are foredoomed.

There may be medicines that will breathe life into stones—and cure the ills of the world, the flesh and the devil—but your practical business man has not found them and from his experience he instinctively refuses the nostrums of the professional reformer, the mountebank of politics.

America the market place of the world! That is the destiny our business leaders today read into the unwritten pages of our commercial history. We are coming to the supreme test—the measure of our ability as a nation to rise to a great opportunity. Ours the task to prove in actual service the special fitness of which we boast; to demonstrate by the ability to do, our worthiness to the high place in the world's business to which we aspire.

Conditions growing out of the European war will demand more than ever that the people of the United States develop and live *in the spirit of the international mind*. We have been repeatedly reminded that the Spanish-American war of 1898 made this country an international power, with all its privileges and responsibilities. In spite of ourselves it made us alien land owners and concentrated the attention—and not without apprehension—of Latin America upon the so-called "Colossus of the North."

This entrance into the world as a world power quickened that international understanding known as the Monroe Doctrine and admonished both ourselves and the world that hereafter in statesmanship and in naval and military resources we must measure up to our responsibilities even as in industrial and commercial development we must measure up to our opportunities.

In this present moment the two words that seem to have made the deepest impress upon our minds are "Opportunity" and "Responsibility." And let us not forget for a single moment that we cannot own the one and disown the other.

Usually, in the affairs of nations, as of individuals, opportunity knocks but timidly. But with us the knock of opportunity is so imperious that it fairly batters down the door.

Circumstances uncontrolled by us have given this opportunity. Indeed, had it been for us to say, no thought of commercial gain

would have weighed against the stronger sentiment of humanity which governs the American people to permit for a day the European cataclysm responsible for the changed conditions, to meet which this country finds itself in so favored a position.

But the opportunity is here. Will America be worthy of it? For it is not ours to grasp, but ours to justify; not ours to seize greedily, but ours to claim by right of superior ability to serve.

The markets of the world are not to be taken by conquest. They must be won and held by the administration of the same business principles on which our domestic trade is founded—superior goods, superior service, uniform fair dealing, unflinching reliability and that faculty of being eternally on the job that is the truest characteristic of American business today.

I have complete confidence in the ability of the American business man to compete with anybody, anywhere, on any terms—when he really sets out to win.

The trouble is with us that we have not cared. Profits at home have been too easily made to supply the necessary stimulus to the search for profits abroad. Our own country with its natural wealth has offered so rich a field that the foreign field has seemed less attractive by comparison, and if we in the past have viewed with complacency the greater progress of others in the winning of world markets it has been because right here at home were more generous rewards than could be found overseas.

But we are facing changed conditions.

Our commercial future is not as an exporter of raw materials and the products of the soil. More and more we are consuming our raw materials at home. More and more we are learning the wisdom of marketing not merely these crude materials of relatively small value, but finished products to which have been added the relatively large value of American-paid labor.

As immigration continues—and immigration will continue—we will feel the greater necessity of providing for our own people the food stuffs we have been wont to export, and we will feel, too, the greater necessity for world markets to keep pace with the increasing capacity of our industrial resources.

I predict that after the war there will be a change in the character of our immigration. More largely, I believe, those who come to America's "melting pot" in the future will be drawn from the moderately well-to-do and the more skilled classes of labor. Europe will need her captains of industry for the period of recon-

struction that will follow the war. She will need her laboring classes to accomplish her big task. But the man who is moderately well-to-do, upon whom will fall most heavily the burdens of war taxation, will look to America as a land where burdens are less onerous and where the pursuits of industry are more secure.

Here, then, is added reason for America to look to her future as an industrial nation, and I believe we are all agreed that is where America's future lies. Here is added reason to look to the conservation of resources of which we have been so prodigal, to the application of the principles of economics not only in the development of American industries but in our everyday affairs as individuals, and—looking beyond our borders—to turn to the development of our trade with foreign nations, making it our chief concern that this development shall be founded upon principles which make for permanence and mutual advantage.

Let us consider for a moment what it means to be regarded—or to regard ourselves—as a storekeeper inviting the patronage of the world. Truly, circumstance bids us to counsel, bids us view our problem not in a maze of generalities but reduced to simplest principles.

The customer who comes into Uncle Sam's store comes to buy what he wants, not what the men behind the counter has to sell. So, if our respected uncle is to prove himself a good shopkeeper, he must have on his shelves the goods that the customer nations need, and he must have right facilities for delivery.

The shopkeeper of today cannot sell much calico, nails or cheese without a delivery wagon. A merchant marine to make deliveries across the seas is just as necessary as the railroad, the auto truck or the parcel post. Not many customers come into the store today with a market basket on their arm.

Truly, the merchant, if wheat is asked for and he has none to sell, may call his customer's attention to the fact that he has a large stock of socks and mittens; or if it be steel rails and cotton that are wanted and his supply is short, he may temptingly display his beet sugar and his stock of boots and shoes. But the merchant man or the merchant nation, if you please, that does the business of tomorrow will supply the goods that his customer wants, will supply them more promptly than his competitors can, and will deliver the goods when, where, and how his customer may want them, and in doing this he will render that degree of service that is the true measure of commercial success.

Probably because we in America have been so thoughtless of our needs as a merchant nation we have given little heed to the question of a merchant marine. But recent developments across the ocean have demonstrated, as has been demonstrated to us before, the imperative necessity for American merchant ships to carry American merchandise. The Chicago Association of Commerce, acting with the Chamber of Commerce of the United States, stands for subsidies and subventions to offset the difference in cost between the operation of ships under the American flag and operation in the same deep-sea trade under foreign flags, and for such amendments to the navigation laws as shall be necessary to restore an American merchant marine to the water highways of the world.

Other most pertinent matters involving federal legislation needed or already enacted, which time limitation—certainly not their relative importance—impels me to touch but briefly, are the establishment of a permanent non-partisan tariff commission to place the tariff on a scientific basis as a question of business and not of politics, the federal trade commission, whose powers, wisely administered, will mean much to American business, and the federal reserve law, providing as it does added facilities for international banking as well as greater stability in the financial situation at home.

It seems to me that in all our foreign business relations we may largely counsel with and be guided by the crystallized thought expressed by the Chamber of Commerce of the United States of America, an organization broadly representative of the business men of the country—representative, too, of the newer ideals of business and commanding the confidence and respect of the country at large.

No man or group of men can predict when the present war will end. The longer it endures the less promising may be the opportunity we see today. The world's wealth and its power to purchase must continue to decrease until the destructive struggle closes; and, alluring as is the thought of world supremacy, to my mind the immediate and tangible opportunity is to fit ourselves for the developments the future may afford by educating ourselves and our people in the principles of conservation, economy, patriotism and national preparedness.

We, as a nation, have still to learn the lesson of conservation. We must conserve our lands, our forests, our crops, our mines. Following, rather tardily, the example of Europe, we have made a start toward intensive cultivation, but only a start. Thousands of

acres that might be made productive are rich only in weeds. Acre for acre we raise little more than fifty per cent of the grain the European farmer harvests from his soil. And it is a notorious fact that Europe can live on one-half of what America wastes.

Closely allied to conservation is economy in our daily lives and habits. We have been called a spendthrift nation, and this criticism is altogether too well founded. With the prodigality of the unnaturally exhilarated sailor, we spend and spend, easily and carelessly, until there is nothing left to spend. As a nation and as individuals, we must learn the need of that economy that means living within one's means and laying up something against the proverbial rainy day.

One hesitates to say that we must learn a truer patriotism, and yet there are evidences of a decline in that sterling virtue, traditionally inseparable from American character. While the men and even the boys of Europe are giving their lives—not by hundreds, not by thousands, but in numbers we can scarcely comprehend—we in America seem strangely indifferent to our country's needs, even to the greatest need of all, national defense. We must come to the realization of the solemn duty of preparedness, and this realization can come none too soon.

The present war, when it does end, will leave us as its chief physical beneficiary—not the highest state, for the moral results of the war are to be Europe's own sacred and cherished possession, forever.

The war leaves us a bustling, booming market place, a country not enthusiastically loved by any belligerent power and one not yet on intimate terms with any Latin-American state. We have made enemies and also friends of expedience, but our magnified financial and industrial prowess and our growing ambitions are likely to give both friends and rivals disquietude.

It is a hallowed and potent tradition that this country should avoid entangling alliances, but whatever the revered origin of this policy circumstances may compel its modification. At the close of the war we shall have gained one or two billions of new money; we shall have given normal or artificial stimulus to many industries; we shall have embarked upon undertakings which we must sustain or suffer loss and discontent; we shall have acquired prestige of temporary if not permanent leadership in finance, and, generally speaking, we shall have greater need of foreign markets; greater need that the world shall concede to us, in a sense broader

and more altruistic than the world has yet known, the international mind.

And so we are looking forward hopefully, hopeful for the immediate future—hopeful, confident for the ultimate future—not with the blind optimism that ignores obstacles but with the courageous optimism that overcomes them.

To you, the workers, I give this toast—

“Men, my brothers, men the workers, ever reaping something new,
That which they have done but earnest of the things that they
shall do.

For I dipt into the future, far as human eye could see,
Saw the vision of the world, and all the wonder that could be;
Till the war drum throbbed no longer and the battle flags were
furled,

In the Parliament of man, the Federation of the World.”

PRACTICAL SIGNIFICANCE OF PURE RESEARCH.

Address Delivered Thursday, November 6, by Dr. Willis R. Whitney of the General Electric Company at Nineteenth Annual Convention of the American Mining Congress.

Most thinking people of the United States are disturbed by thoughts of the ultimate effects of the world war upon our country's future. What is the relative position we shall occupy and maintain after the other countries have been through a schooling whose strenuousness is sure to produce permanent results? We in this country are not likely to learn so much by witnessing this contest as will the contestants themselves. Experience as usual will be a better teacher than mere observation.

The acceptance of fundamental changes in conditions of living is already greater in Europe than in America. Among those particular peoples who are now vitally concerned, such changes as greater attention to national duties, greater activity in industry, greater unity, greater extension of co-operation in mental and physical effort, will result. For example, women have undertaken men's work in many fields and are showing a strength of purpose and gaining a recognition such as the previous militant methods could never produce. Is it probable that all of these women will be withdrawn from the new lines of effort? While it is possible, is it not equally probable that where they have shown economical advantages, where they have worked as well as men or better, they will maintain the step in advance for which the whole world is apparently preparing?

My point in this illustration, which might equally well have been shown by specific references to developments such as that of the municipal kitchens in Germany, is that those who are to learn most quickly and thoroughly are apt to be those on whom the lessons are most forcibly impressed, and that there was never a time when we Americans could so illy afford to fold our hands as at the present.

May it not be that we are in a state of coma, induced by superficial prosperity and prolonged by the relatively scattered and dis-

organized conditions of our more recent past? For apparently good reasons, we have of late years entered upon a policy of discouraging the growth of corporations, of stranding the railroads, and of forcibly stopping large water power developments, and now we learn from the press that Germany and England are busy bringing about the union of competing manufacturing companies in order to strengthen home industry. England is planning a system of general industrial research to generally assist her manufacturers after the war. The scientific and engineering societies of Germany are banding together under a single president so as to render their co-operation more effective. These peoples are becoming aware of their power when acting collectively and of their dependence upon and interest in national undertakings to an extent unthought of a few years ago.

Can we not in some way, without the pressure of war or the force of immediate necessity, determine by fair means and by enlightened public opinion the best policies to pursue in our many debated difficulties?

This paper is not directly a discussion of these questions. It is intended as an attempt to help to water the roots of our country's engineering knowledge and prestige, upon whose wide extension and penetration through the mass of the people we must finally depend for the accomplishment of such an end. And the effectiveness of such knowledge and the continuance of such prestige will depend always upon the activity of the profession in seeking out the new advance and in systematically investigating previously unknown fields. Successful engineering depends upon an accurate knowledge of matter and its processes and this can only be acquired by tireless pursuit of the facts.

Nations like individuals grow older, and new steps of progress no longer meet the same welcome which was given earlier novelties. The youngster in his toy auto talks with interest of his carburetor or "twin six," which his grandfather does not care to investigate. He erects his wireless aerial, learns the Morse code and "listens in," while his father, too inflexible already to do as much, realizes that his son is relatively a wonder. And so we learn to expect the young men to have visions and the old men to dream dreams of the past. It has been said that unwillingness to see the certainty of continual progress is comparable with expecting time to stop when we hold the hands of a clock. It is of course wiser to learn the code and "listen in."

In the matters of special interest to the mining engineers this persistency of progress is as potent as anywhere. It is not my intention to remind you of this too tiresomely, but as we are passing through a period when national and social progress is particularly in the public eye it may not be amiss to harp a little on the subject of research.

I think I am right in saying that the preparation of men for scientific research in America has been quite inadequate. If any one country has advanced along this road beyond the others it is Germany. There the results were fairly evident before the war. There were then many men of pure scientific training who were carrying on research in the natural sciences. No student of any natural phenomena or remote branch of science could disregard what had very probably been done already by some German student along the same line. A few of the leaders were well supported but a vast majority were discovering the truths of nature and nearly starving into the bargain. Probably many of you know of cases among the German mining engineers where years of self-sacrificing study were necessary for some slight metallurgical discovery which may have greatly enriched the country. I could hardly continue without pointing out that Germany is today entirely dependent for its explosives on the research work of such laboratories as Professor Ostwald's and Professor Haber's, excluded from the Chilean and Norway supplies of nitrates as she has been so long. And it is also evident that her powers as a peaceful nation, whether it be in her study of welfare of labor, of her banking or of her industries, depended almost entirely on her national support of scientific research work.

My aim here is to give a certain view of engineering research, with particular reference to national welfare. I want to defend and help support that kind of experimental study which must lie as a foundation to our technical or engineering advance but which because of its apparent remoteness from immediate need is often classed as pure research and is not appreciated by the utilitarians.

It is not my intention to present new facts as, for example, the results of research work in a particular field, the outcome of certain investigations, the ratio between cost and profit from any special material studies, or the work of the laboratory with which I am most familiar. These will all vary for individual cases and persons. I want to go directly to the important point and spend a few minutes closely circumscribing it.

I want to emphasize the necessity which confronts us of devoting greater attention to natural sciences and to the unearthing of those values of natural knowledge which nothing but mining in fact will provide. I want to see our country get out of the habit of too exclusively awaiting fundamental discoveries from abroad and merely developing them by the application of brute force and high speed.

Those who are accustomed to contemplate the rate of increase in our knowledge of matter, in our control of materials, never tire of recognizing new illustrations. Who is there of normal mind that seated comfortably at the steering wheel of a rapidly and smoothly running automobile on a well built road has not reflected on the improvements in our means of locomotion and recalled the rapidity of development? How much more must this thought come to the mind of the aeronaut? Are these rare illustrations? We are confident that similar rates of advance are taking place in all fields and by the same methods. The development of methods of protection against contagious diseases or the discoveries in long distance communication are of the same kind. But what is identical about them all is that they are built upon little second order studies on the properties of matter and the processes it undergoes. Usually the foundations have been laid by a delver in peculiar things, frequently a man set aside by himself and not apparently fitted at the time into the general mechanism of efficiently providing and consuming food and raiment. Natural searchers after truth are not common but they occur and persist and they should be more extensively encouraged, educated, protected and supported.

We need not distinguish between narrow, mercenary motives and broad human or national interests. The study of nature may remove the causes of disease or demonstrate the value of universal peace as well as enrich a temporary investor or corporation. Bacon recognized the same peculiar spirit which after 300 years still actuates a few students of nature who deprecate the study of her laws for purposes of human happiness. "Goods, pleasure, ease, content, whate'er they name." He said, "I find that even those that have sought knowledge for itself and not for benefit or ostentation, or any practical ennoblement in the course of their lives, have nevertheless propounded to themselves a wrong mark, namely, satisfaction (which men call truth) and not operation."

He criticises the thought of research for contentment as distinct from benefit and adds: "Shall he not as well discern the riches

of nature's warehouse as the beauty of her shop? Is truth ever barren? Shall he not be able thereby to produce worthy effects and to endow the life of man with infinite commodities?" "It has not yet been seen that the true aim of all science is to endow the condition and life of man with new powers or works."

He had written, "We may therefore well hope that many excellent and useful methods are yet treasured up in the bosom of nature bearing no relation or analogy to our actual discoveries, but not of the common track of the imagination, and still undiscovered, and which will doubtless be brought to light in the course and lapse of years as the others have been before them; but in the way we now point out they may rapidly and at once be both represented and anticipated."

At the time these lines were written the law of gravitation had not been stated, for the great nature student, Newton, was not yet born. Gilbert's experiments on magnets were under way but nothing was known about electricity. The steam engine was unknown. One is impressed with the thought that most of the conveniences of our lives and most of the facts of natural materials and laws have been discovered since his time. We can truthfully repeat his assertion, "Many excellent and useful matters were treasured up in the bosom of nature," and certainly there is no limit to their further discovery but the limit of human inquiry.

Probably Bacon speaks a different language to different hearers, but I hear him in his determined thought that the direct inquiry of the elements, the testing of the compounds, the trial in new positions, etc., are the sure way of advance.

There are still two ways along which new facts of materials or phenomena are sought, and we see them every day. There is the work of the inquisitive student, the man who is trying new combinations of matter of processes and noting the result, pleased with the outcome if it be but an addition to existing knowledge. He represents a class which is all too small and which any country ought to encourage to the utmost. At present this type is carried through our colleges with perfect order. He gets from its teaching and facilities much that appeals to his special desires, but I do not think the provision for his later life is at all adequate or consistent with any far-seeing national policy of education.

The other seeker is narrower; he has usually a definite desired end in view and tries his combinations of matter and his processes for a single purpose or end. His efficiency is relatively low; be-

cause he usually gives attention only to the special products which he imagines he has foreseen and neglects other disclosures made to him. He is like the gold miner who overlooks platinum.

As mining engineers we may reflect on the relatively enormous quantities of silicon usually mixed with most ores and turn our attention to the already accumulated data on this element. We will find that many minds have been turned to silicon and some experiments have been carried out upon it. The element has been isolated in a fair degree of purity and a few of its properties are known. The first thought is to test it as a substitute for some other element. This is frequently ineffective, but as the properties are further sought a new one is usually found which brings such a material into permanent service to mankind. Such pioneer work as the study of silicon, not as a substitute, but for a knowledge of its properties, should be urged by engineers.

It is interesting to us who think of the metals and their individual properties to note how often we make good use of metallic properties not satisfactorily found in one of the metals alone. In fact, with only a few exceptions we seldom make use of pure metals. We modify properties by mixing and trying the effect. Properties disclosed by experiment and made known are soon applied.

For example, the metal chromium, only recently obtained in sufficient quantities to become useful, is now commonly going into alloys where its power of withstanding oxidation and of increasing hardness are of value. Such properties, still unknown but for the careful study of various investigators, suggest further trials of the material in such specific uses as the valves of gas engines or the linings of big guns.

We need more information on the properties of materials of all sorts in order to suggest their use in places where the needs are often already well in sight. The trial of promising applications is usually easy and not long delayed. It is the fundamental search for properties that is slow and neglected. Our trouble is not that we will not try promising combinations but that we do not know how to project those which are not obvious.

We marvel at a Hertz, devoting his entire energy to studies of the action of one spark gap on another until we see a Marconi develop wireless telegraphy. Then we admit that there was something in it.

It seems to be the rule that the valuable results come from what appear to be the most insignificant observations of natural phenomena. It was not the density of nitrogen that disclosed all the rare gases, but the small difference which was found between the densities of nitrogen from different origins. It was not the active properties of argon which put it into our incandescent lamps of today but its poor thermal conductivity and the peculiar fact that it did not have the chemical activity of other gases. These are really by-products of properties.

As mining engineers we all know that a large quantity of calcium is present in the earth's crust ready for those who need it, and we know the history of aluminum, but do we realize equally well that until the properties of calcium have been extensively studied we will not know that we need it? Ask the average chemist or engineer about calcium. He will probably reply that it occurs in limestone and in the pure state decomposes water. Most probably he will not know how the ore can be reduced to metal.

A few years ago the German Rathenau after describing the method of making this element in large quantity went on to say: "The question may well be asked, what can calcium be used for? And to this I must answer: I do not know. But we are always in this position regarding new metals. We have never known at the time what we should do with them, and the applications predicted by technical men, by the journals, or by common belief have always been the wrong ones. For this reason we trust in this case to the future and remind ourselves that there has never yet been a substance prepared in the pure state which has not found an important use. As to what shall be the uses of calcium, it can probably already be gathered that it is a good reducing agent, a reducing agent which after its work is done leaves behind no caustic lye. Still more probable is the application which most new metals find, i. e. in alloys. The only condition for its extensive use seems to me to be that the metal shall be made cheaply enough. As the raw material is of little value and the current yield is good, I believe that calcium will come into the market in large quantities and at very moderate prices." (Rathenau, *Zeits. Electrochem.* 10, 508-9, ('04)).

Already calcium has come into some technical use, but when it is better known it will doubtless be greatly needed. Now the tests of its properties alone and in combination are very important. How insignificant would seem the effort of the testing of such a

product were it found to be as magnetically permeable as iron, or capable of substitution for lead in the storage battery!

We can all agree on the importance of determining the properties of the chemical elements, because they are few in number and in material things we believe we shall always be confined to them. but the useful properties are infinite in number and the aid we may get from the knowledge acquired by actual experiment or contact with them is also infinite. One of the most terrible explosives of this superlatively terrible war is a mixture containing apparently harmless metallic aluminum and ammonium nitrate. Is it the last thing in explosives? Certainly not. It is only the latest. Was it obvious before the general properties of nitrate and aluminum powder were studied? A knowledge of the Goldschmidt process may well have developed this product, but it can be traced with certainty as far back as the German chemist Wohler who first studied extensively the metal aluminum. If these things can always be traced back to some little experimenting laboratory, why do we not encourage greater study of matter for what it may have in store for us rather than for what we think we need at the time?

In case of danger to our country from war we quickly learn the importance of increasing our navy and our armament, of meeting in kind and degree the menace we imagine can prevail. We all believe in enormously increased expenditure for those plans and devices which students of our situation suggest. We take an industrial inventory and determine where best can be produced the materials most needed in war time. This is only ordinary foresight and in democratic government must be done about as it is being done now.

But even in this undertaking we cannot help noting how dependent we are on foreign nations. This is painfully true for many materials of trade. It has been sufficiently aired in the press. Potash and dyes, nitre and alloys are peculiarly foreign products. In some such cases the cure may easily be effected, in others it may be difficult.

In the more subtle matter of science or knowledge of matter we have in the past been all too dependent on foreign sources. In illustration of this I would cite in some detail our position in regard to fixed nitrogen.

It is well known by mining engineers that the only considerable nitre deposits are in Chile and in case of war we might be prevented from drawing on this supply. For all explosives now used in war,

whether it be the old black powder, gun cotton, or the modern trinitrotoluol and deadly ammonal, the one indispensable material is nitrate.

But how shall we make nitrates? Had we even a small fund of knowledge obtained by research upon the reactions involved the problem would be simple. But we have no certain knowledge of our own, only the published reports of the work of Germans.

There are several processes but none which has been able to stand on its feet here while paying normal American rates for power and sell fixed nitrogen in competition with Chili nitrate. Yet the price of the latter is so high that few American farmers can afford to buy it.

The value to the country as a whole of a much cheaper fixed nitrogen for fertilizers can scarcely be overestimated. But at this point we pass over into the field where study by engineers should begin, and where the most recent research is exceedingly important.

To avoid too great detail I will discuss here the possibilities of but one of the known processes.

Ammonia can hardly be obtained more simply than by the direct union of its elements, hydrogen and nitrogen. This may then become the ultimate process for fixing nitrogen. Only a few years ago it was known as a slow and incomplete method, but a careful study of the peculiar reagents called catalysers developed so that now the reaction is much speeded up. The early work and the subsequent study of this reaction, as well as of the further reaction for the combination of ammonia with air to form nitric acid, was done in Germany. These applications are the revolutionary results of scientific experiments in university laboratories. Since they have meant so much to the German people today, we must not be blind to their meaning to ourselves.

The net energy consumption of the practical union of hydrogen and nitrogen seems to be relatively low so that the cost may be largely determined by the cost of the two component gases. It is directly in the production of the gases that enormous strides have been made in the past few years. While it might have looked a hopeless proposition, a few years ago, to make both pure nitrogen and pure hydrogen, in order to get ammonia, the conditions are wholly changed today and are still in flux.

The methods of producing hydrogen commercially depend on water as their raw material and so the low cost here is certain. By

passing steam over heated coke and separating the resulting carbonic oxides and hydrogen a cheap process seems absurd.

The method of separation which depends on freezing out the gases other than hydrogen in water gas mixtures, and leaving this pure, depends on the use of apparatus only known a few years ago but now applied to the manufacture of liquid air. Here the cost of operation after installation of the rather expensive apparatus does not seem very great. With this process of separation of the hydrogen it is also possible to combine the preparation of the nitrogen which is to unite with hydrogen to form the ammonia. This nitrogen is derived from the atmosphere and is separated from the oxygen in the process of air liquefaction and distillation. The cost of power for producing these two elements will be continually reduced as this work goes on, but is apparently low enough to deserve most careful investigation.

Other processes for producing cheap hydrogen are the reaction between steam and metals such as iron, and the direct decomposition of water by electricity. The former process calls for the reduction of the iron oxide to complete the cycle but this reduction of iron oxide to iron is one of the oldest known and cheapest chemical reactions. Thus the iron process may well be a very cheap source of hydrogen.

The electrolytic process has been widely established for the purposes of oxyhydrogen welding and cutting of metals and for the hydrogenation of oils. Electrolytic hydrogen is also still a useless by-product of some of our industries, so that a low cost of this gas must be considered as probable.

Under conditions of very cheap hydrogen it would be possible to obtain also the nitrogen even at less cost than by the air-liquefaction. This would be done by burning a part of the hydrogen in confined air, condensing the resulting water vapor and using the residual nitrogen of the air to form ammonia with the rest of the hydrogen.

Thus it seems as though the production of ammonia and consequently of nitric acid (because the oxidation of ammonia to nitric acid is a simple combustion in air) may depend almost entirely on the cost of hydrogen. No one can estimate the minimum cost of hydrogen, for beyond economies in the present methods of production lie the possibilities of its being a by-product from commercial electrolysis in co-operating processes.

These are a few of the points complicating our position with regard to national nitrate production for ammunition and ammonia for fertilizers which call for the careful reconsideration of plans which may have been entirely satisfactory only a few months ago. They may well call for comparative tests by some bureau of the Federal Government. The Bureau of Mines is naturally awake to this situation.

Such facts are of especial significance here. They show the great importance of the purely scientific studies which were the original experiments on which each of the above processes were based. At the time when nitrogen was first made by liquefying and distilling air, there was little more than academic interest in the process. For years after the reaction between hydrogen and nitrogen was studied there was no sign that a commercial process had been exposed. The formation of nitric acid from ammonia and air was long only an interesting discovery of a research laboratory, and so it is with most engineering phenomena.

But if we would do more research for ourselves we must first look to the training of more of our young men so that they may be fitted and encouraged to take up such work. We must plan for more general scientific education and for training in research. The thousands of young men who take four years of study in our colleges must have among them very many whose cultivated instincts would make them tend in this direction if properly directed and encouraged.

A first step in this direction and a step which may well bring most valuable and far-reaching results is that sought by a bill which has been before Congress for several years, which aims at the national encouragement of research. It was introduced and supported by the Association of Land Grant Colleges of the separate states and it calls for the establishment of an experiment station in each with an annual Federal appropriation of \$15,000. There seemed good precedent for such a move. A very similar plan has been carried out in the state agricultural stations and by many states additional support has been given to this work, so that the country as a whole has long seen the good results. It was thought that very similar methods devoted to original, new, and experimental work in other engineering fields was warranted by the country's need for constructive research, the study of its supplies of untouched raw materials, and the development and education of engineers. This so-called Newlands Bill, which is still being advanced, may well greatly aid the country in that type of

preparedness of which J. J. Hill said: "Economic preparedness that shall permit our abundant capital to employ itself wisely here, where it belongs and would prefer to stay, create new industry, make more prosperous the old, and pay wages to all our workers, is the test by which the future of our hopes and visions must stand or fall."

Every engineer who is interested in the advancement of his profession and in the welfare of the country will do well to follow the details and progress of this bill and lend it such support or constructive criticism as is possible.

A PAPER FAVORING REMEDIAL LEGISLATION FOR THE BENEFIT OF OIL COMPANIES.

Address Delivered Thursday, November 14, by Roy A. Bishop,
President Oil Industry Association of California, at Nine-
teenth Annual Convention of American Mining Congress.

There has never been a well defined law enacted which properly met the needs and requirements for the exploration of petroleum and gave proper protection to those who prospected for and undertook to develop oil lands.

The attention of Congress was called to this fact and on February 11, 1897, it passed an act wherein it was provided "That any person authorized to enter lands under the mining laws of the United States may enter and obtain patent to lands containing such petroleum or other mineral oils, and chiefly valuable therefor, under the provisions of the laws relating to placer mineral claims."

This law has been declared by the Secretary of the Interior and other officials to be a misfit law because it could not be properly applied to the prospecting and development of petroleum lands. Under the placer mining laws a prospector with little expense and with the use of a pick, shovel and pan could enter upon public land and with little work, small expense and in a short time make a discovery whereupon he would file his location and upon making improvements of the value of five hundred dollars would be entitled to a patent. He could protect his location indefinitely by doing one hundred dollars' worth of work thereon each year, and as long as he did this work he could not be disturbed or molested.

A discovery of oil cannot be made so easily. It requires the expenditure of large sums of money and frequently a year or more of work. During this prospecting period, and before the discovery of oil is made, the claimant has no right to the land which he can defend and another party can enter upon the land and start operations alongside of him and if he discovered oil first, he will be entitled to locate the land in preference to the one who was first upon it, no matter how much labor he had performed or money expended.

But unsatisfactory as the law was many of our citizens went upon the public domain where they thought there was a fair prospect of finding oil, commenced their development work and in many instances discovered oil and in many more spent thousands of dollars in fruitless attempts to find it.

The discovery of valuable oil deposits in California encouraged many of its citizens to go into the mountains and valleys and prospect for oil. Farmers, merchants, professional men, laborers and all classes bought shares of stock in companies formed for the purpose of drilling for and producing oil and gas. The country that they invaded was remote, dry and arid. There were no roads and no water. Some were crowned with success, many met with failure after spending large sums of money. Into this arid section roads had to be built for miles over which to transport heavy machinery, iron casings and timber for derricks. Water had to be developed and brought through the mountains from long distances. Every hardship was there to discourage a weak man and only that hope of reward and success which rests within the breast of a western man and inspires him to attempt the almost impossible kept up their courage to go on.

New oil fields were discovered, splendid properties were developed, and a great industry given to California and the nation through the courage, optimism and pluck of these men. The development of one oil field encouraged men to further penetrate the mountains and look for others. And in the summer of 1909 they were in the midst of this work. Some were then engaged in building roads to their locations, some were developing a water supply, some were building their cabins and derricks and installing their machinery for drilling and some were in the actual progress of drilling. All were acting in good faith under a "misfit law" and as they believed within their rights as American citizens and with the sanction of the government. Every one believed and having the right to believe that if oil was discovered that the government would issue a patent for the land upon which the discovery was made.

While all this work was going on in the oil fields, the Government without any notice or warning on the 27th day of September, 1909, withdrew from entry all the lands upon which this work was being done and many thousands of acres besides. The order of withdrawal embraced 3,041,000 acres in California and Wyoming, a part of which had, however, already been patented as agricultural and grazing land.

The order is as follows:

"Temporary Petroleum Withdrawal No. 5."

"In aid of proposed legislation affecting the use and disposition of petroleum deposits in the public domain, all public lands in the accompanying lists are hereby temporarily withdrawn from all forms of location, settlement, selection, filing entry or disposal under the mineral or non-mineral public land laws. All locations or claims existing and valid on this date may proceed to entry in the usual manner after filing investigation and examination."

This order startled those who were working to discover oil. Serious questions arose as to what their legal rights were, not having yet discovered oil, notwithstanding they were occupying the land and had expended large sums in an effort to discover oil and were then engaged in such work as was necessary leading to its discovery. Some continued their work believing that the President had no authority to withdraw the land upon which their work was being done; others more timid ceased operations and sought legal advice. The question then arose as to whether or not the President had any authority to make the order. President Taft expressed a doubt that he had. Members of the legal profession advised their clients that no such authority existed and two federal judges so decided. Finally the Supreme Court on February, 1915, held in the *Midwest Oil Company* case, by a divided court, that he did have.

Ever since the withdrawal order the conditions in the oil fields of California have been chaotic. Companies do not know what their rights are; suits by the Government have been commenced against some and receivers have been appointed.

No new work is being done, great losses are being suffered, and bankruptcy faces many who but a few years before in the best of faith went upon government land under the mining laws of the country and risked their fortunes in an effort to discover oil in a locality that was most forbidding and discouraging. What is going to be done for these men? What relief should Congress give them in the Oil Leasing Bill now pending in the Senate of the United States? These are pressing questions. If this bill passes, and there is every prospect that it will, the petroleum and gas lands owned by the government will thereafter be leased to those offering the best bid therefor.

Forecasting the passage of this bill, the Secretary of the Interior has withdrawn from entry 5,603,295 acres of oil lands and further withdrawals will be made as fast as oil lands are discovered.

In making this change in the law it is not only just that those who entered upon the land under existing laws and have discovered oil by the drilling of a well should be protected in their rights either by receiving a patent or a lease as the facts of each case may warrant.

The justice of this was recognized early by Secretary Lane. In his annual report for the year 1915, he says: "If the full measure of the Government's rights is acted upon as a basis of our policy in dealing with these lands, it will bankrupt many oil companies, and do what appears to me to be an injustice, and an unnecessary injustice to those who have invested many millions of dollars under a mistake as to the law." A law which all concede to be a misfit law and not applicable to mining for petroleum.

The Director of the Geological Survey who prepared the order of withdrawal stated before the Public Lands Committee of the Senate that "in all discussions of the matter of withdrawals leading up to the original withdrawal the desire and intention was unanimous that the equities should be protected."

The House of Representatives in passing the Oil Leasing Bill on January 15, 1916, recognized these equities and provided for them in that bill.

In reporting favorably the Oil Leasing Bill at the last session of Congress Senator Meyers, chairman of the Committee on Public Lands, in passing upon an amendment offered by the oil men, and which amendment the committee allowed, said: "This is intended as a just and deserved protection to many entrymen, who under existing laws, located, occupied, claimed and improved, as bona fide claimants and occupants under the placer mining laws of the United States certain tracts of oil and gas producing lands of the public domain prior to withdrawal thereof by the Government from mineral entry or location on July 3, 1910, and who have from and since that day diligently prosecuted all necessary work and have discovered oil or gas thereon prior to this time and who have vested rights therein, and have expended large sums of money thereon. Some of these parties were represented before the committee and made extended arguments. After hearing all of the arguments and after hearing representatives of the Government from the Interior Department who appeared before the committee, and after mature deliberation and consideration of all of the premises, it is decided just and proper to protect these rights and make this amendment.

Without it grave injustice would be done and the Government has no desire therefor."

So just were the claims of the oil men that they never imagined that any serious opposition could arise, and they felt confident that Congress in dealing with the question would in passing the Oil Leasing Bill fully protect them in their rights.

But opposition has arisen. Opposition in the Navy Department and from a few well-meaning but misinformed citizens who have especially delegated and appointed themselves as the guardians of the nation and protectors of its interest and welfare. The navy is afraid that unless it can get possession of the few thousand acres which have been developed and upon which the citizens of this country have spent millions long before a naval reserve was ever established, that the building of battleships will cease for the lack of proper fuel, and this country will be a hopeless prey to any nation that can fit out a gunboat and come over and get us. And this claim is being seriously urged notwithstanding the fact that the Government has already created two very valuable naval reserves containing hundreds of millions of barrels of oil, where private interests are not affected, one in California comprising 39,000 acres, and one in Wyoming containing about 10,000 acres, with the right to establish as many more reserves as it may desire out of the 3,000,000 acres of petroleum lands already withdrawn by the Government from entry.

The only reasonable excuse that the navy can give for desiring to appropriate the land in the possession of the oil men is that the property has already been developed, and producing oil wells drilled at an expense of millions of dollars are upon the land ready for use.

The opposition to the relief provisions of the bill coming from Gifford Pinchot and a few other ultra conservationists is based upon the false cry of wilful trespassers and looters of the public domain. A few papers and magazines have been induced to publish their views.

The question as to whether or not the oil companies are wilful trespassers has been fully answered by the recent decisions rendered by two Federal judges.

Judge Bean, in his decision rendered on May 1, 1916, in the case of the United States vs. Midway Northern Oil Company et al., which included many other oil companies, said:

"The defendants were not wilful looters of the public domain nor reckless trespassers thereon. They acted on the advice of

reputable counsel, expended their money and labor in good faith, relying upon a law of the United States and in the honest belief that they were within their rights."

And again in the United States vs. G. W. McCutcheon et al., recently decided, Judge Bledsoe in his decision said:

"There can be no valid claim in my judgment that the defendants herein were wilful trespassers. Fortunately there is nothing in the facts developed to warrant that conclusion, and I know of no rule of law which could or should appeal to this court in equity which would have the effect of so judging them."

These two decisions should settle the alarm that seems to exist in the minds of some that other oil men of California are wrongdoers, wilful trespassers and looters of the public domain.

This cry was not raised because it was true, but for the purpose of forming public opinion against the oil companies and to persuade Congress to deny the relief they were asking for.

Wherever an impartial and unprejudiced committee or a public official of high standing has made an investigation of the facts, all agree that the oil companies acted in good faith and are entitled to relief. Some, and there were very few, entered upon the land after the withdrawal upon the advice of counsel and in the Leasing Bill no patent is asked for them.

All have acted in good faith and under most difficult and trying conditions have developed their several claims.

They spent their money in good faith, have developed valuable properties and believed that they were operating under the law and within their rights. If the Leasing Bill becomes a law and any part of this property is to be leased, then there is no reason why the company who is in possession of it and who has discovered oil and spent thousands of dollars in the way of improvements should not have a preference right to a lease upon the payment of a royalty to the Government which is fair and equitable.

Not to grant this preference and to give a lease to a stranger would be wrong and a grave injustice.

The oil companies want relief and must have it or they are ruined. If no order of withdrawal had been made and they had been permitted to have continued their operations under the laws existing at the time of entering upon the land all locators who had discovered oil would now be entitled to patents. If a change in the policy of the Government in disposing of its oil lands is to be made, then those who were in possession in good faith before the

change, and who have diligently prosecuted their work and discovered oil should be protected. This is all the oil companies are asking for and this much in fair and honest dealing the Government should give them. The oil companies believe that Congress will deal fairly with them. The House of Representatives has already passed the bill and the fight is now in the Senate.

The Senate Public Lands Committee has made a favorable report on the bill and there is every reason to believe that the Senate will do justice to the oil men of California and Wyoming, and at the same time fully protect the rights of the Government and of the navy.

The work was all done in the open with the full knowledge of the Government. It was all done under laws which permitted it to be done. Fortunes have been spent, a great industry has been created, and those who did the work and spent their money in good faith should not be deprived of that which they have honestly earned and we hope and believe that they will not be.

This oil question cannot be settled until it is settled right, and such a settlement cannot be made which does not protect the interests of those who entered upon the lands in good faith and developed the property by discovering oil.

THE PROSPECTOR AND THE MINING LAW.

Address Delivered by F. W. Van Wagenen, of Denver, Thursday, November 16, 1916, at Nineteenth Annual Convention of American Mining Congress.

A mining law has for its purpose the attainment of two ends, namely, to secure the discovery of mineral deposits, and to encourage their development. The first has to do with the occupation of prospecting, while the latter is a matter of mining engineering. As mines cannot be developed until they are discovered, it seems clear that the paramount purpose of such law must be to stimulate the activity of the prospector.

This individual as known to us may be said to be entirely a product of American civilization. In dictionaries of the English language published prior to 1850 the word is not to be found. Just when it became current seems to have been about the years 1845-50, when, lead ores having been discovered in the vicinity of Galena, Illinois, a number of pioneers of the vicinity began to search the surrounding country for more of the mineral. These individuals appear to have been called prospectors by a writer of the day. Shortly thereafter came the gold discoveries in California, which, naturally, drew all such characters to the coast, where their line of activity was at once recognized as desirable, and the title appropriate. The idea back of it was a totally new one to the world, for it meant an individual who had been *invited by the nation* to explore the surface of the public domain for indications of metals of any kind. These, when found, if on land not already appropriated by another, became by law the exclusive property of the finder, to work or to sell, as he saw fit. In a short time the occupation became entirely one of searching and finding, development being quite abandoned, so much so that the prospector ranked himself above the status of the miner, and took more or less pride in the fact. This professional feeling continued, and still exists, though at the present day some of the craft are not only too dignified to work, but too lazy to be efficient explorers. In the beginning, however, the occupation was followed by men of real pioneering ability,

though sometimes very illiterate, and in all parts of the western mining districts of the United States there still remain numerous vigorous, honest and capable individuals of the class.

Outside of the United States and Alaska the prospector, as we understand the character, does not exist. I make this statement without any reservation, and before closing expect to give proof of it. During five years of travel and residence in Mexico, covering in that time nearly every one of its states, I failed to find a single one. I am reliably informed that the same conditions prevail in all other parts of Latin America. The occupation is unknown in South Africa. There were hundreds of them at one time in British Columbia, but they have disappeared. In the Yukon country they were present in large numbers when the Klondyke District was thought to be a part of Alaska, but they left in a body when that famous region turned out to be British territory. In all the remaining parts of Canada the prospector is notable by his absence. The business has never been heard of in Siberia. In Australia and New Zealand many were in the field in the early days, but none can be found now.

And I will make the further statement, without any fear of successful contradiction, that the prospector exists *only in those parts of the United States that are under the provisions of the Federal mining law*. For instance, though numerous in New Mexico, he cannot be found in the adjoining state of Texas, though the latter is known to possess great mineral resources. There are none in the Lake Superior copper and iron mining regions, nor in the lead and zinc fields of the Mississippi Valley, so far as I have been able to ascertain.

The natural and inevitable inference from these facts, if they cannot be controverted, is that the prospector is the product and child of the American Mining Law. If he is a desirable one, it will be well worth while to ascertain what there is in the law that has produced him, and keeps him with us. But first it may be well to inquire whether his occupation is a necessary one for communities possessed of latent mineral wealth. Can discovery go on without his services?

To a very limited extent discovery is still in progress in Australia, but only in the politically unorganized or very sparsely settled parts of the great island continent. It has ceased entirely in all districts that have become well occupied, even where great unexplored wealth is known to remain. In New Zealand, Latin

America and Canada the same conditions exist. We hear of nothing from these countries except the continued working of mines discovered thirty to fifty years ago, or the reopening of "antiguas." In the case of Canada, a few new districts have been found during recent years, but investigation reveals the fact that all of them were purely accidental strikes, made either by railroad graders in the course of their day's labor (Sudbury and Cobalt), or by sportsmen when in the pursuit of game (Porcupine). Practically nothing new has been found in British Columbia since the law there was changed from one allowing extralateral rights to one confining the prospector within vertical planes. In Texas, though the state has offered liberal bounties for mineral discoveries, and where there are plenty of mineral areas still held open, but under state laws, none are reported. Prospectors by the thousands are swarming all over Alaska, in spite of its severe climate, while across the international line, in the Yukon territory of Canada, no exploration whatever is in progress. In fine, a careful examination of international conditions in the industry of metal mining, shows that in the matter of new discoveries the United States and Alaska are the only parts of the world where advance has been steady and important from the first, *and still continues to be so*. Evidently, then, the American prospector is an asset of some value to the nation.

Now, what does the prospector require as an inducement to carry on his particular line of activity with energy? First, he appears to demand freedom in the exercise of his occupation. He carefully keeps away from all lands where a miner's license is required, and from those where the processes of initiating and maintaining title are complicated and expensive, and where no fee simple title is obtainable. But, above all other considerations, that which seems to be most necessary to retain his services is the ability to locate a claim which has a selling value *as a prospect*, and which does not have to be developed to attain that quality. For he is not a developer. He is purely an explorer and finder, and can not make a living in his profession unless he can dispose of his find on the basis of the *nature of the claim* he can file and maintain upon it. Such a nature and characteristic was unconsciously conferred by the Federal Mining Law when the principle of the apex and of extralateral rights was enunciated. For these principles, for the first time in the evolution of mining law, declare the vein or deposit to be a *legal entity*, distinguishing not only between it and the surface where its top may outcrop, but, also, between it and

the rocks enclosing it, and so gives it to the discoverer in its entirety, no matter where it may lead him. With this right conferred you cannot locate along his side line and cut him off on the dip, nor is he compelled to locate a number of claims alongside of each other to protect himself. And when he has found something of value he can command a fair price, for his title covers the whole of it.

My argument, then, is briefly summarized as follows:

Exclude extralateral rights from the Federal Mining Law, and change its simple provisions for the initiation and maintenance of titles, and the prospector will disappear.

With his disappearance, discovery (except by accident) will cease. Then, as our known ore bodies become exhausted, production will decline, as it has elsewhere, and the magnificent industry that our free laws have created will slowly but surely dwindle to the status already reached in British Australasia, and to that which is approaching in Canada.

As many of my statements concerning the decadence of prospecting and discovery in various parts of the mining world will, perhaps, be strenuously denied, it will be proper to give here the evidence on which they are based. In the first place, it must be remembered that I speak of the prospector as we know him in America, the real searcher for new outcrops, and not the claim pegger or locator, who dogs his footsteps for speculative purposes only. Nor should the business be confused with that of the alluvial gold hunter, whose activity does not extend beyond discovery of placer deposits that may be worked by himself with no more of an outfit than a pick, shovel and gold pan. Such men were prospectors in the early days, but are so no longer.

Perhaps the best proofs of the decadence of prospecting in British Australasia are the large rewards that have been offered during recent years by the legislatures of all the provinces of these lands for new finds. These may be found detailed in Bulletin 505 of the U. S. Geological Survey, entitled "Mining Laws of Australia and New Zealand." The author, Mr. Arthur C. Veatch, is a great admirer of the mining laws of these colonies. Consequently, evidence drawn from his report as to conditions in that part of the world should be fairly convincing. Without attempting quotations from this bulletin, which would make my paper too lengthy, I will invite those who doubt the statements herein expressed to read those paragraphs at the end of each chapter which detail the prac-

tical working of the law in the state under consideration at the time by the writer. As to the rewards and other inducements, that the several parliaments have authorized, I will say that they include almost everything that could be suggested with any degree of relevance, from cash advances to prospectors up through the building of roads, trails, telephone lines, dams and ditches, the loan of drilling outfits, of crushing batteries, of cyanide plants on wheels, of money to pay for shaft sinking and level driving, and to buy tools and supplies, to rebates on freight charges on first shipments of ore. One of the most fantastic of these "encouragers" is the offer of a bonus of \$50,000 for the establishment of the first new mining town of a population of 500 or over, which, by the way, has not yet been claimed, so far as I can ascertain. Naturally, when affairs get to such a pass in a most desirable industry that inducements of these kinds are considered necessary, one begins to wonder if there is not something wrong with the law under which the business is being conducted, and particularly when the sought-for revival of it does not materialize.

In British Columbia the same stage of decadence is approaching. Here is an extract from a periodical called "The Northwest Mining Truth," whose name alone should be a guaranty of its accuracy. But I have taken the precaution to verify the authenticity of its statements by correspondence direct with the Minister of Mines of that country. The date is some time in the early part of the current year.

"Aiding the Prospector.

"Honorable Lorne A. Campbell, Minister of Mines to British Columbia, is losing no time in efforts to aid the prospectors of the Province, and thus resuscitate some of its *former mining glories*. Briefly the bill gives the prospector the sole right to work any mineral claim that may have reverted to the Crown for non-payment of taxes. Upon payment of a fee of \$25 to the Gold Commissioner of the district, he may secure a lease for one year, the Commissioner having power to renew for a second year upon payment of a similar fee. No prospector may lease more than two claims in one mining district, and his lease, which gives him all the privileges of a free miner under the mineral act, *will not be transferable*. If, after working the claim for a time, the prospector should find pay ore, he may obtain Crown grant upon payment of the taxes due to the Crown before the lease was secured. If he has done

\$200 worth of work a year, he does not have to pay taxes during the period of his lease.

"The measure is designed to remedy conditions which have in large measure *discouraged prospecting*, thus *hindering development* of many promising districts. As matters stand now, the prospector, should he find pay ore, may apply to the Gold Commissioner for right to purchase. The claim is then offered at public auction, and is knocked down to the highest bidder. This method is obviously disadvantageous to the prospector, who *has no asset but knowledge of the ground*, and has led to much injustice in the past."

What a commentary this is on the minister's and editor's knowledge of the habits and needs of the prospector. Whoever found one with \$25 in spare change on his person, to say nothing of \$200; and who knows of one who would waste his time and cash on an already tested and abandoned claim, and on one which, also, he could not sell?

If any more proof is needed of the decay of discovery in Australasia, it is to be found in the steadily decreasing production from all its provinces. Here are the figures, giving a summary of the output of gold, silver, copper, lead, zinc and tin in New South Wales, Victoria, West Australia, South Australia, Queensland, Tasmania, and New Zealand, for the period 1904 to 1914, inclusive:

YEAR.	VALUE.
1904.....	\$ 99,269,529
1905.....	111,328,672
1906.....	114,944,986
1907.....	112,931,668
1908.....	98,333,114
1909.....	94,047,425
1910.....	88,678,029
1911.....	84,535,425
1912.....	87,324,250
1913.....	86,148,001
1914.....	71,321,859

Compare these with our own steady advance in output. Here are the figures for the same period, covering the production of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mex-

ico, Oregon, Utah, Washington and Wyoming, in gold, silver, copper, lead, zinc and mercury:

YEAR.	VALUE.
1904.....	\$233,752,178
1905.....	243,527,922
1906.....	302,851,951
1907.....	283,155,244
1908.....	233,336,894
1909.....	257,579,031
1910.....	259,896,171
1911.....	263,550,225
1912.....	331,972,117
1913.....	316,107,602
1914.....	324,778,704

All of which has been accomplished under the provisions of what one of our most ardent revisionists has characterized as "the most absurd and utterly damnable law which the mind of man has ever conceived."

As to South Africa and Mexico, I can speak from personal experience, having lived and operated in the former for three years, and in the latter for five. I was in Rhodesia from 1902 to 1905, and during that period, though constantly moving around among the mines, never heard of a new discovery except of a deposit of chrome iron, and of tungsten ore. Neither of these was made by prospectors.

As to Latin America, outside of Mexico, my conclusions are based on hearsay, and a published letter from an American engineer by the name of H. R. Hammond, Jr., writing from Chile. His letter is entitled "Remarks on Mining in Chile," and was published in a Denver periodical. Speaking of the generally quiet condition in the mining industry outside of copper, he says:

"The reason for the limited amount of mining of the precious metals is that hardly any prospecting has been done. Most of the mines were either discovered long ago by the Spaniards, or recently stumbled on accidentally."

Again, after referring to the lack of inclination among native capitalists to embark in mining enterprises, and the further fact that most of the foreigners domiciled in the country were English merchants and bankers, whose tendencies were naturally not toward field work, he says:

"If a few old-time American prospectors were to go into the mountains, it would probably mean the discovery of some very

good and rich deposits, for the country is highly mineralized.”

In conclusion, may I be permitted to suggest that before this Congress expresses itself finally on the question of the suggested revision of the Federal Mining Law, it should cause a study to be made not only of the laws of all other important metal producing countries, but of the history of the mining industry in those lands, and the present condition of the same. There can be no more accurate measure of the intrinsic worth of a law than the degree of prosperity attained under it. Let this supreme test be applied by our organization before it lends its powerful influence to either side of this important controversy.

AUTHORITY OF STATES TO TAX MINING PROPERTY ON INDIAN LANDS.

Address Delivered Tuesday, November 14, 1916, at Nineteenth
Annual Convention of American Mining Congress by
Judge J. G. Gamble, of Des Moines, Iowa.

I am to address you concerning "The Authority of the States to Tax Mines on Indian Lands." This subject is at once limited and general. Limited, because such authority is affected by restrictions upon the title to and right of alienation of Indian lands; and general, because all the limitations upon such authority imposed by the Federal and state constitutions or statutes with respect to taxation generally are equally applicable to mining operations on Indian lands.

The particular restrictions upon the title to such lands, as well as the relation of the Government thereto, can be determined only by reference to the several treaties and congressional acts having to do therewith, and I shall not now undertake a technical discussion thereof. But speaking generally, such restrictions arise from the relation and policy of the Government toward the Indians, which is described by the Supreme Court in *United States vs. Rickert*, 188 U. S. 432, as follows:

"These Indians are yet wards of the nation in a condition of pupilage or dependency, and have not been discharged from that condition. They occupy these lands with the consent and authority of the United States; and the holding of them by the United States 'under acts of Congress and agreements with the several tribal organizations' is part of the national policy by which the Indians are to be maintained as well as prepared for assuming the habits of civilized life and ultimately the privilege of citizenship."

In many instances the Federal Government has made provision for the entry of mineral lands in Indian country, or on Indian reservations, under the terms of the Federal mineral land laws. This is true of the Blackfeet and Crow reservations in Montana; the San Carlos and White Mountain Apache reservations in Ari-

zona; the Coville and Spokane reservations in Washington, and in numerous other instances. In such cases there is no difference in the rights and liabilities of the operator or of the authority of the states to tax than where an entry is made upon the open, common and undeveloped lands owned by the general government, frequently referred to as the public domain.

But in other instances the Government has by treaty provision, as well as general law, specified conditions under which mines might be located and operated upon Indian lands. The most notable instance of the exercise of this power by the Government is included in the act of June 23, 1898, commonly known as the Curtis Act, which ratified an agreement between the Choctaw and Chickasaw Indian tribes with the Federal Commission made at Atoka on April 23, 1897. By this act provision was made for the development of coal and asphalt deposits which were reserved from allotment and segregated as common property of the members of the tribes mentioned. This act also provided for the allotment of certain lands, and with subsequent enactments amendatory thereof, together with similar allotment acts relating to the other civilized tribes, imposed restrictions upon the leasing of the allotted lands as to the conditions of operation as well as the period of lease.

Thus, by the provisions of the Curtis Act and other similar enactments, leases of mining rights could only be had in accordance with the terms of the law, or upon conditions prescribed by representatives of the Federal Government, as to rate of royalty, time of payment, extent of development and term of lease. These provisions and restrictions upon the leasing of mineral rights by the Indians to whom the lands had been allotted, or by the representatives of the tribes in the case of the segregated common lands, were enacted in pursuance of the philanthropic policy of the National Government heretofore referred to as preparing the Indians as wards of the nation for assuming the habits of civilized life and privileges of citizenship. In other words, the Government in the discharge of its duty as guardian, undertakes to see that the property of its wards is properly developed, and that the fund derived from the development thereof is devoted to the improvement of their condition rather than to ignorant dissipation, and by contracts of lease constitutes the operators of the property, in a measure, instruments of the Government to attain the ends described. All of the rights to operate mines upon those lands are derived from the terms of the leases entered into upon the conditions imposed by and with the sanction of the Government. Therefore, it follows

that as to the operators engaged in the development of the property bearing such a relation to the Government, there could be no interference on the part of the state in the way of taxation or otherwise, for if this were not true, by taxation or regulation the state might thwart the governmental purposes.

It was settled in the early and celebrated case of *McCullough vs. State of Maryland*, 4 Wheat. 316, that instruments of the general Government are immune from taxation by the authorities of the several states, it being argued therein :

“If the states may tax one instrument, employed by the Government in the execution of its powers, they may tax any and every other instrument. They may tax the mail; they may tax the mint; they may tax patent-rights; they may tax the papers of the custom house; they may tax judicial process; they may tax all the means employed by the Government, to an excess which would defeat all the ends of government. This was not intended by the American people. They did not design to make their Government dependent on the states.”

So that in so far as the right to engage in mining upon Indian lands is concerned, where such right is derived from contracts entered into under conditions prescribed by the general Government, there is no authority on the part of the state to tax the same, first, because the right is not derived from the state, and second, because the power to tax involving the power to destroy, if exercised, might so greatly impair the efficiency of an instrument of the general Government as to prevent the proper performance of its functions. Thus there was involved in the case of *Choctaw, Oklahoma & Gulf R. R. vs. Harrison*, 235 U. S. 292, an attempted levy of a so-called production tax upon all coal produced at the mines of the operator located on Indian lands. The tax was laid upon production, and not upon coal as property, and, therefore, became in reality nothing more than an occupation tax, or excise, upon the right to engage in the business of mining. Since this right was derived from the general Government under the terms of the Curtis Act heretofore mentioned, it was held that the attempted tax, if levied, would constitute a burden upon an instrument of the general Government contrary to the provisions of law referred to heretofore, and the tax was held invalid for this reason.

The Harrison case has been followed with respect to oil properties located upon allotted lands. See *Indian Territory Illuminating Oil Co. vs. State*, 240 U. S. 522.

Again, in *Farmers & Merchants Savings Bank vs. Minnesota*, 232 U. S. 516, there was involved a levy of taxes upon bonds of a municipality located in Indian country. It was claimed that the municipality in the Indian country was an instrument of the general Government, and that its securities issued for governmental purposes should not be subjected to a tax for the same reasons and upon the same considerations mentioned as involved in the *Harrison* case. Thus it was held that an attempt on the part of the State of Minnesota to tax securities owned by its citizens, but issued by a municipality situate in Indian country, which in turn gained its power to issue the securities from the Federal Government, was void.

I do not mean to convey the impression that the property of an operator located on Indian lands is not subject to taxation in the same way as the property of other individuals elsewhere located, for it has long been settled (see *Union Pacific vs. Pennison*, 18 Wall. 5) that the exemption of Federal agents from state taxation is not dependent upon the nature of the agents or upon the mode of their constitution, or upon the fact that they are agents, but upon the effect of the tax, and that a tax upon their property as such does not have the effect necessarily to hinder the efficient exercise of their power as Federal agents. This conclusion is reached upon the theory that a tax upon property is too remote to be said to be a burden seriously impairing the possibility of performance of the Federal duty by the agent.

However, even tax levies upon property of operators on Indian lands are subject to all of the limitations imposed by the constitutions, both Federal and state, as well as local laws, that apply to taxation of property generally. Thus taxes as a general thing are required to be equal and uniform upon all subjects, and in this connection one class of property may not be arbitrarily specified for the purpose of attaching a given charge, while another is subjected to a lesser charge. It is true that in most cases where mining property is involved there is little other property in the immediate vicinity which is subject to taxation. This is because of the natural location of most of the mines. But there is a population about the mines which demands of the local government the installation and maintenance of many governmental facilities, such as police protection, schools, sewerage and paving, and the municipalities are oftentimes hard driven in the provision of sufficient revenue to discharge such demands. Consequently, there has been a rather

decided trend in the enactment of statutes authorizing tax levies toward classification of mining property apart from property generally, and a subjection of such property, when so classified, to a greater rate of levy than is the case of other property. The effect of such a classification is more often felt by reason of a difference in the assessment of the value of property for taxation. Thus when subjects of taxation are classified, one class of property may be assessed nearer its true value than another, and when a subsequent levy is applied to such a valuation there, of course, results an inequality in the burden borne by the owner of the property as a taxpayer. The state and its municipalities are limited in such classification in that it may not be made, unless it is reasonable, that is, unless there are reasons which support the classification for the particular purpose and even if a classification is made, if it is merely arbitrary in its nature, it affords no basis for a differentiation in the rate of taxation, and in this way the power of the state to lay the tax is limited.

Certain exactions are imposed concerning the erection of what are sometimes called public improvements, which exactions are in the nature of special assessments. The theory of these assessments, whether applied to mining property or property generally, is that they are rested upon an increment of benefit to the property assessed in proportion to the cost of the improvement, and where it can be shown that such an increment does not in fact exist, then the authority of the state and its municipalities to lay such a tax is limited. As for instance, in the recent case of *Myles Salt Co. vs. Board of Commissioners*, 239 U. S. 478, 60 L. Ed. 204, an assessment of benefits from the drainage of a marshy area was attempted to be laid against salt deposits located on an island in the area. It was shown that this island could have no benefit from drainage. Indeed, the difficulty of its owners arose from erosion rather than submersion, and it was held in this case, that since there could be, from a physical standpoint, no benefit to the property attempted to be charged, the tax being grounded upon the existence of a benefit, the state was without authority to lay the same.

I cannot within any reasonable limit attempt to detail to you the various limitations upon the authority of the states to impose the various kinds of taxes. These matters are largely referable to the provisions of the particular laws in each state and municipality. I do want, however, to emphasize the thought that in so far as the tax burden is concerned, it matters not how many kinds or

classes of taxes may be authorized by law, or to what extent any particular levy may go, if there exists an opportunity on the part of administrative offices to indulge in extravagant and useless expenditure of funds so raised. In other words, the amount of the burden which is imposed upon the property owners, whether on Indian lands or not, is dependent, first, upon the efficiency and competency of the governmental officials, and second, upon the means provided by law, in which such exactions may be laid.

Very much the larger proportion of governmental revenue is derived from a general property tax, although the trend of recent legislation providing means of raising revenue for public purposes has been for a subdivision and classification of property rights, as to which different rates of assessment and levy are applied. Thus we have today an annual output tax, a gross earnings tax, a net earnings tax, a gross production tax, an income tax, a tax on royalty, a tonnage tax, a license tax or excise both upon the right to be and the right to do, inspection taxes and taxes of classes too innumerable to mention, grounded at least in theory upon an increment of benefit to the property assessed.

A review of the laws enacted by almost any legislative body in recent years will lead to the conclusion that there is really no end in sight of the various kinds of taxes which may be expected to be authorized, so that I take it to be a futile hope, with the varied interests of the various types of government in the several sections of the country at large to expect anything in the way of uniformity in the classes of taxation to which mines and mining property are subject. Rather, it seems to me that relief from undue and unequal taxation, if it is to be approached at all, must come from an effort directed more at governmental needs than at the means with which such needs are to be discharged. It has long been customary in Government finance to subject suggested needs to scrutiny. The budget system, which is but another name for this phase of the subject of taxation, found its origin in England near the middle of the eighteenth century, and in the language of an eminent author, means "a forecast of the Government's next annual income and outlay as well as the legislative authorization of both." Since a budget in its operation is a forecast of the needs for the Government, as well as an authorization for the raising of revenue to meet such needs, it necessarily operates as a limitation upon the exercise of the powers of expenditure of governmental funds by the administrative branch of the Government, and as such gives to the direct

representatives of the people a control over such administrative offices. This system prevails to a greater or less degree in the finance of the general Government, as well as practically all of the states and municipalities; and the thought that I wish to convey to you is more nearly an enlargement of the budget plan than the suggestion of any original theory with respect to the imposition of taxes for governmental purposes.

It must be recognized that in recent years government generally in all of the United States has become more and more paternalistic in its nature, and it is a self-evident proposition that the more paternalistic the nature of the Government, the greater must be the expenditure for governmental purposes, and consequently the administrative officials are more exacting in their demands for revenue, which in the main must be produced by taxation. Again, I think it must be conceded that the more general the Government, the less paternalistic is its nature. Consequently, it is in the smaller political corporations that the greatest demand is made upon administrative officials for the installation of innovations in government, and therefore, in such instances the requirements of the administrative branch of the Government is much greater proportionately, and affords the most fertile field for apparent extravagant expenditure.

The total revenue of the general Government is very great, but since it is contributed by such a vast populace, to the individual it is a minor charge when compared with the fund required to operate the machinery of the municipal corporation in which he lives or in which his property is located. The annual rate of taxation upon property generally for state purposes is much less than the rate of taxation in almost any of the modern municipalities, and this is because the municipal government is much nearer the citizen, and its administrative offices are subjected to what might be termed individual demands of the citizens. Thus we have provision for finer school facilities, sometimes not because they are needed, but because some other municipality located near by has established the same. A coal mine is sometimes subjected to a tax for sprinkling streets because merchants some distance removed want dust allayed to preserve their stocks of valuable merchandise.

Civic centers are quite the order of the day. Public bath-houses have grown into swimming pools, which are merely a place of congregation for those citizens socially inclined. One municipality attempts to outstrip its neighbor in the matter of paving, or of

lighting, or of any one of the thousand so-called public improvements which the fancy of some influential citizen has impressed upon the officeholder, who perhaps is seeking re-election.

As illustrating the extent to which municipal expenditures may go and the consequent unreasonable burden upon the owners of property, it is interesting to note certain statistics concerning governmental costs in the village of Hibbing, Minnesota, for the year 1915. This village had a population of 8,832 people. By levies for municipal purposes, excluding schools, for the year 1915, there was raised \$1,693,889, or \$191.79 per capita. This means that for purely municipal purposes, exclusive of schools, the administrative officials of this village spent more than \$3,000 every day. In doing this there were many innovations installed. For instance, the village had a White Way consisting of 668 metal posts on which were installed 3,136 lights at a cost of \$81,000, and to operate it during one year, it cost the municipality \$19,822. This village had more street lights than the city of Cincinnati, Ohio, with its population of 363,591. In 1913 there were eighty-two cities in the United States having populations ranging from 30,000 to 50,000, and only four of them showed governmental costs, exclusive of school purposes, greater than those of Hibbing. In Hibbing the annual payroll approximated \$500,000. The cost of maintaining and improving village parks was \$55,863. To grave diggers and lawn rakers in the municipal cemetery in one year there was paid \$6,350. A baseball park was built at a public expense of \$10,795. The average cost of garbage collection was \$130 a day. To a public weighmaster there was paid a salary of \$90 a month, while the total receipts from his office for the year was only \$17.20. The city's average pay-roll for the greater part of a year contained 855 men, while the total vote cast in the village in 1914 was 1,318. The police force, consisting of more than thirty salaried men, cost in 1914 \$41,158, but this did not include the policing of the property of the mining companies within the corporate limits of the town, since the operators employed special policemen whom they paid. Quarters for the village firemen were equipped with quarter-sawed oak furniture, handsome rugs, phonographs and pianolas. The public buildings of Hibbing cost \$808,150, while the true value of all the privately owned buildings in the village was \$1,095,852. These striking statistics are to be explained only by the statement that located within the corporate limits of the village were valuable mining properties, which were subjected to taxation for the purpose

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of raising this revenue in large part, with which the administrative officials installed the innovations in government referred to.

It is true that this is an extreme, but not an isolated case. The same conditions, differing only in degree, existed in other towns located on the Iron Range in Minnesota, and I recall another instance of a school district situated in Indian country where the total assessed value of property was \$204,000, of which the property of corporate interests was valued at \$202,000. Upon this value a levy of fifteen mills was laid, producing for school purposes \$3,060 per year. Of this amount the citizens of the district paid only \$30 a year. For the purpose of instructing five or six pupils who lived in the district there were employed two teachers through the school year at a monthly salary of \$90 each.

It is pleasant to know that such instances of apparent extravagance are infrequent, but the occasion for the existence of even infrequent instances should be removed. To that end I desire to submit for your consideration the suggestion that if there was created in each taxing district a board consisting of taxpayers to whom the administrative officials should submit an estimate of their requirements of funds for the ensuing year, together with a financial statement showing among other things the resources of the municipality other than from taxation, and if such board was invested with authority to review such an estimate and reduce the same, but not increase it, as their judgment might dictate, and thereupon was empowered to lay the taxes necessary to meet the estimated requirements as approved by it, it would seem to me that there would be an added assurance to the taxpayer that he would be subjected to no such extravagant expenditure as is possible under the system existing in certain communities now. Again, such a plan would require the sharing of this board of the responsibility of expenditures by the administrative officials and would afford a complete answer to demands which might be made upon them by individual citizens, which would necessitate the expenditure of public funds.

I can only suggest for your consideration the salutary effect of the inauguration of such a system.

CO-OPERATION, CONSERVATION AND COMPETITION IN COAL.

Address Delivered by E. W. Parker, Director, Anthracite
Bureau of Information, at Nineteenth Annual Convention
of American Mining Congress, Wednesday,
November 15, 1916.

The first letter I received from our highly efficient and versatile Secretary, asking me to prepare a paper to be presented before this session of the American Mining Congress, suggested that the subject of "Conservation" had not been entirely worn to shreds and that it might be considered from three different standpoints, namely, conservation of life, conservation of resources, and conservation of investments. In the next letter he mentioned "Co-operation" as a suitable topic for discussion, and in one of them he also suggested that "Competition" was a factor not without interest to those engaged in the mining and merchandising of coal. So I have selected for the title of this address "Co-operation, Conservation and Competition (the three C's) in Coal." It is alliterative, at least, whatever criticism may be made of the text which follows it.

Co-operation.

In the process of transferring coal from the depths of the earth to the consumer there are four opportunities for the development of a higher order of co-operation than we have yet attained, and which when effectively put into practice will go a long way toward securing the elimination of unnecessary waste, the highest degree of efficiency in the mining, preparation and utilization of the product, and the end which must be attained in any successful business, the delivery to the consumer of the volume and the quality of coal that he desires at a steady and uniform price and at the lowest possible price that will return a reasonable profit on the investment and insure stability to the industry.

The opportunities for co-operation are (1) among producers, (2) between producers and distributors, (3) among distributors, and (4) between employers and employes. It is not my purpose

to attempt to work out the details of these nor of the subheads of the second division of my caption—Conservation—but to state them briefly in the hope that subsequent discussion may eventually lead to tangible results.

In any discussion of the coal industry one must, as I do, approach the subject of co-operation among producers hesitatingly. This is particularly true in regard to the anthracite branch of the industry, for heretofore to suggest that any two or three of those who operate a coal mine should "assemble and meet together" for the discussion of any plan of co-operation has been to start anew the claims of the yellow press that the operators were planning some coup for mulcting the public. Nor have the attacks upon the anthracite industry been confined to certain types of journalists. There are government officials, both legislative and executive, state and federal, who for reasons best known to themselves, try to persuade themselves that their duty to the public and their oath of office requires action of some kind against the anthracite operators.

It is encouraging to note that there is at last established under the Federal Government at Washington a tribunal whose words and deeds so far have shown that it realizes not only the desirability but the necessity for a higher degree of co-operation among the producers of coal, to the end that some stability may be given to the industry and we may hope before long to see coal mining given as fair a chance to exist under the Federal Trade Commission as railroading is under the Interstate Commerce Commission.

Aside from the effects produced by the European war, the beneficent influences of the new order of things is already apparent in the bituminous regions, and the operators of the Pittsburgh vein and the Hocking districts in Ohio, the operators in this State of Illinois, in West Virginia and elsewhere, are co-operating with the sanction of the Federal Trade Commission in the exchange of information through their association with benefit to the trade and without injury to the public. There is even in the anthracite region of Pennsylvania an Anthracite Coal Operators' Association, composed of the individual operators who make weekly reports to their secretary as to conditions of trade, labor and car supply, etc., and receive a weekly bulletin giving a resume of these statements.

It is reasonable to believe the time is not far distant when coal operators may and will co-operate in an exchange of information relating to trade conditions, car and labor supply, etc., so that pro-

duction may be regulated somewhat in accordance with demand, even as now the California fruit growers regulate their shipments with entire satisfaction to the consumers, and with a stabilizing of the industry from the growers' standpoint which was not dreamed of twenty years ago.

But if there is need for co-operation among producers there is even greater need for it between the producers on one hand and the retailers or distributors on the other. As I stated in an address before the New York Coal Merchants' Association a few weeks ago, the producing end of the coal business is its foundation and the retailing end is the superstructure. It is necessary that one should square with the other if the house is to stand. Mine operators are not as familiar as they should be with the problems that face and harass the retailer, and the retailer cannot know or begin to appreciate the larger problems that confront the operator. All of you have probably heard retail dealers express the opinion that coal operators generally, and particularly the anthracite operators, are animated only by self-interest; that they control the supply of a commodity the public must have, and as the retailer had to take the complaints of the public, they, the operators, were entirely indifferent as to the quality of the product they turned out, or as to how and when the public got it. But in this regard, too, there appears to be a tendency in the right direction. Permit me to recall that last spring just prior to the conference on the wage agreement, the anthracite operators took the public into their confidence through some large advertising displays in the columns of the daily press, and in one of these it gave some figures showing what items entered into the price of the ton of coal for which the consumer paid. It was an illuminating statement and one of the things it did was to bring out some indignant protests from retailers, especially in Philadelphia. The result was, however, that there were several conferences held between some of the representative dealers and some of the officers of the operating companies, from which it developed that many of the dealers actually did not know what the first cost of the coal was to them, what it cost them to handle and deliver it, and how much, if any, profit they were making. The conferences gave them something to think about and indicate that more of the same thing would be rather advantageous than other wise to both sides. The operators realize this and as a step in that direction have requested the Bureau of Information to keep in touch with the retailers as much as possible

by having its director attend the meetings of their associations and take part in their discussions. The desire of the operators has been and is for a closer co-operation and better understanding between the producers and the retailers. " 'Tis a consummation devoutly to be wished," if a higher degree of efficiency and economy in the distribution of coal to the consumers is to be accomplished.

There is no branch of industry in which there is greater need of co-operation than among the retailers in any specialty—coal among the rest.

It has been said that it costs more to deliver a quart of milk in the city of New York than it does to get it from the cow to the city. What can be more illustrative of useless expense than half a dozen or a dozen milk wagons from as many different establishments delivering milk in one city block? Delivery of coal is not exactly akin to delivery of milk, for one coal cart cannot deliver 50 or 100 tons of coal as a milk wagon delivers that many quarts of milk, but there is just the same more waste energy in the retailing of coal than in its mining, preparation, or transportation, or possibly all of them put together.

Why should a coal dealer whose yard is in one part of a city deliver coal to a consumer two or three miles distant when another dealer could reach the same consumer by a haul of as many blocks? The coal merchants themselves are beginning to realize this, as is evinced by the discussions which constitute the larger part of the proceedings in their conventions. There is a disposition to get together and talk over matters affecting the economies of their business, to discuss candidly the problems that confront them, and to try by co-operative methods to improve their service to their patrons and incidentally to attempt to achieve a better return on their investment of capital, labor and brain.

The securing of a higher degree of co-operation between employer and employes, or between capital and labor, is perhaps a matter more difficult of accomplishment, but we can afford to be optimistic.

At the present time the periods between the wage agreements smack somewhat of armed truces, with the terms of the truce not always strictly adhered to, and with apprehension of open conflict at the termination of the agreement. But, unsatisfactory as conditions may be as we have them now, I believe they are better than they were fifteen or twenty or twenty-five years ago, and that they are going to improve still further. And one of the best methods of

securing this species of co-operation is to compel the honest fulfilment of an agreement once it is signed and not to permit an evasion on the part of either side because of a temporary situation that makes the evasion easier or more profitable than its enforcement. The heads of labor organizations today are more than vituperative over the Danbury hatters' case, but because of that case they are, no matter what they say, more respectful of the law and of the men who compelled its observance. "Safety First" in keeping the mines in operation, when it is a matter of principle or the fulfilment of an agreement for which we should contend, will not compel respect by the other side. But if both sides contend honestly and strenuously for the strict observance of their agreements, each will have a higher respect for the other and be more willing to work in co-operation rather than in antagonism.

Conservation.

As stated in the beginning, Mr. Callbreath suggested that the "Conservation" part of this paper might be divided, like Gaul, into three parts—conservation of life, conservation of resources, and conservation of capital. Of these, of course, the first is by far the most important. We all know that coal mining is one of the most hazardous of occupations in which men engage, the Gloucester fisheries, railroad train service, and the steel mills being the only industries in which the loss of life bears a higher percentage to number employed than does coal mining. But in these four it is to the one with the lowest percentage that credit must be extended for doing most to promote the welfare of the employes and to reduce the hazard of their employment. The birth of first aid to the injured was in the anthracite region of Pennsylvania and came about through the observance by the present president of the Philadelphia & Reading Coal & Iron Company, Mr. W. J. Richards, of an accident in which the injured man lost his life because there was no help at hand to stop the flow of blood. That was some fifteen years ago. Last September the twelfth annual field day and first aid contests of the Philadelphia & Reading Coal & Iron Company, at which seventy-odd teams entered the competition, was held. It was not long before other companies began to follow the example of the Reading, and now most of the companies have their trained crews to render first aid, and their annual contests are a feature in the late summer and early fall months in the anthracite region. Nor is this matter of saving life and relieving suffering now a monopoly of the anthracite region. It has spread all over the bituminous coal

mining districts, and even the railroads and the steel mills have been organizing and training first aid corps. So efficient have these men become in the application of first aid that the chief surgeon of one of the hospitals in the anthracite region has stated that many of the cases brought to them, and which had received first aid treatment, required no further attention until it was necessary to remove the bandages to dress the wounds.

Conservation of life in the anthracite region is not confined to taking care of the injured and to the installation of "Safety First" signs and accident-preventing devices and rules. It is also applied to looking after the health and well-being of the employes generally. It would interest anyone to take a trip through the region and observe the changes that have taken place in the living and sanitary conditions of the anthracite mine workers. Villages that are not only model in name, but in fact, have sprung up in the last few years and there seems to have developed a sort of competition among the companies as to which can show the best results in the matter of housing its employes. One of the latest projects of this kind is the building of some 300 houses by one company (150 blocks of two houses each) which are not only attractive in design but are equipped with hot-air furnaces, heating every room in the house, electric lights, shower bath and toilet floored with concrete, laundry, hot and cold water—in fact, all modern conveniences and as sanitary as human ingenuity can provide. All of these improvements are not made as an investment in real estate, but as an investment in men, for the companies judge, and wisely, that through these they will secure a better type of workman and that it will lead eventually to that much-desired end—a spirit of co-operation among their employes.

In a paper presented some years ago before the American Institute of Mining Engineers, I hazarded the suggestion that the highest degree of conservation yet attained in the conservation of our national resources was typified in the anthracite region, and that opinion still holds. Less than a quarter of a century ago it was estimated that the average recovery of anthracite was only 40 per cent, that for every ton of coal marketed a ton and a half was lost. Competition was certainly not the life of trade—it was rapidly exhausting an invaluable resource and ruining the companies engaged in the business. Heroic methods were necessary and they were applied. The business was got under control, improved methods of mining and of preparation were introduced, and devices for

utilizing the small sizes of coal and of recovering them from the culm banks were invented, so that at the present time instead of 40 per cent of the coal being sent to market the recovery is nearer 70 per cent, and I cleave strongly to the opinion that these improvements upon the earlier conditions will extend the life of the anthracite field 100 per cent. To return to the conditions of cut-throat competition as it existed in the latter part of the nineteenth century would be little short of criminal, our friends in the Department of Justice to the contrary notwithstanding. Many of the bituminous fields have been until quite recently in much the same condition as formerly obtained in the anthracite region, and when such conditions exist it is not much use to preach conservation. Most of the bituminous operators are making money just now, it is true, but the situation is abnormal, due to the European war, and there are many lean years to be made up. With the end of the war we may look for even worse conditions than those that preceded the present prosperity.

Much of our very best bituminous and semi-bituminous coals, as well as anthracite, have been lost through methods that must be deemed wasteful in the light of present knowledge, but which under the circumstances could not be avoided. It is not through reckless competition, but through properly regulated co-operation that the highest possible recovery may be obtained, waste in mining, preparation, distribution, and utilization, reduced to a minimum, the public adequately served and protected, labor receive its just reward and capital a fair return.

Capital, by the way, is generally considered as being able to take care of itself and that no particular provision is necessary to conserve its interests. But capital is timid—nothing more so—and must be assured of a reasonable degree of safety before it ventures into large undertakings. Modern business, in order to secure the maximum efficiency and minimum waste, requires operations in large units, and large units require large investments. Conservation in mining coal or any other mineral resource cannot be successfully accomplished unless due consideration is given to the conservation of the capital invested. In a previous paper presented before this Congress,¹ I called attention to the meager returns on the capital invested in coal mining as shown by the report of the United States census. This report showed that in six states the expense

¹ Philadelphia meeting, October, 1913.

involved in the production of bituminous coal exceeded the revenue derived from it, and that the average return for the entire country on the capital invested in bituminous coal mines was only 2.5 per cent. Such an exhibit is not encouraging to the investment of further capital, nor is it helpful to the cause of conservation of life and resources.

The present railroad situation is illuminating. With the banking institutions overflowing, railroad building is at a lower ebb than at any time since the Civil War and fewer orders for cars have been placed this year than for a long time. Part of this may be due, of course, to the high prices of all steel products now obtaining, but it is also true that capital is not encouraged to invest in an industry that is the constant subject of antagonistic legislation and of governmental attack through the courts. No objection can be raised to a reasonable amount of governmental supervision and regulation, in order that abuses may not arise, but if the other desirable forms of conservation are to be effected, capital must be given fair consideration.

Fortunately, a new standard of business ethics is now in force. It is a standard that denies to larger enterprises any right to advance prices merely because of a temporary demand over the available supply, and condemns an exaction of profits not commensurate with the capital invested, but it recognizes the right to a fair profit at all times, and the right of capital to demand it.

Competition.

Competition, if it is to be the life of trade, must be competition that constructs and not that which destroys. Price cutting to secure an order and thus to injure the business of a competitor is not according to a high standard of business ethics. It is injurious to the trade as a whole.

Other kinds of competition, such as the unfair condemnation of a rival's goods, or of his manner of doing business are just as reprehensible, but competition of service works for the good of all concerned. Competition of service consists in maintaining the standard of your product, in seeing that your customers are supplied with your goods when and how they want them—not when and how you want to deliver them—in the pleasing personality of your salesmen (for a salesman is frequently the cause of making or breaking with a customer), in fact, in keeping your customers satisfied. The average buyer would rather do business with a

concern from which he gets satisfactory treatment than to save a few pennies or even dollars at the expense of his temper. The rivalry among anthracite operators (for it is a rivalry) in the securing of better living conditions for their employes, to which I have already referred, is a competition of service. Its object, as I have stated, is through the improved living conditions to develop a better grade of workmen, who by rendering better service to their employers, will enable the latter to render better service to the public.

COAL FREIGHT RATES—RELATIVITY AND UNIFORMITY.

Address Delivered by R. W. Ropiquet, of East St. Louis, Ill., at
Nineteenth Annual Convention of American Mining
Engineers, Tuesday, November 14.

The same reasons that call for uniformity in mining legislation, with greater force cry for an equality in the relationship of the coal freight rate adjustments between the various competing fields.

Into the web and woof of its competitive industrial garment three basic strands are interwoven; omit or weaken either of these and the garment is "shoddyized." These three are wage-scale, legislative regulations and freight rate adjustments, and the latter is not the least of these.

The necessity for the adjustment of each and all of these upon bases of uniformity and relativity is too obvious to require argument. The competitive inter-relationship of the coal fields is such that the weakening of any of these elements in any field may completely destroy the potential competitive ability of that field.

"An unjust balance is an abomination unto the Lord"; and likewise unto men. The iniquity thereof evoked the legislative enactment of the late Federal Trades Commission, as it did that of the earlier Interstate Commerce Act.

Wage Scale Adjustment.

In the adjustments of the wage scale, the coal industry has recognized the principles of relativity as witnessed by the interstate conferences and the wage scales resulting directly and indirectly therefrom.

The results, though not commensurate with what might properly be expected therefrom, still evidence the desirability of the principles involved. The extension of their application so as to include all the inter-related fields, with consequent arbitration of matters upon which no agreement can be reached, would largely overcome the failure of results properly anticipated and now pre-

vented by the selfishness inherent in human nature, the basis of self-preservation, magnified in the coal industry, because of the continuous "struggle for existence" to which this is peculiarly subjected; and the results would more nearly approximate the ideal.

Legislative Regulation.

The propriety of legislative regulation tending toward the conservation of life and of the natural resources that form the basis of the coal industry is admitted by all; even though it is evident that legislation is not the panacea for all of the ills that infest the industrial life.

A straightjacket, proper and necessary for the mentally deficient and insane, can scarcely be commended as a vesture for the normally-minded.

The pendulum now swinging toward complete governmental "commissionization" and supervision must not be permitted to continue its swing until the initiative, individuality and personality that forms the vital force of our business life be submerged and destroyed.

The cry, "Old things have passed away, behold all things have become new," is not modern. The peculiar psychology that sees in "newness" the supremacy of wisdom often, however, presents as "newness" theories, the fallacies of which have long been exploded, as witnessed by the attempt to enshrine in our national laws the principles of fixing wages by legislation, simply a recrudescence of long-discarded economic principles rife in the England of the Middle Ages.

Essential as is this mining legislative regulation, it is oftentimes retarded and defeated because of the lack of uniformity thereof; for where enacted under present conditions, it is apt to, and does, bear unduly upon one field competitive with other fields.

The industry is national in its competitive scope; the regulative legislation, local or by states, and the result necessarily following, relative unfairness which does much to hamper the effective working of relative wage-scale adjustments.

The dual nature of our Government, apparently, prevents or hinders the proper and effectual remedying of the situation, unless perchance the principles applied by the courts to the "Federal Employes' Liability Act" in connection with those upon which the late national "Child's Employment Act" was based, be extended to the coal industry; as they both might well be, because of the interstate character of the coal traffic.

But irrespective of this, under the present conditions, uniformity and relative fairness of this legislation must be procured if the industry is to be fairly competitive.

The necessity for this has already been fully emphasized at the conference and the consideration is perhaps not properly within the scope of our presentation. This legislative situation is, however, so closely akin to that in reference to the freight rate adjustment, that for comparative purposes at least it may not be amiss for us to dwell upon this phase a little.

It would seem to the speaker that the adoption by all of the coal-producing states of the principles underlying, for example, the Mining Investigation Commission Act of the State of Illinois, with its representation of operators, miners and the public, followed by a Joint Legislative Investigation Commission composed of members or representatives of these State commissions, the latter commission to consider and formulate uniform, remedial and regulatory mining legislation for recommendation to the various State legislatures, might, perhaps, meet the exigencies of the situation.

There would thus be presented the opportunity for the winnowing of the wheat from the chaff, and the adoption of real regulative legislation upon advanced lines without passion or undue political pressure, and upon the basis of true relative uniformity; which latter cannot be secured under the present *modus operandi*.

The Freight Rate Situation.

The principles thus suggested for application to the legislative situations will also apply very largely to the freight rate situation. The adjustment of the coal rates upon basic principles of uniformity and relativity can only be secured by the co-operation of the inter-related coal fields and the operators therein.

Legally, it is not the function of commissions to equalize commercial or economic conditions; although in the presentation of the various complaints relative to the adjustment of the coal freight rates, the questions of wage scale and other relative conditions are oftentimes injected and may have some weight in the final decision.

The importance of these freight rate adjustments upon the industry, actually and relatively, seems not to be realized by the same, if we may judge from the attention, or lack thereof, paid to the same; and this notwithstanding that of the average delivered cost of the products of the industry the freight rates will likely exceed the cost resulting from wage scales and legislative regulations.

This statement is made by us with full recognition of the fact that innumerable complaints involving the relative freight rates between the different coal fields have been presented to the various commissions.

But an examination of these will reveal that they were but fragmentic, without regard to the larger conditions that confront the industry as a whole, and chiefly evoked by the attempt of one set of operators to secure a competitive advantage or to prevent others from securing such an advantage.

Apparently, the only result of most of these internecine conflicts, while actually changing the relative situation but little, due largely to the resultant divisions among operators, has been to furnish the carriers the opportunity of unduly increasing the coal freight rates, especially relative to rates on other traffic.

But little special attention has been devoted by the industry to the study and application of foundation principles that must underlie the permanent and successful relative adjustment of these coal rates, so as to permit and encourage the fair and relative growth and development of the industry as a whole, upon foundations of stability and permanency, and of real business principles.

The difficulties confronting such an adjustment but emphasized the need of a more careful systematic and unpartisan study thereof. The present coal rates are largely a legacy of a barbaric age of rail-roading, based upon unbridled and unprincipled competition between carriers, under a distorted idea, and application of "what the traffic will bear."

Considered from an economic standpoint, the adjustments resulting therefrom have proven a distinctive crime against the industry as a whole, to which much of the depressed condition of the same can be traced.

Thus the opening and development under the fostering influence of carriers through favored or special freight rates regardless of the actual or relative cost of transportation, of new coal fields long before the condition of other existing coal fields already fully developed rendered the opening of these new fields advisable is the one outstanding economic crime against the industry.

There followed not only the application of wrong principles to these adjustments, which have since proven obstacles to the proper adjustments of the relative situations, but the potential over-productive capacity of the coal industry and of carrier competition, from which, for the industry, there "sprang death into this world and all its woe."

Incidental to this, and with an important bearing upon this situation, is the over-development, again by preferential rates, of the large civic and industrial centers, maelstroms of civic, economic and political degeneration, these at great distances from the coal fields; with the consequent destruction of the home markets and the resultant economic waste of transportation and the increased cost thereof, due thereto. This has served materially to muddy the waters and to render more difficult the proper solution of the situation.

Relatively unjust freight rate adjustments necessarily followed, the sole basis of the rates being, apparently, the attraction, relatively, of the different fields for the various carriers, who, to secure longer hauls, made comparatively much lower rates therefor, disregarding the basic principles of transportation.

Such adjustments magnified by the imagination of competing operators produced a condition of irritability and of pugnacity between the different fields, resulting in each attempting to secure through freight rate adjustments competitive advantages over the other.

As a result, the energies and intelligence of the industry, instead of being devoted to securing a solution that would produce proper competitive equalization of freight rates between these competitively inter-related fields, was dissipated because concentrated on the lesser litigation resulting.

The effect is much akin to that referred to in reference to the legislative regulation situation; uniformity based upon true relativity is as necessary in one field of endeavor as it is in the other. In freight rates it does not now exist; neither can it be secured by the immediate application of real principles of transportation to the present situation. For in this we are today, in the words of Grover Cleveland, "confronted by a condition and not a theory."

Under long existing relative rate adjustments, investments have been made and the business has been so established that the immediate application of true principles of transportation thereto, and the readjustment of coal rates in conformity therewith, would simply result in "confusion worse confounded," and produce conditions so chaotic as to practically be destructive of the industry in many cases.

But this should not prevent, but really makes the more necessary, the intensive investigation and consideration of the problems involved, for a final adjustment upon basis of uniformity and rela-

tivity more nearly in accord with the proper legal principles than that which now exists.

Such an adjustment is nearer than is generally supposed, as is evidenced by the trend of the later decisions of the Interstate Commerce Commission.

The remedy to be applied must be upon the basis of evolution and not revolution. The Interstate Commerce Commission has said that "the future may compel greater recognition of distance in the making of many rates, but the present business structure was not developed on that principle, and if a change is to be made, it must be a gradual one."

In some of the recent coal cases, for example, that involving rates in the southern Mississippi valley, the principle of distance was emphasized and applied by the commission to quite an extent, notwithstanding the resultant disturbance and disruption of long existing rate adjustments followed necessarily by the greatly restricted competitive ability of some of the fields involved.

It therefore behooves the operators themselves to carefully consider the situation with the end in view of protecting the industry as much as possible from the chaotic conditions that will follow the application of more strictly rate adjustment principles to the coal rate adjustments.

For the removal of the existing evils, and the relative readjustment of the whole coal rate situation upon basis of fairness and equality, which, while guided by the legal principles applicable to transportation, will not overlook the necessarily competitive relativity of the coal fields—depends not altogether, and perhaps not so much upon the action of rate regulating bodies as it does upon the joint and non-partisan, or inter-partisan, if you will, investigation and action of the members of the industry themselves.

For while the theory of equalizing advantages by means of freight rate adjustments has appealed to economists who have studied the situation from the view point of the interests of society, the limitation placed thereupon by the law really prevents the application of this theory to the making of rates.

The Interstate Commerce Commission has frequently held that it is not within its function to equalize competitive conditions from commercial standpoints; that carriers are under no duty to equalize such rates, and shippers have no right to demand the same; that no order can be issued to overcome advantages by making differential rates to equalize advantages or disadvantages of location, cost of production and the many other incidents that enter into economic

and commercial conditions, as distinguished from those of transportation, and seriously affect shippers competitively.

While carriers cannot be compelled to thus equalize rates, they may voluntarily do things which they may not lawfully be compelled to do, and may make rates to move the traffic so that they may participate in the business. But as stated by the Commission, this is a different matter from compelling them to adjust their rates, to equalize competition between shippers of different fields of supply, and by different and unrelated routes.

Provided carriers are not guilty of undue and unjust discrimination, they have a wide latitude of discretion in the adjustment of the rates; and this adjustment between inter-related fields based upon real competitive situations and conditions can therefore never be secured by the sporadic attempts of various sections to force carriers to meet them by rate adjustments. The real remedy lies in the hands of the operators themselves: United and harmonious co-operation with carriers acting under their "permissive powers."

The operators have awakened to the realization of the fact that unbridled competition in the disposition of their product spells bankruptcy to the industry; and this applies as truly to freight rates and their adjustments.

Keeping in view the fact that readjustments upon principles more nearly in line with legal principles applicable to transportation is rapidly approaching; that there is a large limit of action which the carriers may voluntarily but cannot be compelled to take; that adjustments by the carriers upon economic rather than transportation conditions may be upheld by commissions, but that such voluntary adjustments are subject to disturbances under complaints of discrimination.

And keeping further in mind that the coal industry itself has been built up and to some extent, at least, must be maintained by rate adjustments predicated upon competitive economic and commercial conditions, as well as upon transportation principles, it is evident that the time is ripe for and that the occasion demands an united, intelligent effort on the part of coal operators as a whole to secure an adjustment of the whole inter-related situation upon basis of agreements and not of strife.

Some Suggestions.

For this reason we would suggest an organization somewhat similar to that suggested for the adjustment of the mining legislation questions:

Let each of the competing fields, considered from the standpoint of larger units, form its own organization which shall adjust upon a fair and equitable basis, so far as possible, the smaller minor local differences, and represent this field in all traffic matters and in the larger joint body.

Let these representatives of the smaller organizations form such a joint body representing the whole competitive industry, which latter shall consider the rate adjustments as between the larger units, and represent the industry in traffic matters affecting the coal interests generally.

Both of these bodies might gradually secure from the carriers under the permissive power of the latter adjustments between the competitive fields which, while more nearly approximating true principles of transportation, do not ignore the competitive relativity of the inter-related fields; this latter to be considered not so much from the viewpoint of the naturally selfish desires of the individual field, but rather with a wider vision and consideration of the interests of the industries in the inter-related fields as a whole.

Only when no adjustments could be secured through either of these bodies, and in case of the smaller body, until the matter has been passed upon by the larger body should recourse be had to the regulating commissions. This latter would be rather in the nature of an arbitration; for the facts upon which the adjustment was desired could readily be agreed upon, or would be within the knowledge of all of the parties concerned and be, therefore, readily accessible to all.

In connection with these bodies and their activities there would naturally follow the gathering and compilation of statistics having bearing upon the transportation problems involved; and thus there would be supplied the opportunity of readily securing the evidentiary material necessary for the proper presentation of the cause of the coal operators in conflicts that might arise with the carriers in reference to rates.

The weakness, under present conditions, in this respect has been apparent in most of the rate cases, wherein the solid massed front of the carriers was met by a divided and but partially equipped band of operators dependent, to a large extent, upon statistics compiled by the carriers for their own use.

The natural result would be to unify the industry as against the unified carriers, the necessity for which is certainly obvious. For in this matter of freight rate adjustment, as oftentimes in that

in reference to the wage scale, the coal operators have sadly learned the truth of the saying "divided we fall." It is time they realized the truth of "united we stand."

Underlying Principles.

As some of the principles or theories to be applied to these adjustments, permit us to suggest the following:

First: The readjustment, gradually, of these coal rates as between the home markets, or those nearest the coal fields, and the more distant markets, so as to give these home markets the benefit of their location, and to overcome the discrimination that now relatively exists against them; and to foster and develop the home-consumptive territory instead of the more distant exaggerated and civilly dangerous industrial communities, lessening the economic waste attendant upon the longer transportation under existing conditions, and increasing the use of equipment.

Second: The application of rates so as to *primarily* reserve for each field its natural and tributary markets, so as to avoid as far as possible the undue competition existing therein, resulting from the present rate adjustments, and which has heretofore served chiefly as a producer of losses to all of the operators engaged therein and a profit to none.

Third: The adjustment of the freight rates so that the surplus coal of all of these various fields, by which we mean that which is over and above that consumed in the naturally immediate markets, might compete upon some basis of relative fairness, both from transportation and economic standpoints, in the larger consuming markets more distant from the coal fields, and common to them all; remembering that a large proportion of the expense of a railway is independent of the amount of the traffic and quite a percentage of the cost of transportation is irrespective of distance; and also keeping in mind the fact that the economic inequalities and disadvantages, relatively, must in the end be met by the operators by adjustments other than those of freight rates.

In addition to this, we would suggest the nationalization of the coal equipment, with a supply to reasonably meet the demands of all of the consuming markets as a whole; this equipment to be distributed amongst the various inter-related fields and the operators thereof, under some principle of distribution similar to that applied on individual lines in case of car shortage; so as to give to each of the fields and these operators a relatively fair proportion of the equipment, when and as the needs arose, and to prevent the

economic waste resulting from the present system, which in ordinary times requires an equipment larger than the demands would be if it were properly distributed in accordance with business needs, with a surplus of idle cars in one field and a shortage in the other; there lacking what is termed in financial circles "fluidity."

In other words, we would suggest, if you will permit the illustration, the application to the subject matter of coal equipment and its distribution of principles somewhat similar to those applied under the National Reserve Banking Act to the financial situation.

With an equipment thus commensurate with the real market demands, and no greater, fairly and equitably distributed amongst the various fields and the shippers therein, in accordance with their productive capacity, the level of the production would be so maintained that there would be no temptation on the part of the operator who had the advantage of location and consequent freight rates to dissipate this advantage in an attempt to meet or destroy the competition of the other fellow.

This benefit of location and rate advantage would simply prove a source of profit to the operator, and there would be no incentive on his part to sell his coal at prices less than those needed by his competitor, since under the car distribution thus limited his ability to supply the market with coal would also be limited.

The unbusinesslike and unmoral sale of coal below the cost of production, or without a profit in such cases, could only be attributable to the lack of mental balance or innate depravity of the offender, the remedy for which, while obvious, cannot be suggested here.

The present situation, exaggerated though it may be because of present conditions, is illustrative of a fair return to the coal industry for its products based largely upon the knowledge of an equipment not greater than that which will meet the demands of the consumers as a whole.

We have thus briefly sketched some of the ideas that have forced themselves upon us as we have studied this situation from the view point of an operator and in connection with litigation.

We offer them, not as a panacea, but rather with a hope of stirring up the industry to the possibility of securing a greater degree of uniformity and relativity in the rate situation, and the removal of the present "irritability," with the consequent unification of the industry and the destruction of the competitive pettiness that does so much to destroy the efficiency thereof.

For whether these suggestions in themselves have any merit or not, and irrespective of their feasibility, we are firmly convinced that should the coal operators apply the same energy to the consideration of this rate situation which they do to the wage scale adjustment, and will organize for the purpose of securing a more relatively fair rate adjustment, a solution will be reached.

The stability of the coal industry will thereby be enhanced. The economic waste, both in the industry and the transportation as it now exists, will be lessened; senseless competition minimized, and the energies and ability so oftentimes wasted in the internecine struggles can be centralized and focalized against the conditions and forces that oppose the welfare of the industry. Instead of division in the face of the enemy, there would be unity; and trite though the saying may be "in unity there is strength."

For if the coal industry is ever to have a freight rate adjustment based upon any fair and reasonable degree of uniformity and relativity, it must in this respect, as in others, have a broader vision, less of petty division, and more co-ordination and union of efforts, less of passion, and more of reason, less dependence upon fortuitous chance and more upon the principles of true business.

Then in the words of one of old, slightly adapted, "forgetting the things which are behind and reaching forth unto the things which are before," the coal industry may unitedly "press forward toward the mark of the prize of its high calling:"

THE GREATEST INDUSTRY IN THE LAND.

REPORT OF FORESTRY RELATIONS COMMITTEE.

Presented to American Mining Congress, Thursday,
November 16, 1916.

Mr. Carl Scholz, President,
American Mining Congress,
Washington, D. C.

Your Committee on Forestry Relations begs to submit the following report of its activities to October 1, 1916.

Owing to the inability of Judge E. A. Colburn, of Denver, to serve on this Committee, the membership was too widely distributed to make a meeting practicable. It is a pleasure to say, however, that this did not lessen in any degree the work or activity of the members and it is felt that considerable work of a worth-while character was accomplished, and it is expected that a better and more satisfactory relation has been established between the prospector and the Forestry Service.

Your Committee wishes also to express its appreciation of the courtesy and sincere efforts of the Forestry Service officials, particularly of the Pike National Forest officers in Denver. Their kindness in officially approving the matter sent to the prospectors no doubt went a long way toward accomplishing the end intended.

The preliminary work of the Committee was covered by the sending out of the following matter to several of the leading mining journals, all of whom very kindly published it:

"With a very optimistic feeling in the mining industry, with the price of all the metals at a high stage and a better appreciation of the industry by the investing public, it is reasonable to expect that during the coming season there will be a marked revival in prospecting. In some quarters at least there is a misapprehension of the rules regarding prospecting on Forest Reserves and it may be stated almost as a general situation that the attitude of the Forest Service is not well understood by the majority of people who are interested.

"Broadly speaking, the same condition holds for prospecting on the forest reserves as on any public land, but rules are laid down by the Forest Service for the preservation of timber and as regards fires and such like and these must be observed as well by the prospector as by any casual visitor.

"This is the only limitation which is imposed and the Committee on Forestry Relations of the American Mining Congress is endeavoring to render a service in making the situation plain to the prospector and in case of any difficulty with the local forest officials to do everything it can in adjusting them.

"The prime object of this work is, of course, to foster the mining industry by furnishing to prospectors information regarding the rules of the Forest Service and to make this as definite and conclusive as possible; to try and adjust differences which have already arisen by taking up the case with the headquarters in Denver and if necessary with the Chief Forester in Washington.

"This Committee will not do any legal work but will use every consistent endeavor to carry out the work outlined upon receipt of a statement of the facts of the case which, it should always be remembered, will have to meet a similar statement made by the local forest official.

"It would appear to the Committee that its best results can be reached by furnishing information in advance of any work, so that the parties going on a reserve may be fully informed of what they may or may not do. It would, therefore, urge intending prospectors to take up the question at as early a date as possible and inform themselves fully so that there may be no difficulties or misunderstandings regarding their rights.

"Please bear in mind that the Forest Service has headquarters in Denver, making it very convenient to get definite and conclusive information as the Committee headquarters is likewise there.

"It is hoped that this information will be generally passed along as it is obviously impossible to reach the individual.

"FORESTRY RELATIONS COMMITTEE,
"THE AMERICAN MINING CONGRESS.

"Carney Hartley, Chairman.

"316 Colorado Building, Denver, Colorado."

The idea of sending this matter to mining magazines was to bring it to the attention of operators and local publications, with the hope that in this way it would get generally distributed in the mining district. The chairman received twenty-five inquiries for the information mentioned, twenty of which resulted directly from

this publication. This, however, was a small percentage of the total inquirers, as will be stated later.

At the same time a letter was sent to every member of the Committee asking co-operation and outlining a plan for reaching the man most deeply interested in the subject. Letters were also sent to the vice-presidents of the American Mining Congress, in the metal mining states, asking their direct co-operation, or that they turn the matter over to the local metal mining association. Replies were received from practically all these letters and through this means direct communication was established in many mining districts which relieved your Committee materially and no doubt resulted in spreading the information very generally. This was particularly true through the efforts of Captain William McDermott, member of the Committee. Through his efforts the matter was taken up by the Arizona State Bureau of Mines and copy of the rules and comments published in every paper in that state, with requests that inquiries be made to them, rather than to the Committee.

Through the efforts of Mr. George L. Brooks a similar arrangement was effected in New Mexico and by Mr. A. G. McKenzie, Secretary of the Utah Chapter of the American Mining Congress, in Utah.

Appended is a compilation of the rules and regulations of the Forestry Service in so far as they apply to prospecting on forest reserves and use of timber and right-of-way. To this has been added some comments and explanations, the whole having been formally approved by Mr. J. S. Stall, Assistant Forester of the Pike National Forest.

From various conversations and other sources of information, it would appear that the intent of the Forestry Service is being very well carried out by the field officials. In some localities, at least, where there has been some complaint on this score, the difficulty has been that unfair advantage has been taken of the rules in various ways, compelling the Forestry officials to exercise the letter of the law in order to carry out instructions. In some cases this has been due to a lack of appreciation of the spirit, in a few cases through an attempt to take unfair and unlawful advantage of the situation. It is generally believed, however, that by this time the situation is quite well understood and the principal need for the

regulations is to show the prospector what his rights are under them, rather than to serve as information to cause friction.

Respectfully submitted,

FORESTRY RELATIONS COMMITTEE,

By Carney Hartley, Chairman.

Denver, Colorado, October 3, 1916.

Prospecting on Forest Reserves.

Broadly speaking, the rules relating to prospecting for mineral on forest reserves are just the same as on any public land. The occasion for any difference between the forest service and the prospector is usually the result of the fact that, because the Forest Service covers its territory with the rangers, the land laws are enforced, while on public domain there is no provision for doing this and in consequence their application has been very largely lost sight of.

All mineral land whether on forest reserves or on other unlocated land is under the jurisdiction of the Secretary of the Interior, while the Forest Service comes under that of the Secretary of Agriculture. The part which the Forest Service takes in connection with mineral land is merely that of carrying out a courtesy of one department to another and because they have men on the ground who are available for the work. There is the advantage, however, that the Forest Service is presumed to and does go into all the facts and as far as possible adjust any difference. It is their purpose and intention to encourage development of any mineral land, in a great many cases because it is very desirable as a matter of fire protection to have the reserve occupied.

In addition to this fact the Act creating the forest reserve specifically states in the following language: * * * "but it is not the purpose or intent of these provisions, or of the act providing for such reservations, to authorize the inclusion therein of lands more valuable for the mineral therein, or for agricultural purposes than for forest purposes."

That the situation is fully realized is shown also by the following quotation from the Act or its amendments:

"The Secretary of the Interior may permit, under regulations to be prescribed by him, the use of timber and stone found upon such reservations, free of charge, by bona fide settlers, miners, residents, and prospectors for mineral, for firewood, fencing, buildings, mining, prospecting and other domestic purposes, as may be needed

by such persons for such purposes; such timber to be used within the state or territory, respectively, where such reservations may be located.

"Nothing herein shall be construed as prohibiting the egress or ingress of actual settlers residing within the boundaries of such reservations, or from crossing the same to and from their property or homes; and such wagon roads and other improvements may be constructed thereon as may be necessary to reach their homes and to utilize their property under such rules and regulations for all proper and lawful purposes, including that of prospecting, locating and developing the mineral resources thereof; *Provided*, That such persons comply with the rules and regulations covering such forest reservations.

"All waters on such reservations may be used for domestic, mining, milling, or irrigation purposes, under the laws of the state wherein such forest reservations are situated, or under the laws of the United States and the rules and regulations established thereunder.

"And any mineral lands in any forest reservation which have been or which may be shown to be such, and subject to entry under the existing mining laws of the United States and the rules and regulations applying thereto, shall continue to be subject to such location and entry, notwithstanding any provisions herein contained."

From "The Use Book" it will be very evident that the policy of the Forest Service is to give anyone who goes on the forest reserve in good faith every opportunity to carry on his work to the very best advantage. They have, however, frequent cases to contend with where the rights are abused and the laws broken without any reason or excuse. The following is quoted from instructions to the executive portion of the Forest Service and no fair minded person can take exception to what is stated particularly when it is remembered that the work of the Forest Service is for the benefit of many thousand people for every prospector that might reasonably be expected to go on the ground.

"Definition of a Valid Claim."

"A valid claim is one initiated in good faith under some act of Congress for the acquisition of title to public lands and continued by use consistent with the character of the claim and necessary for its actual development.

"It is a fundamental requisite that all claims be initiated in good faith for the purpose contemplated by the law under which they are held. It is bad faith, for instance, to hold a mining or agricultural claim primarily for the timber thereon or to acquire a site valuable for water power development. Where the land is held for the timber, for a hotel site, saloon site, or other foreign use, and there has been no compliance with the requirements of the law under which the claim was initiated, it may be considered prejudicial to National Forest interests."

"Examination of Mineral Claims."

"Prospecting will not be interfered with and mineral locations will not be examined prior to application for mineral patent, except where a report is requested by the Department of the Interior or where locations interfere with the administration of the National Forest. No adverse report will be submitted to the Department of the Interior which has not been made by a mineral examiner. Prospecting may be carried on without obtaining a permit from forest officers."

"Free Use of Timber for Development of Mining Claims."

"The locator, or subsequent owner, of a mining claim has a right to the use of sufficient timber from his claim for development purposes. This includes the construction of such buildings as may be necessary as an adjunct to such development and the timber for shafts and tunnels, as well as for fuel in connection with such development. Timber, however, may not be cut from one claim to be used on another claim, even if it be of the same group, unless its use tends to develop the claim from which it is cut, as well as the one on which it is used, except under free-use permit."

"A mining claimant has no right whatever to cut or remove timber from his claim for sale or for purposes other than the development of the claim, and such removal constitutes trespass, except where the removal of the timber reasonably in advance of the mining work is necessary to the development of the claim."

The law regarding the use of timber for mining purposes on any public lands states that it may be cut only from the isolated surface, although this is something which receives very little attention from the mining public and frequently is a matter of surprise when this restriction is made on forest reserves. The quotation above, however, shows how very easy this question can be arranged when

the claim is taken up where timber is unsuitable or scarce and all that is necessary is to consult the local ranger who will advise what timber may be cut. Service Regulations S 27 and S 29 quoted herewith will show how well this matter is taken care of.

Regulation S 27.

“Free use may be granted: (1) To bona fide settlers, miners, residents, and prospectors for minerals, for firewood, fencing, building, mining, prospecting, and other domestic purposes: (2) to school and road districts, churches, or non-commercial co-operative organizations of settlers for improvements of mutual or public benefit; (3) for the construction of telephone lines when necessary for the protection of national forests from fire; (4) to certain branches of the Federal Government.”

Regulation S 29.

“Permits will be required for green material.”

Free-Use Areas.

“Supervisors may, with the approval of the district forester, designate as free-use areas portions or all of any National Forest, and settlers, miners, residents, and prospectors for minerals may cut and remove from such areas, free of charge and without permit, under such rules as may be prescribed by forest officers, any dead timber needed for their own use for firewood, fencing, buildings, mining prospecting and other domestic purposes. No timber may be taken under this regulation for sale to other persons or for commercial use.”

Emergency Use.

“Material may be cut outside of a free-use area without permit in cases of emergency of immediate need. The person taking such material shall promptly notify the forest officer in charge of the district.”

“Small quantities of material needed by transients may be taken without permit.”

Briefly stated, therefore, the situation is as follows:

No permit is required to prospect on Forest Reserves.

Timber on claims may be used freely for all necessary purposes in developing.

If additional timber is required the ranger should be consulted.

Forest Service Regulations regarding fire are perfectly reasonable and should be carefully observed.

The ranger has no option in his action in carrying out any rules prescribed and fire rules are of highest importance. In case of any uncertainty consult the ranger and if not satisfied the District Forester or write to the Secretary of the nearest chapter of the American Mining Congress, or to the Forestry Relations Committee, 316 Colorado Building, Denver.

METHODS FOR OBTAINING A UNIFORM MINING LAW.

Address Delivered by Judge J. W. Thompson, Tuesday, November 14, at Nineteenth Annual Convention of American Mining Congress.

OUTLINE.

Introduction.

1. Assumption in discussion.
 2. Definition.
 3. Extent of uniformity.
- I. Objections to uniform law.
1. Diversity of deposits.
 2. Diversified methods of operations.
 3. Existing state laws.
- A. Objections answered.
- II. Obstacles to be overcome.
1. Ignorance.
 2. Indifference.
 3. Prejudice.
- III. Essentials in obtaining uniform law.
1. Knowledge of present state laws.
 2. Knowledge of court decisions.
 3. Draft of proposed law.
- IV. Treatment of proposed law.
1. Study and discussion in separate states.
 2. Amendments and changes by states.
 3. Discussion in common parliament.
 4. Agreement by mining interests.
 5. Presentation to legislatures.

A discussion as to the methods to be employed for obtaining a uniform mining law assumes that such a law is desirable. No argument need now be advanced to bodies of thoughtful men or intelligent miners as to the advantages of such a law. Places and people who have not reached this stage of the discussion are too

remote either for access or influence and argument would be useless.

A uniform mining law means one law governing the entire mining enterprise. It is intended as a single system of laws adopted and applied in mining operations in the separate and several states. A uniform law should be so complete and inclusive that once learned in one state or in one locality it is learned and known for every state and every locality where similar mining operations are carried on. The proposed uniformity is not to be limited to coal mining but is understood to mean a uniform law for coal mining states and a uniform law for metal mining states.

Objections to Uniformity.

There are some reasonable objections to a uniform mining law. One is that there is such a diversity of deposits of coal or minerals in the different states as would render a uniform law impossible of application. So it is said that methods of operations due to diversity of deposits, to the nature of the surface of the ground, the extent of operations and the appliances employed, would render such a law impracticable. Another objection is that many states now have satisfactory mining laws, such as have grown out of experience and study of the needs of the enterprise and adapted to the individual states and to the particular localities and mining regions. It is urged with some force that the states having these laws in good working order would be reluctant to surrender their present laws and adopt instead a new and untried code. There may be other minor objections but these are the most reasonable and the most serious to be encountered.

The answer to each objection is found in a discussion of its reasonableness. Conceding there is a diversity of deposits in different states, it is likewise true that there is diversity of deposits in a single state. Mineral deposits in their making were indifferent to state lines; and likewise they had as little regard for the lines bounding the subdivisions of a state. There may be as great a diversity of deposits in a single state as in the entire United States. If this assumption is correct, or if it is a geological fact, it follows that a law applicable to the diversified deposits of one state would be equally susceptible of application to similar diversified deposits in the several states. Likewise mining conditions in a single state may be as different and varied as those in a score of states. Thus in a single state may be found overlying seams of coal; gaseous and non-gaseous mines, wet and dry mines, mines the roofs of

which require constant attention and propping and others where no props are required.

The same is true as to methods of operation. There may be in a single state mines operated through vertical shafts and others through inclined or horizontal haulage ways; mines where the pick and shovel are used for mining and the lineless mule for hauling, while others have the most improved mining machines, the most experienced shot-firers and the safest possible electrical appliances for all operations. But a single state law adapts itself to these motley methods of operation, and the intelligent mine inspectors, the careful operators and experienced foremen have little difficulty in applying the law as the varying needs and circumstances require.

It need not be assumed by any state official or miner that a proposed uniform law will take from any present mining law any of its virtues. It can safely be predicted that no state law will be robbed of any good thing. No state should be satisfied with its present mining law, if any other state has a better law, or if a proposed uniformity is an improvement. If any existing state law should be found to contain all desirable features, there is no reason why such a law should not be taken and adopted as the model for a uniform law.

Obstacles to Be Overcome.

In the effort to secure a uniform mining law there are certain barriers to be removed and some obstacles to be overcome. The first of these, but perhaps the least, is ignorance. Not only ignorance of the importance of a uniform law but of mining laws themselves. Some mining states have done nothing or but little in the way of perfecting or passing a mining code.

Then there is a certain amount of indifference on the part of operators, miners and legislators as to the enactment or enforcing of mining laws—a feeling that mining like agriculture or common commercial industries does not require special legislation. The satisfying feature of this situation is that the refusal of any such state to adopt a uniform law would not prevent other and leading states from enacting such a law. Furthermore, the adoption of a uniform law by any considerable number of states would be the last argument for the adoption of such a law by the states at present indifferent to any law.

Another and perhaps a more formidable barrier is the prevalent, though not necessarily fatal, disease of prejudice. This is

known to exist though never admitted. Like milk-sick in the pioneer days, it is always in the adjoining township! The operator, and the miner, whatever his rank or position, is more or less given to the self-satisfied status and seems to have the ability to convince himself that what he does and the manner of its doing is the only way the thing should be done.

It is refreshing to observe that this disease is rapidly disappearing, due to the heroic treatment received in meetings and conventions of state and government mine officials and the annual gatherings of the numerous bodies of organized miners with their sharp criticisms and free exchange of mining experiences. Indeed these are the things that create the desire for, and mark the trend toward, the day of the uniform mining laws.

Essentials in Obtaining Uniform Mining Law.

An essential feature in securing a uniform law is a thorough understanding of the present state mining laws. Not a mere acquaintance with the laws of one state, but a clear apprehension of the laws of all the states. It is not sufficient that a state mines department, operators and miners of a particular state, be familiar with the laws of their own state, but there must be a comparative estimate of the laws of the several states. There must be such critical examination and patient comparison that will result in a comprehensive knowledge of the best features of all state laws.

Another and equally important factor is a knowledge of the decisions of the courts in construing the several state statutes. Some state courts have held certain provisions of state laws invalid while courts of other states have held similar provisions valid. This, by way of illustration, is true with reference to the extent that state laws may authorize state mining officials to take charge and superintend the underground workings of a mine. Also with reference to wash houses, employe's compensation acts, and as to requirements for weighing and screening coal. A proposed uniform law would meet with sudden and deserved doom should it contain important provisions that have been held invalid. Any proposed law must meet every judicial objection that has been raised against individual state laws.

An essential step toward the desired end is that some person, body or committee be authorized to prepare and submit for inspection and discussion a draft of such a law.

Miners, operators and mining conventions have discussed the different phases of the subject and the consensus of opinion estab-

lishes both the desirability and practicability of such a law. But all discussion will end in fruitless agitation until some person or body is delegated to prepare the contemplated law. Some person or committee must be appointed to "bell the cat!"

It need not be expected that even a studied draft or carefully prepared bill will be swallowed as an unbroken dose by operators, miners, state mining boards, governors and legislatures. But the start must be made. The end desired must have this essential beginning.

The bill when prepared must be submitted to the miners, operators and mine officials of the several states. This proposed draft must be thoroughly thrashed out—beaten with the flails of prejudice, opposition and self-satisfaction. If such proposed draft could be agreed upon, or if the same changes or improvements, if any, could be made by all the states, then the proposed bill would be ready for presentation to the legislatures of the different states. But if the original draft should in different states be variously amended or revised, it must in its changed condition be brought to a common parliament of state mine officials, miners and operators and there solidified and unified and again returned to state officials, miners and operators for approval.

When such proposed draft is submitted its ultimate success will depend on the friendly feeling of the persons particularly interested and directly engaged in the mining enterprise. If when proposed it is met with a listless indifference, prejudicial opposition, vindictive assaults, or a destructive criticism, and a disposition to kill rather than cure—the efforts at uniformity will there end. On the other hand, if the proposed law, however incomplete or defective, is met with a friendly spirit, an attitude of constructive criticism, a general desire to cure the defects and improve provisions and to make perfect and practicable any seeming imperfections, then its final adoption is assured. Uniformity in effort and a disposition toward final agreement is the prime requisite to a uniform law. When such a draft is proposed and submitted to individuals for study or to a common forum for discussion, miners, operators, mine officials, legislators and governors must remember that in the settlement of every controversy and in the compromise of every claim or case there must be some crucifixion of prejudice, some abandonment of position, some yielding of advantage, when these can be done without sacrifice of principle or surrender of right.

If harmonious action cannot be obtained and final agreement effected by persons and interests most nearly concerned, indifferent legislators cannot be expected to act. It would be expensive folly to present to a state legislature a proposed mining law that did not have the approval of state mine officials, leading operators and representative miners.

Such a proposed law must be harmoniously supported by friends and friendly interests and must be presented to the governors and legislatures of the separate states with an enthusiasm that will command sacrifice of time and expense and an intelligence that will convince indifferent law makers.

STATE MINE RESCUE STATIONS.

Address Delivered by H. H. Stoek, Professor of Mining Engineering, University of Illinois and Secretary of the Illinois Mine Rescue Station Commission, at Nineteenth Annual Convention American Mining Congress.

The mine rescue and first aid movements in the United States are at present being carried on under a number of distinct auspices, as follows:

1. Federal bureaus, such as the United States Bureau of Mines;
2. State bureaus, such as the Illinois Mine Rescue Station Commission and the Ohio Bureau of Mines;
3. Organizations, such as the National Red Cross and the National Safety Council;
4. By the employers or operators;
5. By the employes or miners.

These agencies necessarily overlap to some extent in their functions, but as far as possible an effort has been made to avoid duplication of effort in the same territory. The work of the Federal Bureaus, the Red Cross and the National Safety Council have been described more or less fully in the bulletins of these organizations and the associations of employers and employes have been taken account of in the technical press. The present description, therefore, covers only the second of the agencies and as the paper was assigned too late to permit of the gathering of data from other states, the topic might more properly be State Mine Rescue Methods as Carried on in Illinois. The only other distinctly state agency of which we have been advised is that in Ohio, where the mining bureau operates a mine rescue car, but the details of its operation are not at present available.

In 1909 the Technologic Branch of the United States Geological Survey, now the United States Bureau of Mines, in cooperation with the Illinois Geological Survey and the College of Engineering of the University of Illinois, established at the Uni-

versity of Illinois in Urbana, a rescue station for the training of miners and mining officials in the middle west coal fields. As the result of this move oxygen breathing apparatus was used at several accidents in Illinois prior to the Cherry disaster and at that disaster helmets were used in the examination of the mine prior to its opening. One of the results of the Cherry disaster was a strong demand for greater safety measures in the state, and during the winter of 1910 the state legislature, upon the suggestion of the Illinois Mining Investigation Commission, not only added a number of safety provisions to the state law, but also appropriated \$75,000 for the erection, equipment and maintenance of three rescue stations, placing the administration of the stations in the hands of the Illinois Mine Rescue Station Commission, "consisting of seven members, including two coal mine operators, two coal miners, one state mine inspector, one representative of the Department of Mining Engineering of the University of Illinois and one representative of the Federal Bureau of Mines." The law provided that the work should be carried on under the general direction of a manager and there should be at each station a superintendent and an assistant, all of whom were at first appointed by the commission but later were placed under a state-wide civil service law.

The commission also has authority to employ such assistants as may be needed in giving first aid instruction to the injured and similar technical subjects and such assistants as may be needed from time to time to properly carry on the work of said rescue stations and such rescue cars and sub-stations as may be installed in connection with said stations, but not more than two extra assistants can be employed for each rescue car. The commission is also instructed to "arrange for co-operation in the work with the mine owners, miners and state and federal organizations so as to render service of the utmost efficiency." In 1915 the legislature abolished the position of manager. With this exception the organization is as previously provided for in the law of incorporation.

The stations are located at La Salle for the northern part of the state, at Springfield for the central part and at Benton for the southern section. They are identical in design and were built, from plans prepared by the state architect from sketches furnished by the commission, upon ground that in each case was donated either by the city or by a private corporation in the city. The buildings cost approximately \$10,000 apiece and each contains an office, living quarters for the superintendent and his family, a dormitory where

ten or twelve men in training may stay without expense to themselves, a work room and store room for apparatus and supplies, a smoke chamber and a lecture room. Details of the construction and equipment of these stations and the cost of maintenance can be obtained from the biennial reports of the Rescue Commission which may be had upon application to the Mine Rescue Commission, Springfield, Illinois.

At each station there is also a rescue car which is a remodeled Pullman, very similar in design to the rescue cars of the Federal Bureau of Mines. One of these cars was purchased by the Commission, one was donated by the Chicago & Northwestern Railroad and one by the Chicago, Milwaukee & St. Paul Railroad. It is questionable if such refitted Pullman cars are adapted for a state rescue service and the writer believes that an ordinary box or baggage car, thoroughly equipped with emergency supplies and apparatus, such as are used by a number of the anthracite coal companies would better serve the purpose, and that automobile trucks developed within a few years past render inadvisable any form of railroad car in a section where the roads will permit of the use of such trucks.

The maintenance and upkeep of rescue cars that are kept on the road is excessive and apparatus and supplies can be transported from place to place much more cheaply by trucks or even by express.

In considering the development of the work in Illinois, it should be distinctly remembered that the Illinois commission had no precedents for its guidance and its early labors were carried on at a time when the general public was excited by a series of unusual accidents in western Pennsylvania and West Virginia and when the feeling in Illinois in particular was very tense due to the unparalleled disaster at Cherry. It should not be considered a criticism of the early efforts of the commission, therefore, to say that in the light of later experience undoubtedly a number of things might have been differently done.

It must also be remembered in considering the development of the work in Illinois and in the whole United States for that matter, that only a very few years ago oxygen breathing apparatus was to a large extent unknown in the United States and when first suggested was not believed in. Moreover when the law was passed for the establishment of mine rescue stations in Illinois the first aid movement which had already attained considerable impetus in the east was practically unknown in Illinois and there was not a

first aid team in the state. Consequently much of the early work of the commission had to be of a missionary and explanatory nature, and if nothing else has been accomplished, very few will deny that there is at present in the state a distinct appreciation of first-aid as a system that can be carried out with profit at each mine in the state.

In a well-meant effort to encourage men to devote time to rescue and first aid training. The State Mining Board soon after the installation of the rescue service ruled that every applicant for a certificate as mine manager or as a mine examiner must have an Illinois Rescue Certificate and at first such certificates were accepted by the board as fulfilling the requirements of the state law that says a man must have a knowledge of rescue and first aid work.

The result of this ruling was to create a demand for certificates that unfortunately resulted in superficial training in too many cases, for having once gotten the certificate all training and interest in the subject ceased.

For several years the rescue cars, each in charge of two men, were sent from mine to mine, and at each mine for a period of from one to three weeks men were trained in the use of oxygen breathing apparatus and in first aid. This training was given in rooms that were fitted up at the mine and frequently it had to be carried on under very unfavorable circumstances. The intent of such training at the mine was twofold. First, to demonstrate the use of oxygen breathing apparatus and similar appliances and to show what first aid work really meant, hoping to enlist the co-operation of the operators and miners in carrying on the work after the car left the mine.

Second, to leave at each mine at least one trained squad that should serve as a nucleus about which to build up a first aid and rescue organization.

It is very difficult to measure the results of any pioneer work, but it is unfortunately true that in very few cases was interest shown in the work after the car left a mine and very little systematic training was undertaken, excepting in preparation for first aid contests. The reports of the Commission for 1913 and 1915 show that six first-aid associations have been formed in the state and a number of very successful first aid contests have been held, and there are at present at least sixty-six sets of breathing apparatus purchased by coal companies, these being in addition to the equipment

of the state stations. Six rescue stations have been built by coal companies.

The Illinois commission feels very strongly that it is not wise to give indiscriminate and broadcast training in the use of oxygen breathing apparatus and that until such apparatus has been perfected to a far greater extent than at present it should be worn only by thoroughly trained men who keep in training by regular practice with the apparatus.

The work of the commission is at present being carried on in the following manner:

At each state station there is maintained in addition to the two permanent employes a team of five men who train twice a week at the rescue station and are paid for their time. These men work in nearby mines and can be quickly assembled at the stations if needed.

2. Three sub-stations have been established in districts where there is the most called-for assistance and as far as funds will permit and the demands of such stations seem justified it is planned to establish other substations. One or two permanent employes are in charge of each substation and at each substation there is maintained in addition a team of five men under the same conditions as the regular paid teams at the main stations. These stations are at present located at Herrin, Harrisburg and Duquoin. Each of these stations was established at the joint request of the operators and miners in the district, who at first shared in the expense of hiring and maintaining suitable rooms and furnishing the heat and light, the Rescue Commission furnishing all the equipment. Such co-operation has not usually lasted very long and the expense of maintaining and operating the stations is now borne by the commission.

The state, therefore, has at present six well trained teams that can be called out on short notice. These teams are subject to call whenever life or property is in danger in case of explosions, fires, etc., and under such conditions the men are paid by the state. They may also assist in routine work of a mine such as the fighting a fire by helping seal off a portion of a mine or helping to unseal a portion of a mine, but in such routine work in which no saving of life is involved, it is expected that the men will be paid by the operators. This does not, of course, apply to the regular employes at the stations or substations who will assist in such work without other compensation than the regular salaries paid by the state.

3 First-aid classes have been organized in towns so near the main stations that the superintendent or assistant can reach such towns though living at the main station. These classes have in many cases been very successful and they represent a phase of the work that should be greatly increased.

To assist in extending this work, about two years ago a meeting was held of representatives of the miners' organizations, the several mine operators' associations in the state, the State Mining Board, the Federal Bureau of Mines and the Illinois Mine Rescue Commission. A tentative organization was formed intended to enlist the active co-operation of all of these interests by the establishment of county organizations. In several counties a start has been made toward effecting local organization under this plan, but the possibilities of such an organization have by no means been tested thus far.

The Illinois Commission, though fully appreciating the advantage of first-aid contests and rescue demonstrations as a means for popularizing such work and as an incentive to the formation and training of teams, feels that the permanent value of the first-aid movement must come from regular and systematic training of a fairly large group of men in each mine, rather than in the specialized training of one team mainly to participate in contests.

In addition to training men about the mines, in a number of cases first-aid classes have been formed in the public schools and in connection with various associations of men and women in mining towns. City firemen have also been trained and it is the policy of the commission to encourage such training of persons not connected with the mines as much as possible if it does not interfere with the regular training of mine employes. The rescue men have also assisted the city firemen in fighting fires where it was impossible to enter a burning building without the use of breathing apparatus.

THE EFFECT OF UNIFORM MINING LAWS ON MINING ENGINEERING, WITH SPECIAL REFERENCE TO COAL MINING.

Address Delivered by J. A. Garcia at the Nineteenth Annual Convention of the American Mining Congress.

The methods of mining, hauling, hoisting and preparing bituminous coal have changed so during the last decade—primarily because of the large production at individual operations—that the design, construction and development of a mine both on top and underground, and also the shaft in between, has developed into one of the most difficult branches of engineering, and the work of the mining engineer who practices his profession in a number of states is further complicated by the conflicting or radically different mining laws, as well as the requirements of the miners' unions, the rules of the insurance companies, compensation acts, company rules, etc.

The confusion resulting from the lack of codification of these laws, rules and regulations can be appreciated only by those who have constructed or conducted operations in various states, and leads to errors in design or false moves in operation and construction that are very expensive to correct. To guard against these the engineer must either stuff his brain with a mass of legal lore and keep stuffing afresh as new legislation is enacted, or make his own code and index laws of each state for convenient reference.

Since the enactment of old legislation still on the statute books the capacities have vastly increased, the number of men employed underground doubled and trebled, the haulage and mechanical problems made much more intricate and complex, and it is sometimes impractical or even impossible to comply with these antique laws; for instance, the limitation on cage speed lowering men and number of men on a cage at deep mines, hoisting four to five thousand tons per day of eight hours, the number of men on a split regardless of quantity of air, the innumerable things required of a mine manager, half of which he could not perform, in some states, if he had nothing else to do.

The mining engineer now projects the underground workings before the shaft is sunk and he must be careful to see that the

mining system conforms to conditions demanded by the statutes of the state, but since the laws of Kentucky are different in many details from those of Illinois or Pennsylvania, or Iowa from Kansas, etc., one must be careful to avoid confusion, even though the mining conditions admit of standardization.

The variety of laws not only make it difficult for the engineer in laying out the work, but cause radical differences in unit costs and create an injustice to investors or operating companies in competitive fields whereby the cost of a new mine is increased 50 per cent or more on account of state laws, and another mine just across the state line with duplicate mining conditions can be constructed and equipped for the same capacity and production costs at a much less initial investment.

In Illinois all new shafts must be fireproofed, while in competitive states they may be lined with wood. This item very materially affects the engineers' estimates of construction cost and the same condition obtains as to the tipple. The fire risk is practically the same in all states, but the engineer in preparing estimates for his client must know the law and in certain states figure for fireproofing not only the shafts and all top buildings, but underground construction as well, for a distance of 300 feet from each shaft.

The clearance between rail and entry rib is fixed by law and varies in different states and this controls to a certain extent the design of the pit car. In one state the distance between crosscuts is sixty feet, in another forty-five; in Illinois one hundred men are permitted to work on one split, in Kentucky sixty men, in Iowa eighty, in Indiana fifty, etc., etc., and these factors determine in a measure the length of panels, the working places per panel, the location and number of overcasts, doors, etc.

The distance between hoisting and escape shaft varies several hundred feet in different states; the permissible voltage for transmission of electricity may be 250 in one state and 500 in another; we must use stairways in the escape shaft in one state and may use a cage across the line; we may construct an underground stable for mules, or may be compelled to arrange the cages for hoisting the stock each shift; we must include a washroom in our estimated cost at one mine and cut it out at another; we must arrange the tipple in Illinois, Ohio, etc., for weighing the coal from each pit car, but we can leave out the scales in Kentucky, where the miners are paid by face foot or cubic feet; we must include the cost of a complete underground telephone system when developing a mine

for Jones & Company and can avoid that expense when building for Mr. Smith; some ventilating fans must be arranged for convenient reversal of air current, while others may be installed as simple blowers.

These are but a few instances of variations in the mining laws, but should suffice to illustrate the confusion that may result from lack of uniformity, and how necessary it is for the engineer in designing a mine to be familiar with the requirements of the laws.

As a general proposition there is not, from an engineering standpoint, any reason why the mining laws of the states cannot be made uniform in practically every section, with special provision for those districts or coal measures where mining conditions necessitate a departure from the standard code, and such uniformity would not only simplify the statutes, but would tend to eliminate the penalty now imposed on operators in certain districts where the mining laws provide for most modern and fireproof construction, and, therefore, more investment and capital expenditure.

It is generally conceded that the mining laws of Pennsylvania and Illinois embody the most advanced coal mining legislation enacted to date, and with these as a basis it would require only careful and serious consideration of the various sections by competent and experienced mining men to bring about a code that would fulfill all requirements of all the states, but it would probably be impossible to apply the stringent legislation that obtains in Illinois or Pennsylvania to such States as Kansas, Iowa, etc., where the short life of the mines prohibits high-class and expensive construction; so the problem is one of adjusting or fitting a code to existing conditions with due consideration to the financial as well as the physical and engineering factors.

To the engineer, uniform mining laws means simplification, which is one of the most desirable features in any engineering work. The physical conditions of the coal mining fields of the United States are not so radically different but that a competent body of men can draft a set of laws, or by synthetic analysis of those now on our statute books, set up a code to fit, and all mining engineers would be made happy thereby. However, the acceptance of a general code based on the best and most modern laws now in existence, by operators and coal mining companies now favored by older and less burdensome legislation, is another question, and this feature of the case is the real problem rather than the actual work of selecting, classifying or codification of a set of mining laws that could be made to cover all conditions in all fields.

GEOLOGY IN ITS RELATION TO THE OIL INDUSTRY.

Address Delivered Wednesday, November 15, at Nineteenth Annual Convention of American Mining Congress, by
J. C. McDowell, of Pittsburgh.

In a study of "Geology in Its Relation to the Oil Industry," we find that oil and gas are more widely distributed than any other minerals being found in practically every formation porous enough to contain it throughout the entire geologic series, from the Silurian to the Tertiary age in North America. In each major producing field the oil and gas comes from rocks of an age peculiar to that field. For instance, the oil deposits of northwestern Ohio and Indiana are principally in the Trenton lime of Silurian age. In western New York, the Province of Ontario, Canada, and central Ohio deposits, up to this time, of oil and gas, principally the latter, are in the Medina and Clinton sandstones of the upper Silurian. Throughout the Appalachian region, New York, Pennsylvania, West Virginia and Kentucky the deposits are found principally in the many of the sandstone formations of Devonian age. In Kansas and Oklahoma, at present, oil and gas are found principally in the sandstones of the Carboniferous, Cretaceous and Tertiary ages, while in California and New Mexico the production is principally, if not all, from either lime or sandstone formations of the Tertiary. The oil fields of Montana and Wyoming are in the Cretaceous.

An analysis of the oil and gas produced from each of these geologic formations, covering æons, discloses a close similarity, suggesting a common origin.

There are two general theories as to the origin of oil and gas, with many modifications of each. Briefly, they are:

First—The inorganic or chemical theory.

Second—The organic theory.

According to the inorganic theory, oil and gas originate principally from the action of heated waters on the iron carbides contained in the earth's crust; hydrocarbons, resembling oil and gas have been produced in the laboratory by this method.

According to the organic theory, oil and gas originate by the action of heat and pressure on animal and plant remains buried in the rocks at the time of deposition.

The process covers many geologic periods of time, and although slow in operation, it is thought to be continuous, and that oil and gas are being generated now as in the past ages. This theory is supported by the fact that crude petroleum can be produced in the laboratory from so-called oil shales.

Practically all geologists hold to the organic theory of the origin of oil and gas, but there are several eminent men among them who believe in the inorganic theory. The advocate of either theory is able to disprove the theory of the other to his own satisfaction, but is unable to conclusively prove his own. Consequently, in the absence of positive proof, when asked what is the origin of oil and gas, we must answer, we do not know. The interior of nature's laboratory is not open to inspection, and it is extremely doubtful if this question can be solved. We think, however, that the theory of its origin held by a geologist must to some extent influence his attitude of mind in attempting to locate deposits.

While oil is so widely disseminated, like other minerals, its accumulation in commercial quantities is rare. The problem confronting the geologist is to locate these deposits. Profitable commercial deposits are found only when the formation containing them is enclosed within an impervious strata of rock or shale, usually the latter.

The Anticlinal Theory.

The anticlinal theory was first promulgated by Dr. I. C. White, about 1880. It is a theory to explain the accumulation of oil and gas in large quantities. From a study of the distribution of oil and gas pools in relation to geologic structure, he discovered that the production was generally found associated with anticlines or earth folds. The anticlinal theory of oil and gas accumulation resulted from an attempt to explain this relation, and also to explain the relation of oil, gas and salt water, which were observed to occupy definite positions in the anticline. Gas, the lightest substance, being in the upper part of the anticline; oil, the next heavier, below the gas, and beneath the oil, the salt water.

The anticlinal theory, in its broadest sense, is now generally accepted by oil geologists. Oil deposits are usually found on or along such anticlines, but there are many modifications of this theory. Perhaps it might better be said that by recent studies the

application of the anticlinal theory has been more fully developed, and accumulations are found in places where the theory apparently does not hold, but upon further study a trap or some condition similar to that produced by anticline is found to be present.

It is now over thirty years since Dr. I. C. White first advocated his anticlinal theory of the deposition of oil and gas. Practical operators have been very slow to take full advantage of this important theory. No doubt their reluctance or failure to adopt it in guiding them in the search for new pools, and in developing known deposits, was due to a lack of full understanding of the application of the theory. The most common belief seemed to be, that to be correct, the theory should prove universally successful in its application. It is a common trait to expect too much of any new theory stepping out in advance and upsetting the equanimity of established practice, especially among men who have gained their knowledge by the sweat of their brow and long years of hard, practical operation. No doubt most operators who gave the theory much thought at all checked it up against all the exceptions they could think of, and generally turned away from it as nothing but theory, notwithstanding that, as operators checked up their experience or applied their judgment upon the possibility of any field or pool, they intuitively turned to the same theory in comparing the chances of production in selecting drilling locations from known wells. Whether the sand raised or lowered in one direction had much to do with the selection of the location for the well, the evidence disclosed by the drilling of each new well was carefully considered and applied in the location of the next well. The higher the top of the sand rose, the more desirable was the location in that direction. The lower the top of the sand from that in known producing wells, the less desirable was the location in that direction, and if a well drilled into water instead of oil or gas, drilling in that direction was either abandoned or greatly retarded. To this extent practically every operator applied, perhaps unconsciously, the anticlinal theory. However, in wildcatting, or prospecting in new territory, not much attention was paid to geologic structure, and this part of the production work remained much of a gamble, a matter of chance. Wildcatting was very risky, and without any real definite or tangible basis greater than, in many instances, merely chance. In fact, the forerunner of oil or gas development, or even wildcatting, was perhaps the digging of water wells, in which water contaminated with petroleum gave the first hints of possible produc-

tion. Again, seepage of oil or gas at the surface were indications of possible reservoirs, and occasionally a field was opened up through drilling for water, or salt or other mineral. Many of our famous fields have been opened up by more adventurous men, who took a long chance on some such indication as a small showing in a water well, or a seepage from who knows where. The number of failures were far greater than the successes, and the more cautious or conservative operators bought their holdings in partly developed fields, in preference to opening new pools by wildcatting.

In years past, as history of the industry shows, men of strong character and who were willing to take a long chance for a large gain, were the pioneers in opening up new pools. Even in partly developed pools the percentage of dry holes to successful wells was very large. The principal reasoning in locating wells was to compare direction, and the operator was considered a very fortunate man could he but take a lease lying between two producing wells. Lands lying between producing wells commanded much higher prices and values than lands not so located. In fact, to this day the greatest number of wells are located by stepping out cautiously from producing wells, and operators who hold leases a half-mile or more from a producing well feel that they have a good chance of production, and generally locate the test well on that portion of their lease nearest the producing or pay test well. Naturally, the intervening land is considered very favorable. However, an intervening well is often drilled in as a dry hole, and is valueless. In such a case the field is designated as spotted and treacherous. It was found that fields were generally of greater length in one direction than in another, and great stress was laid upon the direction of the axis of the nearest pool, and this used as a guide in directing drilling. In short, the developing or proving up of a field was much a matter of feeling out cautiously for each new well drilled, taking into account the results of each well drilled prior, until a dry hole was encountered, and then the direction of operations shifted, and so on until the field was fairly well defined by dry holes. Such practice is in great vogue today and perhaps the vast majority of wells being drilled at this time are located in this manner.

Leasing of lands was conducted much in the same way. Whenever a wildcat test is started it is considered a good practice to step in and take up some leases, preferably scattered in different directions about the drilling well, so that in whatever direction the pool extends, the chances will be good for production in some direction from the test well.

During all these years Professor White's anticlinal theory has been given comparatively small attention notwithstanding that more recent work is proving its fundamental accuracy and far-reaching importance to the oil and gas operator. Without a doubt it will in time prove to be probably next to the discovery of the oil and gas themselves, one of the few great discoveries of the oil and natural gas production industry. In fact, only at this time is a fuller and truer conception of this theory being had by the practical operator and its possibilities becoming understood. Heretofore too much was expected of this theory. Generally it was expected to hold true that a well located on the ridge, and throughout the anticline, oil or gas must be found, or the theory fails. This is not the case at all, for the ridge of any anticline is not level or of uniform slope or texture of sand throughout its length, but there are traps or peaks or domes along the strike of the anticline which are the natural gathering points or reservoirs in which oil or gas can collect, provided a porous stratum exists under such domes, and also provided oil or gas exists in such stratum to gather in such reservoirs. It does not apply that oil or gas must exist under every anticline, nor does it follow that either must be collected in the dome if they do exist in the stratum. Often a change in texture or porosity may form a barrier, and prevent the passage of oil or gas higher up in the sand. Naturally they tend to travel to the highest point in the sand to which they can pass, conditional that first there is a channel through which they can find passage, either by capillary force, by expansion of the gas under its pressure and tendency to fill all voids, and in the case of oil, by being able to float upon water in a more porous formation. However, whatever the means of causing the movement toward the higher point, the matter here considered is that there can be no passage where there is no opening. After the oil or gas has once reached the highest accessible point, it is arrested and gathers there, whether that point is a dome or an anticline, or the highest extent of continuous porosity on a natural slope, or whether it is arrested in its travel across flat or terrace, the matter is all the same; it has reached some obstruction retarding its further migration, and arresting it there until tapped and produced in commercial operations.

As a general rule, very little attention was paid as to whether deposits which were developed occurred on a fold or bore any definite relationship to the geologic structure or not. Development work was carried on chiefly on the rule of thumb methods, with rather tenacious persistency to remain on that basis. Very few

operating companies paid much attention to the application of geology to deciphering the relation of existing fields to geologic structure, and very few, if any, companies applied geology greatly to wildcatting work. ✓

Some of the European companies operating in America were inclined to study the fields geologically in more recent years, but confined their work strictly to reconnaissance work, but not going into plane table work or actual surveying.

In the different main fields of the country, as the Appalachian fields, the mid-continent fields, the gulf coastal fields, the California fields, and the Wyoming fields, it appears that the geological problems are entirely different and the experience, deductions and conclusions obtained in any one of these fields appears to involve a problem entirely different from any other field, and for operations in different fields, to be successful, work must be studied from the ground floor up, in each case. In foreign fields, such as Mexico, with its deep-seated deposits, apparently reaching accessible shallower zones, through fault or other fissures, an entirely different question is involved in unraveling the geological problem than in any field in the United States. The largest wells in the world are found there, but, like elsewhere, the most prolific wells appear to be of the lower grade oils, there apparently being some inverse relationship existing between quality and quantity throughout the oil-producing territories. ✓

Inasmuch as each producing section of the country appears to offer its own peculiar problems of relationship of deposit to structure, it is practically necessary to study each field by itself, and often the nature of the deposits change in various parts of the same field. In the earlier attempts to unravel this relationship, and to reduce the findings to practical purposes, the simplest methods were used, and probably the most rational beginning was to check up the then present developed fields. Such work was early rewarded by good results. Probably the most successful application of geology to oil and gas production is that of the last few years, in the mid-continent field of Kansas and Oklahoma, where, during the past year, it may safely be claimed that the application of geological study in the search for and development of oil and natural gas along patient and careful lines has resulted in opening up and pointing out the trend of geologic structure, making clear to all operators a new prospective territory for oil and gas development every bit as large as the entire known productive area of these two

states prior to that time, resulting in a leasing campaign during the years 1915 and 1916 on an extent never before witnessed in this land.

It is safe to say that several million acres of land have been leased on this trend, and strange to say, not only has Kansas acreage been brought back into demand after years of absolute condemnation as worthless for oil and gas purposes, by practically all of the larger producers and the state generally condemned from an operating standpoint, but it is well established that the record prices of the oil industry for undeveloped leases are now being paid for that even recently condemned territory of Kansas. This condition has been brought about entirely by the results obtained in carrying on and applying geological study in the search for oil and gas by men who operated on a strictly scientific basis; men who had faith in the correctness of the anticlinal theory, in its various applications, and who would not be turned aside by the ridicule and comment of many operators. The results obtained in this work were so remarkably successful and on repeated application as to eliminate all chance of mere good fortune and to permanently establish the true value of geology applied to wildcatting for and developing of oil and gas deposits.

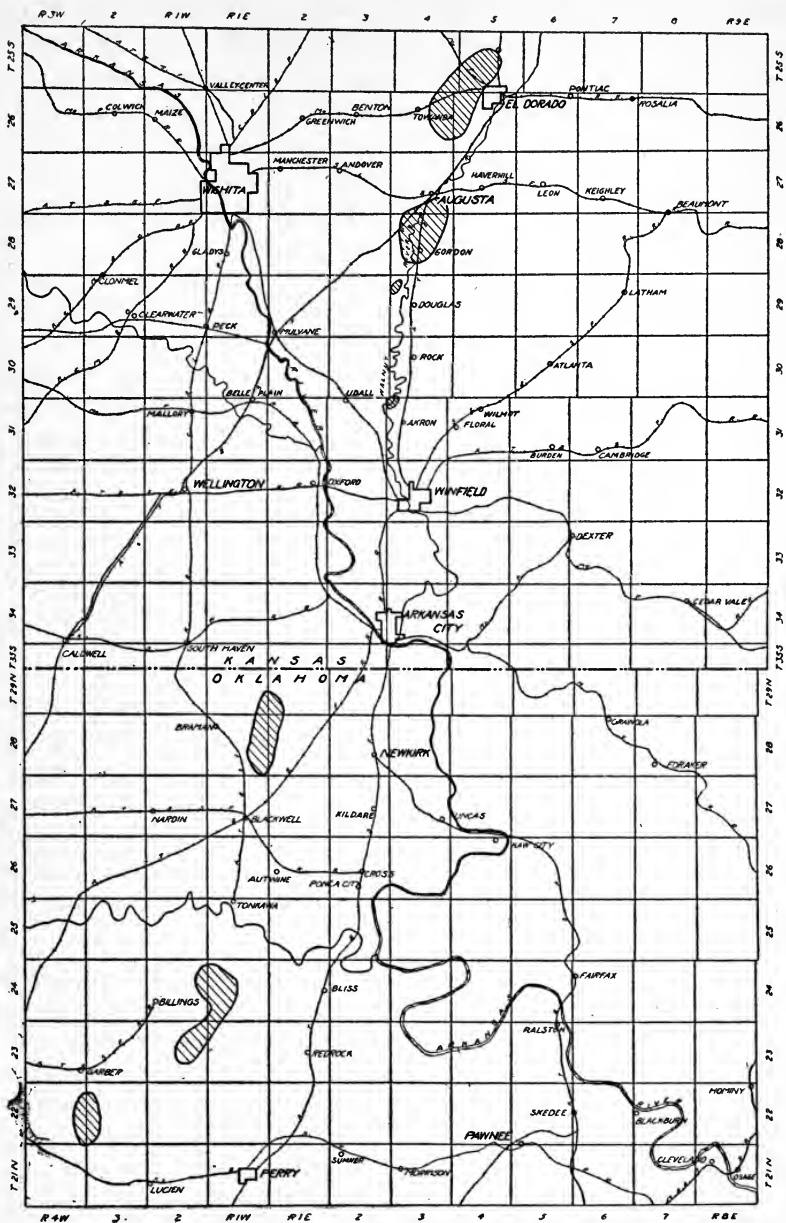
By this work were opened three prolific oil and gas pools now among those attracting the attention of the entire oil fraternity—the Augusta pool, the North Augusta pool and the Eldorado pool, all of Butler County, Kansas, which represent a good individual example of geology applied to the oil industry.

After several years of unsuccessful attempts to open the Augusta gas pool along the customary practical lines, and this field abandoned several times as small, spotted and of no great consequence, crude methods of geological disclosure were attempted, which were very successful from their earliest application in 1913 until today. We have now one of the great pools of the mid-continent field. The earliest attempts were made by taking the level or altitude at the mouth of each of the wells drilled, whether productive of gas or dry, and plotting an arch representing the top of the gas-bearing sandstone stratum from the well logs or drilling records, taking this cross section at several points and indicating the true axis of the anticlinal dome, and thereby within a short period of time the field was extended several miles in length by actually producing wells. Later a carefully prepared plane table survey of the structure was made, using the Ft. Riley limestone

outcropping at the surface as a base or datum on which to plot the structural contours, thus disclosing a dome or trap extending in an irregular shape for seven miles in length and at least two miles and a half in greatest width. Meanwhile detailed surveys were made of many of the older developed fields, checking up the relationship of geologic structure to the deposits, even in fields which were replete with dry holes, and considered spotted, with rather remarkable results, and many new views and helpful deductions derived. Such study was used as the basis for application in the forecasting of productive territory in the Augusta and Eldorado and other new fields. It was very apparent that with careful geologic study upon sound lines that practically all of the main productive fields of Kansas and Oklahoma could have been forecasted and opened strictly upon geological evidence. The famous Cushing field and the Blackwell field of Oklahoma are remarkable concurrences to geological structure. The extent and limits of the Cushing field being clearly forecasted by geological surveys made after its discovery, but prior to its development.

The earlier methods of application were principally to plot the contours of the top of the producing sand, or stratum, perhaps a thousand or several thousand feet underground, or of some marked stratum underground, and easily identified in the well logs. However, the general features of a vast territory can soon be studied out and its regularity as to thickness of geological strata or formations in the series reasonably determined. In such areas where the strata bear fairly uniform thickness and individual strata do not vary rapidly, surface contours of exposed or outcropping limestones or resistant sandstones are sufficiently accurate guides for outlining underground reservoirs or traps worthy of search or wildcatting.

In general it must not be understood that such forecasting is a simple matter, for it is not. At best there are many chances of failure, even after a possible trap is disclosed upon the surface of the ground. Not only is there a danger of the trap flattening before porous strata are reached, but there may be no porous strata underneath. Again, there may be, but filled with salt water; again, there may be some denser impervious area intervening on the slope, preventing the oil and gas from collecting in the dome or trap, and last, but not least, there may be no gas or oil in any of the formations tapped and so no deposit may be found. Sands often pinch out and terminate. Sometimes there is a gradual



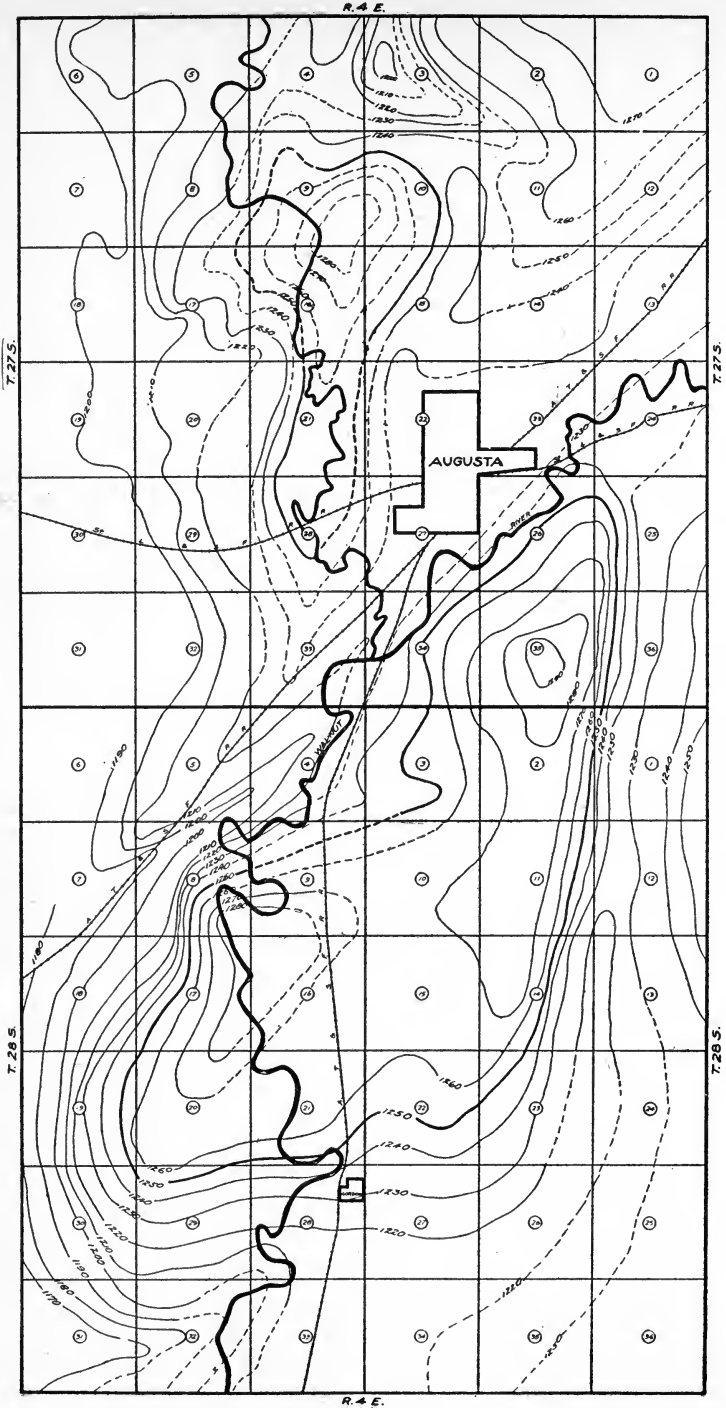
change from sandstone to limestone, or shale, or faults may occur to permit the oil and gas to escape. Again, oil or gas appear to rise up into the higher portions of the structure, chiefly floating on water, and if the water level or horizon is low down on the slope, the oil may even occur in a syncline or on a gentle slope. There are many exceptions to the rule that oil must occur at the highest point of a porous sand, and all the various features must be studied in working out the possibilities of a new field.

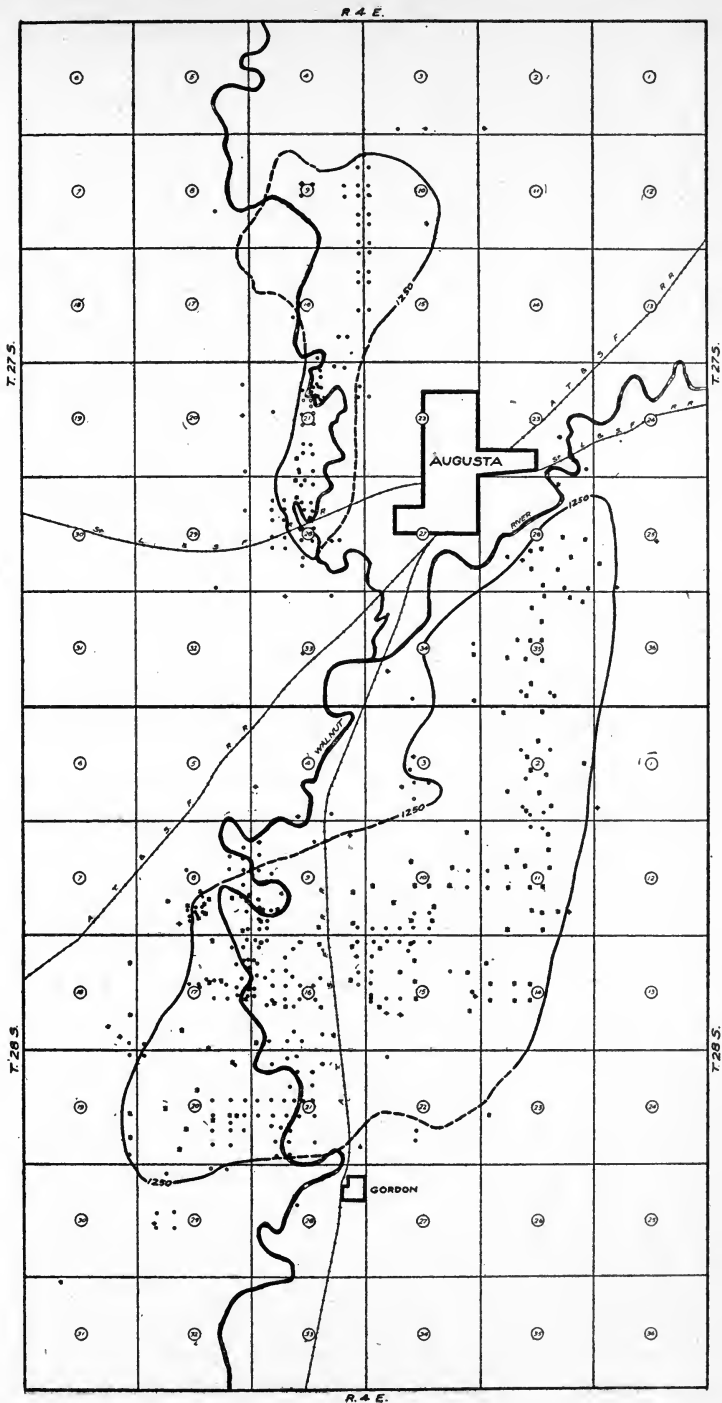
In Washington County, Oklahoma, in a territory thoroughly tested out, in the old way, and condemned as worthless by an unusual number of dry holes or failures, recently two good oil and gas fields have been opened by geological forecast.

Only patient, careful thoughtful study can avail. General reconnaissance alone cannot produce very successful results, and the experience in one section of the country cannot avail in other sections, as each has its own problems.

Peculiarly, few of the individual sectional fields have productive formations in common. There are sufficient unconformities occurring in various parts of our country to in many instances cause the productive formation of one field to be entirely missing in another. The Ontario fields are of the oldest formations yet found productive, while through Ohio, Pennsylvania, West Virginia, Kansas and Oklahoma, Louisiana and the gulf coastal plane, and California the geological age grows more recent, almost in the order as named. Each section has its own characteristics as to volume and size of wells, quality of the oil or gas produced and continuity or life of production. The characteristics of any one field or section are no criterion of those of any other field, each seeming to stand on its own basis, and often exceptions are disclosed which are far-reaching in their effect.

In the development of the Augusta, Kansas, field geological guidance has been employed almost entirely. The early surveys of several years ago have proven out to be remarkably accurate by the extensive drilling to date. The geological contour map (Fig. 1) illustrates the extent of the trap, as outlined by the 1,250-foot contour, representing the last completely closing contour. This contour has become commonly designated as the "deadline." It is the outline of the trap, as indicated by the survey prior to development, and is proven such by the great number of dry holes drilled along that line, tapping both the 1,500-foot gas sand and the 2,500-foot oil sand. By reference to Fig. 2, on which the "deadline" is indi-





cated, it will be seen that there are only a few producing oil and gas wells a short distance outside of the "deadline," while there are 19 dry holes drilled close to it and well surrounding the pool. Within the "deadline" there are drilled 235 wells, 114 of which are gas wells, to the 1,500-foot sand, and 115 are paying oil wells, representing the remarkable record of 97.4 per cent pay wells drilled over a period of three years.

In the Eldorado field, some fifteen miles north of the Augusta field, and entirely distinct and separate from it, the discovery well was drilled just one year ago. This field was surveyed and forecasted from its conception by geological study, and the initial well was located on the peak of the structural dome formed by the Ft. Riley limestone as the datum or marker. This field differs from the Augusta field in that the surface topography and the structural contours closely coincide. In other words, the topographical peak and the structural peak lie at one common point.

The Augusta field topography does not coincide with the structural contours. In fact, the Walnut River crosses one of the structural peaks, thus placing the lowest point of the topography upon one of the highest points of the structure. Thus it is plain that care must be exercised in distinguishing between the topography and the structure. This is not easily done when the outcropping formation is shale or easily eroded sandstone, nor in river valleys filled with wash or alluvial deposits. Every possible means of identification or disclosure of the structure available must be considered to procure the most accurate results.

Map, Fig. III, represents the Eldorado dome, or trap, which is located on the same general anticlinal structure as the Augusta, Douglas, Akron and Blackwell fields, each locality representing a trap or dome on the anticline in which a deposit has been developed or disclosed.

The Eldorado pool as outlined by the original survey contains about 25,000 acres of land, part of which is condemned by a sharp fold penetrating the main dome across sections 12 and 1. The past year, since the original discovery well, there have been drilled within the lowest closing contour, at 1,330 feet above sea level, 492 wells, of which 446 are oil wells, 21 are gas wells, 25 are dry holes, representing a record of 95 per cent productive wells, a record perhaps never before equaled on so extensive a scale except in the Augusta field, also outlined by geological guidance. (See Fig. IV.)

Lying between the Eldorado pool and the Augusta pool, just

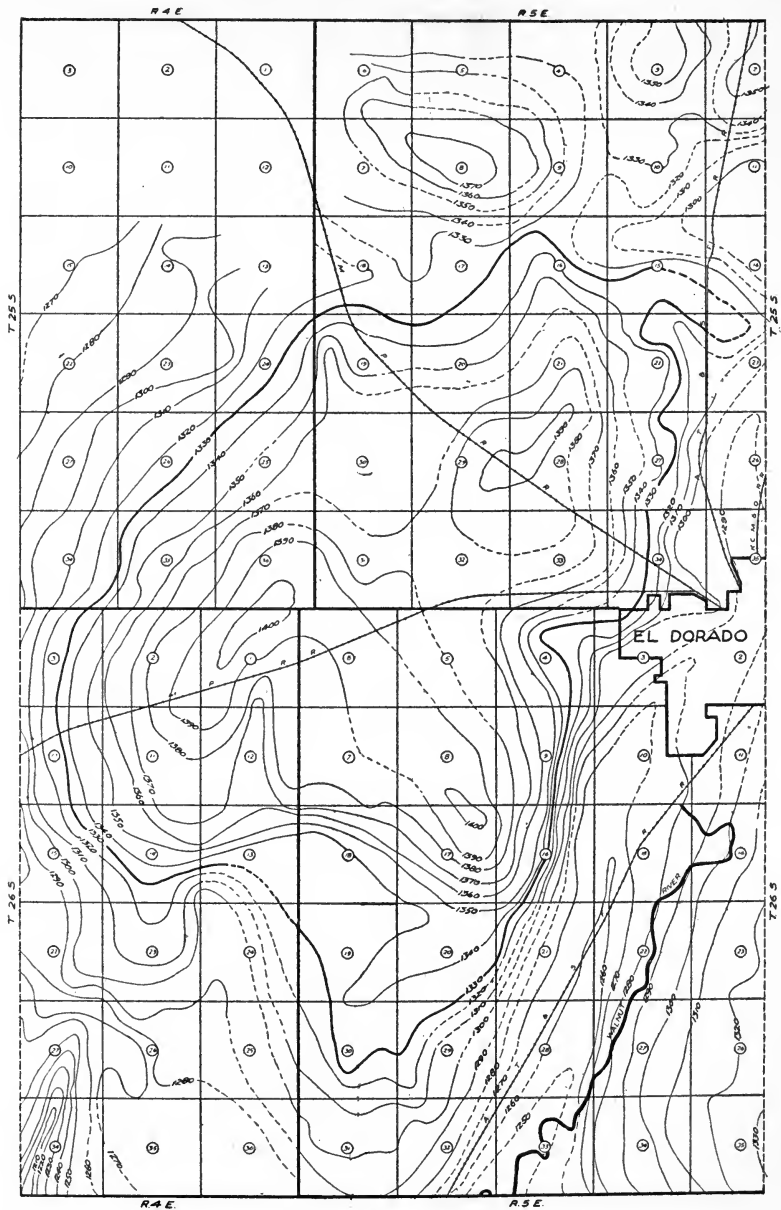


Figure III.

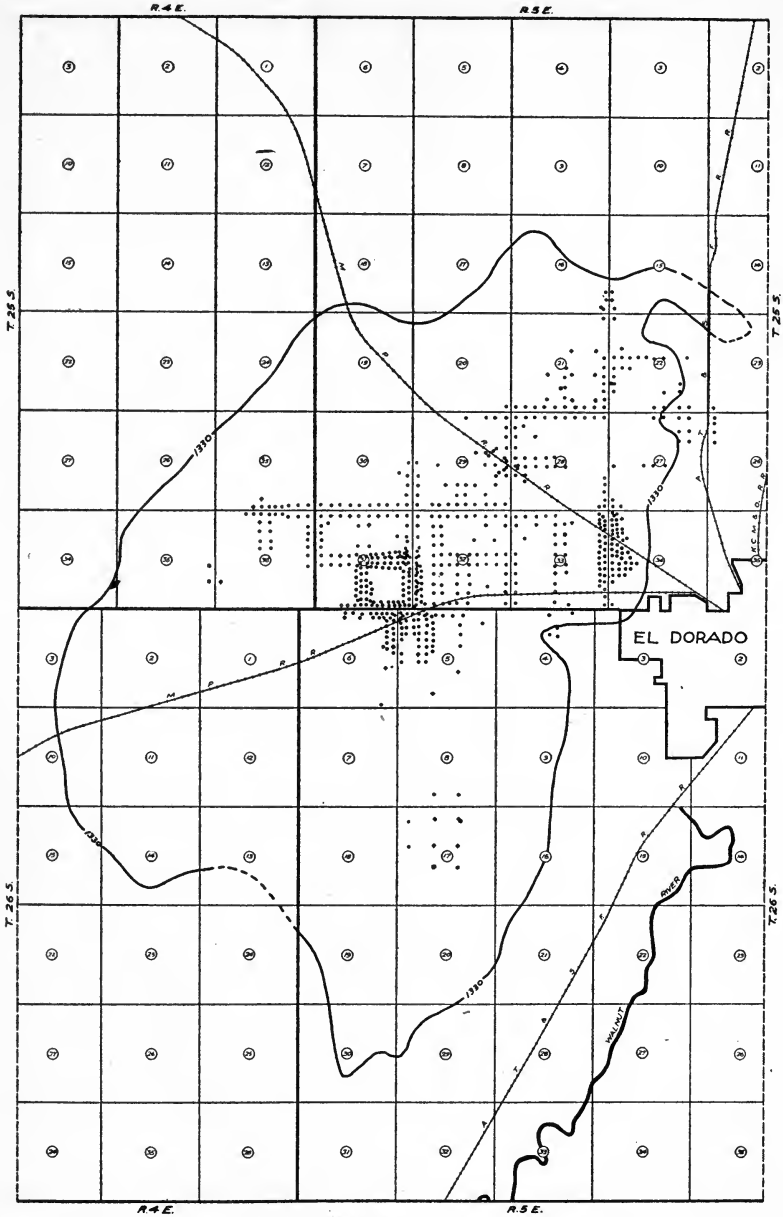


Figure IV.

west of the town of Augusta, lies a dome, or trap, constituting the North Augusta pool (Fig. I), also surveyed and forecasted by geological work prior to any development, but now being developed into a very prolific pool. According to the ordinary practical methods of development, intervening land would be considered almost certain of production, and that the three pools would be in one continuous pool. The geological surveys would forecast them as entirely separate pools, not possible of connection, which also being fully borne out by the number of dry holes drilled in the intervening territory.

Another feature disclosed by experience is that the quality of oil and gas produced in these three pools from the same sand or stratum are different in character and quality. The oil of North Augusta field is of 38 degrees Baume gravity, and gives 33 per cent finished gasoline and 25 per cent finished kerosene, and is of paraffine base, free from sulphur, and is of the highest grade crude oil found in Kansas-Oklahoma fields. The Augusta oil, but a few miles away, is of 34 degrees Baume gravity, produces 21 per cent finished gasoline and 40 per cent finished kerosene, and carries a small amount of sulphur. The Eldorado oil is of 38 degrees Baume gravity, gives 30 per cent finished gasoline, 23 per cent finished kerosene and is free from sulphur. All these oils are produced from the same formation. There can be no question that the application of geological study as applied to these fields and to other fields opened in Kansas and Oklahoma in the past two or three years is very successful, and can be applied with proper modifications to other fields. Kansas would not occupy the important place in the oil industry that it does today were it not for the application of geology to the searching for fields in that state, which was practically condemned under the ordinary methods of wildcatting.

Geology and Structural Features of the Augusta Field.

The Devonian system in Oklahoma and Kansas as disclosed at present is represented by the Chattanooga shale.

The Mississippian system lies above the Chattanooga and consists mainly of limestone and chert. It has a thickness of about 275 feet.

The rocks exposed at the surface in the Augusta field are of Permian age, and lie about 350 feet above the top of the Pennsylvanian system, on which they lie conformably. The formations exposed at the surface are:

Winfield limestone	25 feet
Doyle shale	60 feet
Ft. Riley limestone.....	40 feet
Florence flint	20 feet

Total 150 feet

The Winfield and Ft. Riley limestones are excellent horizons for determining the geologic structure by plane table methods, the Ft. Riley being used as datum on which the structural contours are plotted. (See Fig. I.)

The Pennsylvanian system, which lies below the surface at this place, consists of about 2,500 feet of alternating limestone, shale and sandstone beds. (See Fig. V.)

In the Augusta field the first production is found at about 520 feet below the Ft. Riley limestone. The second production at about 1,500 feet in depth, and the third at about 2,500 feet. The drilling to date has not revealed any producing sands below the 2,500-foot level, but it is not unlikely that other producing sands will be found. The 500 and the 1,400-foot sands produce gas, and the 2,500-foot sand produces oil. Another sand at 1,700 feet in depth is locally productive of oil, but it is frequently missed. A remarkable feature of the 2,500-foot sand is that it contains no gas.

The producing sands in the older pools of the mid-continent fields lie in the lower portion of the Pennsylvanian series, the big producing sand being known as the Bartlesville sand. Several sands, however, are locally productive, and have received local names, such as the Burgess, Squirrel, Peru, etc.

These sands are well known in eastern Kansas and north-eastern Oklahoma, where the development for oil and gas first began, but their correlation across the state into the Augusta field has not been established.

The 2,500-foot sand, or Varner sand, is thought to be equivalent to the Peru, which lies in the Labette formation, between Ft. Scott and the Pawnee limestones of the Pennsylvanian system.

In Oklahoma and Kansas the normal structure of the oil and gas bearing formations is a westward inclining monocline. The rocks are dipping westward at a rate of about thirty feet per mile, away from the Ozark Mountains, the uplift of which seems to have been the center of the crustal movements which caused the inclina-

tion of the oil-bearing rocks. Movements in the earth's crust, from some cause, has interrupted the normal dip of the strata, and produced folds. These folds, anticlines, and synclines, as they are called, extend usually in a northeast-southwest direction in the mid-continent field. They are usually not long, continuous folds, but separate, irregular anticlines, which succeed one another in a more or less general direction.

Thus the Eldorado, North Augusta, Augusta, Rock, Blackwell, Billings and Garber fields form a series of separate domes along a trend of anticlinal folds. (See Fig. VI.)

Several of these trends extend almost across the states of Kansas and Oklahoma. The most easterly one passes through the old Aliwee—Coody's Bluff field—and another probably passes through the old Hogshooter pool. Still a third extends through the Cleveland, Cushing, Pawhuska and Peru fields, and several others are known to exist.

The structure existing at Augusta was determined by a detailed survey. Actual elevations above sea level were established at as many points as possible on top of the Ft. Riley limestone, and contours were drawn through all points having equal elevation. These contours have a ten-foot interval. The structure was mapped on a scale of 1,000 feet per inch. In this way the actual dip and strike of the strata at every point could be determined and the structure accurately portrayed.

Reference to the structural map (Fig. I) will show that the Augusta anticline is of an irregular shape. The highest contour is 1,290, and the lowest closing is the 1,250, or in other words, the highest point on the enclosing syncline is at least 50 feet below the peak of the anticline.

In general the successful results so far obtained in applying geological principles to the practical production of oil and gas are but forerunners of what may be expected in the future, when further advantage is taken of the many new discoveries, theories and conclusions now being disclosed to the operators following geological guidance.

In a paper of this kind, and at the present time, it would be unwise to disclose further theories, the application of which our geologists have convinced us have been the chief factors in their remarkable successes in locating oil and gas deposits in the mid-continent field.

In preparing this paper I am greatly indebted to Mr. Alfred J. Diescher, vice-president, and Everett Carpenter, chief geologist, of the Empire Gas & Fuel Company, to whose original ideas, persistence and painstaking work we feel we are indebted for valuable discoveries.

J. C. McDOWELL,
President, Empire Gas & Fuel Company. ✓

THE SHERMAN LAW AND ITS RELATION TO MINING.

Address Delivered Wednesday, November 15, by Glenn W. Traer, of Chicago, at Nineteenth Annual Convention of American Mining Congress.

During the past year we have numerous illustrations of how the law of supply and demand sometimes works in favor of sellers.

Everyone knows what has happened in connection with iron and steel, copper, zinc, chemicals, wheat and many other commodities. Common labor costs twenty-five to thirty cents per hour in Chicago today and is scarce at that. Two years ago the bread lines numbered thousands. The rising tide finally has reached and lifted even bituminous coal.

The custom in ordinary times is for several millions of domestic consumers, who could easily and cheaply secure their autumn coal supply during the summer months, to refuse to do so and throw the peak load of their requirements upon the market in October and November. Industrial consumers are not so completely improvident, but their requirements are materially increased at the same time. This custom of ordinary times is continued with cheerful optimism into a situation like the present one. The railroads are overwhelmed with freight and are unable to furnish sufficient cars and motive power to keep the mines in steady operation. Consumers find prospects of delivery remote and uncertain. Cheerful optimism gives place to alarm and a buying panic ensues. It is no more unnatural that coal prices should rise rapidly and largely under such circumstances, than that wheat should do so under like conditions.

Fortunately, it is probable that the acuteness of the situation is only temporary and may pass in a few months. It is undoubtedly true, however, that the normal demand for coal has suddenly expanded in a material degree and that the level of prices will be substantially higher for a number of years to come.

I believe it to be undoubtedly true, also that the level of prices is now very much higher and will remain perceptibly higher for a considerable time, than would have been the case if the industry

had not been so weakened and depressed by extreme and needlessly severe competition.

A period of severe depression, without ability to mitigate the peculiarly exhausting competition which is characteristic of bituminous coal mining, leaves the industry with no recuperative financial power and with lessened productive power.

Perhaps the most noticeable weakness at first, is a lack of miners and laborers at the mines. Too many operators have been trying to keep their mines in operation. The aggregate available business has been sufficient to give them only very slack running time. The miners and laborers have averaged less than two hundred days' work per year, for a number of years. When other industries became more active many men were drawn away from mining, by the prospect of steady work elsewhere. Under the sudden peak load of autumn demand the coal operator is confronted with inability to operate his mines a considerable portion of the time from lack of railroad cars; and with lessened capacity on running days, from lessened working force.

For years coal operators have dwelt upon these, as well as other peculiar features of the industry, and have predicted, as one of the results, precisely what is happening now. We have persistently urged upon the public and upon the law-makers that the federal anti-trust laws be amended so as to permit some reasonable regulation of destructive competition. We have asked that this be permitted only under the eye and subject to the control of a commission, whose approval should be subject to reversal by the courts, but until reversed and the reversal disobeyed, would protect the parties from criminal prosecution. To the criticism that a commission ought not to be intrusted with such a power, it has been answered that the Interstate Commerce Commission, for years has been vested with and has exercised greater power and its findings are generally considered to have added greatly to the public welfare, including even the railroads themselves.

It has been shown that unregulated and destructive competition, such as has existed in the bituminous coal industry, is inimical not only to invested capital, but to the best interest of the workmen in the industry and to the general public. The fundamental difference has been pointed out, between competition in a mere merchandising and industries based upon the preparation for market of exhaustible and irreplaceable natural resources. It has been made plain that without special forms of regulation, competition in bituminous coal mining is carried on practically under duress and

without reasonable equality of advantage or disadvantage as between buyer and seller; also that a continuance of destructive competition drives irresistibly toward the natural elimination of competition through the absorption of the weak and exhausted by the strong. It is as futile to protest and threaten against such a tendency as against the operation of any other natural law. This agitation was commenced as long ago as 1911.

In 1914 the federal anti-trust laws were amended by the so-called Clayton Act and the Trade Commission Act. Neither of these laws, however, reflects a practical understanding of the problems of industry or a spirit of helpfulness.

They seem rather to reflect a spirit of ossified suspicion, harshness and increased restraint. The subject assigned to me does not call for a discussion of these acts except as they relate to bituminous coal mining.

I think it is fair to say that the provisions of the Clayton Act furnish no helpful suggestion for dealing with the present practical problems of this industry or any that appear likely to develop. Sections four and five threaten even the weak who, in the struggle, not for monopoly, but for self-preservation, may dare to co-operate for the regulation of peculiarly destructive competitive conditions in their industry.

I think it is fair to say also that the Trade Commission Act strongly resembles an attempt to give the appearance of something without giving the substance. No reflection or criticism upon the commission personally is intended. For its evident desire and efforts to be just, helpful and constructive, the commission is entitled to proper credit. The weakness is in the law. No initiative power is conferred upon the commission except to prevent the use of "unfair methods in competition." The vagueness of the power is self-evident. The word unfair of course is not meant in an ethical sense, but in a legal sense. No legal definition of unfair methods in competition exists.

No single definition could be made which would be wholly comprehensive. From the passage of the original Sherman Act until a conclusive legal definition of restraint of trade was laid down by the Supreme Court of the United States was about twenty-four years. Doubtless within the same period of time we might have numerous acts in competition, legally identified as unfair. But does anyone believe that the list will be completed and closed within that time or ever, so that a business man can determine in advance of being prosecuted what he may or may not do safely? It

seems as probable, if not more so, that the courts will declare this provision of the act invalid for indefiniteness, not only of expression but of reasonable ascertainment, under the rules of statutory interpretation.

Other than that to which I have just referred, the commission is vested only with power to make investigations and reports and recommendations to superior authorities. In the matter of these investigations it has the initiative in only one class of cases; that is, cases which already have been finally decided against the defendants; and for the purpose only of ascertaining the manner in which the final decree of the court has been or is being carried out.

Only upon the application of the Attorney General may the commission make investigations and recommendations prior to prosecution; and in such cases its recommendations are given no force or effect and can have none except at the pleasure of the Attorney General. The office of Attorney General was created to advise and assist the executive in the enforcement of laws. The form and personnel of organization are not designed for administrative or constructive work. Its activities should be confined to the purposes for which it was created. It was not created to officially advise citizens, either natural or corporate, and could not undertake to do so. If the Attorney General were to issue an opinion passing upon the legal significance of the acts of a citizen or citizens, such opinion would have no direct legal effect whatever.

I submit to this Congress whether the governmental answer to its pleas for assistance in working out a difficult public problem, in the best interest of the whole public, is in any way adequate or should be accepted as conclusive.

It seems to me that the answer should be that it is not; and that this organization should not rest until a juster and more equitable state of law has been brought about, together with constructive methods for its administration.

I urge that you again assert that it is the deliberate judgment of your organization that arrangements among producers and distributors shall not be declared unlawful, unless the purpose or the necessary result shall be harmful to the public interest or shall give either buyer or seller an arbitrary advantage; also that the Trade Commission shall be vested with power to pass upon the propriety of such arrangements, with power in the courts to reverse the findings of the commission, but that no person or corporation shall be liable to criminal prosecution or civil damages while acting within the scope of an order of the commission.

OIL STORAGE.

Address Delivered by Garrett B. James of Chicago, Thursday,
November 16, at Nineteenth Annual Convention
of American Mining Congress.

Introduction.

Although the petroleum industry of America is of comparatively recent origin, the crude oil has without doubt been long used by the Indians. In Sagard's *Histoire du Canada*, published in 1632, is a letter, dated 1629, which describes a visit of a Franciscan to the oil-springs of what is now the State of New York. Even though the existence of petroleum over quite a large area in the United States was known at an early date, there are no records of the systematic collection of oil prior to its being obtained in fairly large quantities from the brine-wells which were worked for salt extraction.

According to authentic records the first oil well, drilled by steam power, in the United States, was located near Titusville, Pa., in August, 1859, by Mr. E. L. Drake. Thus the year 1859 marks the beginning of the commercial development of oil resources in this country. The first flowing well was completed about two years later. The following statement serves to indicate the early growth of the American petroleum industry: "In 1859 the total production, which was wholly obtained from Oil Creek, was 2,000 barrels. In June, 1860, the wells along Oil Creek yielded about 200 barrels daily, and in September about 700. The yield then rapidly increased, owing to the discovery of flowing wells, until during the winter and spring of 1861 to 1862 it amounted to about 15,000 barrels daily. The price obtained for the crude oil then fell so low that production was largely arrested, until 'the production in 1863 was scarcely half that of the beginning of 1862, and that of 1864 still less. In May, 1865, the production had declined to less than 4,000 barrels a day, the valley of Oil Creek being the only producing locality at that time.'" (Cone and Johns, *Petrolia*, N. Y., 1870.)

After the middle of the year 1864 the industry began to expand, and the production has since steadily increased with the opening of new fields in different parts of the United States. A com-

bination of the figures for marketed production and of the estimated quantity of oil placed in producers' storage gives more than 290,000,000 barrels as the total yield of the oil wells of the United States in 1914. (Mineral Resources of U. S., 1915.)

As all the petroleum is not marketed immediately after production containers for storage are a necessity. Some form of either temporary or permanent storage tank must be provided wherever an oil field is opened up and also at receiving points for the refinery industries.

Nature and Characteristics of Material.

Crude petroleum varies greatly in character and physical properties. It varies in color from straw-yellow to brownish-black. Some samples are highly mobile while others are quite viscid. According to different authors the specific gravity ranges from 0.771 to 1.06. The origin of petroleum has been the subject of much discussion among chemists and geologists for a number of years. Two groups of theories have been set forth, namely, the inorganic and the organic. The inorganic theories consider petroleum to have been produced from inorganic substances, while the organic theories state that it has resulted from the decomposition of animal or vegetable matter, or both. The organic theories, while still subject to considerable speculation, are now generally accepted. The two general classes into which petroleum may be divided are those of the "paraffin-base" and the "asphaltic-base." The first class mentioned yields solid hydrocarbons of the paraffin series while the other class is rich in asphalt and contains practically no solid paraffins. No sharp line of distinction can be drawn, as some oils contain both asphalt and paraffin. Chemically speaking, crude petroleum may be considered to consist essentially of a complex mixture of hydrocarbons of different boiling points often accompanied by sulphur, nitrogen and oxygen in small amounts.

Flash point determinations conducted on samples of crude oil show results as low as -18.5°C . (-1.3°F .) with the Abel-Pensky instrument. Tests of the explosive range of petroleum vapors have been conducted by numerous investigators, the results indicating that mixtures of the vapor with air, containing 2.5 to 10 or 11 per cent of vapor by volume are explosive.

Present Methods of Oil Storage.

Three general types of storage tanks are in use in the oil fields, namely: Steel tank with wooden roof, steel tank with gas-tight steel roof, and earthen tank. Steel storage tanks are sometimes of

35,000 or 37,500 barrel, but usually of 55,000 barrel capacity. At the end of the year 1915, there had been erected in the State of Oklahoma 1,552 steel tanks of the 55,000 barrel size and 17 more were in process of construction (Oil and Gas Journal, Tulsa, Okla.). The number of 35,000 and 37,500 barrel tanks that had been completed in Oklahoma up to the end of 1915 was 913. From these figures it may be estimated that over \$8,000,000 is invested in steel tanks in this one state alone. The cost of hauling and grading for these tanks amounted to over \$25,000,000.

In the construction of the large steel tanks with wooden roofs the steel entering into the tank shell and bottom is generally of open hearth steel plate. The roof is supported on wood posts with plates at the top. A wood sheathing is then nailed over wood rafters and covered with galvanized sheet steel, closely nailed, or with roofing paper.

In the construction of the steel tanks with gas-tight steel roofs, wood posts are usually eliminated and the roof supports consist of channels and I beams on pipe posts in place of wood supports.

Usually the oil fields are so far from the railroads that it is impossible to build tanks fast enough to take care of production, and much oil has to be stored in earthen reservoirs which are not much more than holes in the ground, roofed sometimes with corrugated iron or loose wood construction.

The loss of natural resources occasioned by storing oil in earthen storage has been brought out very forcibly many times and it may be easily perceived that the lighter constituents of the oil will soon pass from it into the air when no roof is provided for the tank. The roofs on any covered earthen tanks are generally of loose construction and evaporation takes place, but not quite as readily as in the case of open storage. In addition to the evaporation loss a considerable amount of oil is lost due to seepage. Oil standing in open earthen reservoirs has been known to shrink as much as 40 per cent in the course of 15 to 20 days.

The two main points to be considered in the storage of petroleum are evaporation and fire hazard. The loss of the lighter or more volatile constituents of the oil lowers its value to a more or less marked extent from the refiner's point of view. The open storage oil is reduced in value probably 30 to 40 per cent, but the fire hazard is somewhat lower, this immunity being secured due to the loss of the more volatile content.

Detail figures showing the loss by evaporation or seepage from a 55,000 barrel wood roof steel tank in Oklahoma during the sum-

mer and fall of 1914 are given below. The bottom and shell of the tank seemed to be in good condition and the wood roof, covered with paper and tarred, was apparently tight. Between June 26 and September 4 the loss was equivalent to 993 barrels. The tank was then topped out and the loss between September 7 and November 23 amounted to slightly over 1,100 barrels, making the total loss about 2,100 barrels between June 26 and November 23. Other similar tanks showed a loss of between 2,000 and 2,500 barrels during the same period.

No detail figures concerning the loss of oil during storage in steel tanks with gas-tight steel roofs were available for comparison against the figures given above, but with tight roofs the evaporation has been found to be very much less. The estimated cost of putting on riveted and caulked steel roofs on steel rafters with posts, plates, etc., of steel is about \$5,000 to \$6,000 while the estimated cost of the wooden roofs generally used is between \$3,000 and \$3,500. A very conservative estimate of three per cent saving yearly, due to decreased evaporation losses with gas-tight roofs, should be considered. Figuring that the average amount in a 55,000 barrel tank is 50,000 barrels, the yearly saving would be 1,500 barrels of gasoline. As this gasoline is worth at least \$4.00 per barrel, the yearly saving due to the gas-tight roof would be about \$6,000. On this basis the difference of \$3,000 in cost between the steel roof and the wood roof would usually be saved in a little over six months and in most cases in less than one year. A new wooden roof could be replaced by a steel gas-tight roof and the whole expense could be met by the saving due to decrease in evaporation losses in two or three years.

Submerged concrete tanks have been advocated in some parts of the United States and a number of such containers have been built. The construction cost has been high, and so far their use for the storage of oil has not always been satisfactory, as it is difficult to build a large reservoir through which the oil does not seep to some extent. It is often necessary to run water into concrete reservoirs to save the oil, the seepage sometimes amounting to hundreds of barrels per day.

Fires.

A complete record of oil fires in Oklahoma and Texas since the start of production is unobtainable. An examination of all available records covering the period from January, 1907, to January, 1916, shows that about 99 per cent of all fires were due to

lightning. Of the total losses 32 per cent occurred during the month of August, and no losses were recorded for December or January.

Fires of oil in storage may be attributed to many different causes falling within two general classes, viz.: ignition by electrical discharge and ignition by communicated flames. Matches, smoking open lights and friction have also been responsible for oil tank fires. Defective electrical installations and unprotected electric light bulbs may also cause oil fires and have been known to have done so. The boiling over of burning oil has often communicated flames from one tank to its surroundings, causing additional losses. Lightning has caused fires by striking drilling derricks, gas wells, oil wells from which considerable quantities of gas were allowed to escape, flow tanks, stock tanks, gathering lines and pipe lines and the flames being communicated to near by tanks.

In an oil field, lightning does not always strike single objects. For example, a fire in the Cushing field of Oklahoma might be cited. On August 27, 1914, a single flash of lightning caused a dazzling sheet of flame more than three-quarters of a mile in length and simultaneously ignited three 55,000 barrel steel tanks and many smaller tanks covering a range of one mile in length and one-fourth of a mile in width. The large extent of the fire may be considered as due to the fact that the lightning flashed into a highly inflammable atmosphere, over the field, composed of air and gas. Such an example serves well to indicate that storage tanks should be located away from the producing field. Open fires have been responsible for some quite extensive conflagrations and a number of smaller oil fires. Ignition has been caused by fires under boilers or in derrick forges, by unprotected lamps, burning matches and smoking.

Numerous miscellaneous causes may be mentioned, among which are grass fires, brush fires, spontaneous heating of oily clothes and ignition of waste oil in the field or near storage tanks.

Present Methods of Fire Protection.

The precautions commonly taken for protection of storage tanks against loss by fire are as follows:

- (1) Permanently grounding all flow lines or other pipe lines before making tank connections.
- (2) Building a retaining wall or embankment around each.
- (3) Having steam connections to all tanks and maintaining

steam pressure in boilers so that live steam may be turned into tanks on the approach of a storm.

The practice of grounding all flow lines and other pipe lines before making connections to tanks is generally observed in the oil fields and on the tank farms. The usual method employed for pipe lines laid on top of the ground is to bury them for a short distance near each tank or well to which they are connected. Unless pipe lines are properly grounded, there is a danger of lightning causing the entire pipe line to become heavily charged. This might result in serious fires at all tanks and wells to which the line connects.

The embankments, built up of earth, around tanks are usually high enough to retain the contents of the tank in a quiet state, but when the oil is heated to such an extent that boiling occurs, and particularly if the earth is wet or water covered, the boiling of the oil causes it to overflow the embankment. In such a case additional embankments are usually thrown up to prevent the spread of the flames. Cannons are sometimes provided on tank farms, in order to be able to shoot a solid projectile through the wall of the tank. In this way the oil can be permitted to run out over the surface of the ground where it will burn harmlessly within its prescribed bounds.

Most of the steel storage tanks are provided with steam connections at the goose necks, but some tanks have no provisions made for the use of steam over the surface of the oil contents. The steam when properly applied, causes the liberated gas and oil vapors to be blanketed and rendered incombustible. The steam lines in many instances are laid on the surface of the ground, uncovered, and the heavy rains that usually accompany an electrical storm serve to cool the pipe and cause condensation. It is doubtful whether a sufficient volume of steam could be delivered through such a line to be effective at a tank any distance away. The apparent failure, in some cases, of steam to prevent the loss of tanks by fire cannot be considered as a proof that it is inadequate; the methods of application were probably at fault.

Suggested Precautions.

The precautions usually taken have undoubtedly, in many instances, prevented fires or served to reduce the amount of loss by fire. It is also true that there have been instances when the best methods of protection yet applied have failed in their purpose. Steam lines for all tanks should be of large size and enclosed in

tight wooden boxes or otherwise insulated to prevent condensation. Suitable ground connection should be made at each tank. All pipe lines should be either underground or buried for a short distance near each tank or well to which they connect.

Drainage pipe connections of large size should be made to each tank, whereby a portion of the contents may be withdrawn by means of suction pumps and delivered to other tanks at a safe distance from the fire. Strainers of large capacity, and so arranged as to be readily cleaned without interrupting the flow of oil, should invariably be installed in such suction lines, as otherwise the pump would be rendered inoperative by the quantities of charcoal or other material that would find its way into the suction line with the oil.

The most effective means known of reducing the fire hazard of oil in steel storage would be the equipment of all steel tanks with *gas-tight steel roofs*, properly vented, so as to eliminate any possibility of back-firing. All steel tanks and pipe lines connected to them should be thoroughly grounded electrically. The wooden roofs at present in use on steel tanks may be greatly improved by the addition of a substantial metallic sheathing, making good gas-tight electrical connection with the shell of the tank, thoroughly grounding the tank electrically, and making the roof gas-tight. The electrical connection between the metallic covering, over the wood, and the shell of the tank, may be made by bringing the sheathing over and under the angle iron at the top of the shell. This joint should be made gas-tight by means of caulking or a suitable material used as a gasket. The top angle should be tightly caulked to the shell, using additional rivets where necessary.

As a thoroughly grounded gas-tight tank of metal, or one sheathed with metal, is safe from damage by lightning, and will also reduce evaporation losses to a very marked extent, the additional cost for building such a tank will be saved in a comparatively short time.

The use of explosion hatches is strongly advocated by some tank builders and tank owners; but with a gas-tight steel roof and proper vents, in a territory where fires and explosions from causes other than lightning are not feared, no explosion hatches would be needed. As an additional safeguard they might be used. If used at all, the explosion hatches should be of very light construction. Tanks equipped with gas-tight roofs should be provided with suitable vents to take care of the rise and fall of the level in the tank due to inflow or discharge of oil. These vents must also prevent

the ignition of the gas in the tank through the vent. The gauge hatches in the roof should be made tight or have hinged covers which by their own weight, would maintain a gas-tight joint. These hatches should be closed, except when gauges are being taken. The location of these hatches is a matter of choice, but the placing of one near the stairs would be very convenient for ordinary gauging. The winch-box, or boxes, should be gas-tight to carry out the plan of making the roof gas-tight. As the value of the gas-tight roof depends upon its condition, careful inspection should be made frequently of the roofs, vents, gauge hatches and explosion boxes, if any are used.

Another idea in connection with the use of gas-tight steel roofs has been suggested. The tank is to be so constructed that a small pressure will be maintained in the tank at all times. When this pressure increases, due to expansion of the vapor above the oil, it will be relieved automatically and kept at the correct amount. If contraction of the vapor occurs, natural gas will be introduced over the surface of the oil to maintain the proper pressure. With such an arrangement, the evaporation will be reduced to a minimum and the mixture over the oil will be kept too rich in vapor to explode. A pressure regulating device could be placed on the tank and no difficulty would be encountered in maintaining the desired pressure in the tank. Another economical system would contemplate the use of gas-tight tanks for oil, with a suction pipe connection to the space above the oil, whereby the gas which arises from the oil may be withdrawn from the tank. This gas could then be delivered to a compressing tank for extraction of gasoline, utilized commercially as a fuel, or carried to a safe distance from the tank before liberation.

The question as to whether an empty tank should be set aside on each tank farm, to be used in case of fire, is subject to much discussion. The expense of erecting a spare tank seems to be the main objection offered to this course. It would be advisable, if possible, to keep some space available on each tank farm. The practice of storing oil in the producing field should be discouraged, as it has the disadvantage of concentrating the fire hazard and it would seem that, as far as possible, storage tanks should be erected in a district remote from the producing field and beyond the possible fire zone of the field.

The placing of additional cross walls on a tank farm would be of marked advantage, in case of a burning tank boiling over. Protection would thus be afforded to adjoining property. This dis-

tance between tanks on a farm should also be considered. Cases have been recorded in which burning oil has been thrown approximately 500 feet from one tank to another, causing further damage. It is suggested that tanks be placed as far apart as possible, to avoid danger from this source.

The use of a tenacious foam solution as a means of extinguishing oil fires has been brought to the attention of the oil producers in this country during the last two years. The process consists essentially in mixing two chemical solutions, to produce a thick tenacious foam, containing bubbles of carbon dioxide, and in spreading this foam over the surface of the burning oil. There are two methods of application of the foam: 1st, pumping the two chemical solutions from a central point through twin pipes to a point as near as possible to the oil tank, bringing them together in a mixing chamber and allowing the foam to spread over the burning oil; 2nd, automatic distribution from foam generators on each tank. The distribution of foam from generators on each individual tank has the distinct advantage that the generators are installed so that they will operate automatically. The foam is produced by the action of sulphuric acid on a solution of bicarbonate of soda and soap bark in water. The following descriptive matter is quoted from a statement of the manufacturer of the automatic foam extinguisher: "It is the intention to install the apparatus in two different types, one called the stand-pipe method, and the other the underground method. The reason for this is as follows: On any container in which there are steam coils, the stand-pipe method is used, and a small coil put on to prevent the solution freezing. Also the solution can be protected from freezing in the stand-pipe method by means of electric heaters. However, there are locations where neither steam nor electricity are available, and in these the underground method is used. In this case the solution tank is put underground to prevent it from freezing; the acid, of course, will not freeze."

In the installation of the above ground type the stand-pipe is mounted, alongside of the oil tank, on a concrete base and contains a solution of sodium bicarbonate and soap bark in water. Above the level of the soda solution is mounted an acid container in which sulphuric acid is stored. Below the acid reservoir and extending down into the soda solution is a perforated pipe through which the acid when released, goes into the soda and soap bark solution and generates foam which passes through the outlet at the top of the stand-pipe and into the tank. The release of the acid is accom-

plished by one or more fusible links melting and allowing the hammer at the top of the acid tank to fall on a plunger and break the glass plate in the acid box at the top of the acid discharge pipe. The fusible links are so arranged in the tank that there is always one near the surface of the oil. Other links are located in chains placed horizontally across the tank just under the roof and running over sheaves down into the tank.

In the underground method of installation the tank containing the solution of sodium bicarbonate and soap bark is placed below the ground level and the top of the sulphuric acid container is just above ground. The foam is conducted from the generator to the top of the oil tank by means of a vertical discharge tube. This type of generator is equipped with fusible links arranged in a manner similar to those used in connection with the stand-pipe type of generator. The fusible links used are designed to fuse at about 212° F.

Tests of this extinguisher were conducted at the shops of the Treadwell Construction Co. (builders of the device), at Midland, Pa. The first ring about 5 feet in height, of a 55,000 barrel steel tank was set up on a concrete base. One stand-pipe type of generator was erected as if the tank had been built up to its full height. From a post, in the bottom of the tank, about 40 feet from the base of the generator a chain was run through the discharge tube and connected to the hammer above the acid reservoir. In this chain were placed a number of fusible links, one being about two feet, in a vertical line, above the surface of the oil in the tank. Onto a two-foot layer of water, in the tank about 100 barrels of crude oil were run and on top of this were poured 100 gallons of gasoline. The flammable liquids were ignited near the center of the tank by means of lighted cotton waste thrown over the side. In a short time the entire surface of the oil was in flames. Approximately two minutes after the fire was started the hammer above the acid reservoir was automatically released by means of the fusing of a link. Twenty seconds elapsed after the release of the hammer before any foam came from the discharge tube of the generator. Then foam fell onto the surface of the oil and gradually covered the whole area and extinguished the fire. The time required, after the foam started from the discharge tube, to extinguish the fire was one minute and thirty-five seconds. Thus the total time from the start of the fire until it was extinguished was approximately three minutes and fifty-five seconds. During the test a wind with a velocity of about 12 to 15 miles per hour was blowing at right angles

to an imaginary line between the center of the tank and the generator. The vertical distance from the level of the oil in the tank to the lowest part of the discharge tube was about 28 feet. Numerous other very successful demonstrations of this device have been made at different points in the United States.

Lightning rods have been applied to storage tanks without marked benefit; in fact, it has at times seemed that tanks carrying lightning rods were the most likely to be destroyed.

In several articles written by Mr. E. A. Barrier it is maintained that sawdust with about ten pounds of sodium bicarbonate per bushel of sawdust is superior to sand sometimes used for extinguishing fires in tanks of inflammable liquids. Carbon tetrachloride is very useful as an extinguishing liquid, but its anesthetic properties and cost tend to prohibit its use in the petroleum industry. It is believed that the most efficient extinguisher for oil tank fires is the foam extinguisher.

THE MINING INDUSTRY—ITS MAGNITUDE.

Address by C. A. Tupper of the Mining & Engineering World,
Chicago, Delivered Tuesday, November 14, at the
Nineteenth Annual Convention of the
American Mining Congress.

Mining is the second great basic industry of the country. Its magnitude may be partially shown by the fact that for ten years preceding the European war, or up to the beginning of 1915, the value of mineral products in the United States was \$19,793,928,955, or an average of nearly \$1,980,000,000 per year. In the last normal year, which was 1913, it had risen to \$2,439,159,728.

The totals for the several years are as follows:

1905.....	\$1,623,664,785
1906.....	1,903,229,387
1907.....	2,069,941,398
1908.....	1,594,696,842
1909.....	1,886,756,730
1910.....	1,991,216,220
1911.....	1,926,284,008
1912.....	2,244,033,833
1913.....	2,439,159,728
1914.....	2,114,946,024

\$19,793,928,955

This represents the amount directly contributed to the wealth of the nation, which, under the stress of war demand and war prices has now increased to approximately \$4,300,000,000 per annum.

But that is only the beginning. In the workings necessary for the recovery of such values, together with others which failed to yield returns, a great quantity of equipment and supplies were utilized, exclusive of food, miners' clothing and living necessities which are naturally covered by wages. Such items cannot be determined with absolute accuracy, but it is possible to compute them approximately—and quite closely—by figuring on a series of average percentage costs for the various years. During the decade

mentioned purchases of equipment and supplies made by the mineral properties of this country aggregated not less than \$7,200,000,000, being at present on a basis of \$900,000,000 per annum or more. An amount somewhat in excess of material costs is normally expended in wages, and such proportion for most of the full ten-year period has been greater, so that the total wages paid would be over \$14,000,000,000. Based on the figures thus far available for 1916, it is reliably estimated that about 1,825,000 men are employed in the mines and oil fields of the country. [Taking only the principal items of development, equipment, wages and output, the amount of money put in circulation by the mineral industries of the United States in ten years has exceeded \$39,000,000,000, of which the bulk stands for wealth newly created.]

Even with this magnificent sum, however, only a start has been made; for it will be remembered that the mineral industry is essentially basic, being the broad foundation upon which great structures of other industries are reared. In this respect, while mining stands below agriculture in original output, it far overtops it in secondary products; and the further derivatives of those products reach a total value which is simply stupendous.

Probably few people, even among our leading manufacturers, have tried to realize what the condition of this country would be without its mineral resources *or without the development of those resources on an adequate scale.*

In the first instance, if manufacturing had been in progress for many years, we would be situated as France is today, utterly dependent on importations for all raw material except what is grown from the soil—with, however, this difference, that manufacturing on a large scale would never have gotten a start in the United States at all. We would have remained essentially an agricultural people.

In the second instance, had our mineral resources not been well developed, we would find ourselves today in the position of Russia.

Does the present situation of either France or Russia—even apart from their war problems—appeal to Americans? If not, we owe it to ourselves to get in mind some proper appreciation of what the mineral industries of this country mean to it.

[One of the most important lessons for the people of the United States, as the late Dr. Holmes pointed out, is to realize the importance of the mining industry; and a means of teaching them some part of this lesson has been found in the publication

of dividends paid by the principal mining companies.] The only earnings ever made public in this manner are those of certain metal mining corporations whose stock is widely distributed; and these, of course, represent a mere fraction of the total mineral production of the country; but, even so, they are sufficiently impressive.

The wonderful earning capacity of American mines can be well illustrated by referring to the dividend disbursements made by 167 companies (all that make their dividends public) during the ten months of 1916 just past. These companies between January 1, 1916, and October 31, 1916, divided among shareholders the sum of \$184,830,127. If the dividend payments of the securities-holding corporations were to be included (as they could rightfully be) the year's total would reach \$223,433,208—a most convincing argument that mining, as now carried on, is the principal reason for our present standing at the head of the world's great industrial countries.

That these companies not only enjoyed a remarkable prosperity during the past ten months, but also in previous years, is shown by reports made to the Mining & Engineering World, that these companies previously paid dividends amounting to \$1,067,277,064, which, with the dividends already paid in 1916, makes a total of \$1,252,107,191. This is a return of better than 133% on the combined issued capital of the companies, a remarkable record and one hardly duplicated by any other industry.

The great bulk of these figures for dividend paying stock companies represents metal mines operated solely within the United States. If you added to the exact proportion of that total the actual earnings of close corporations in the same fields and those of coal and other mineral producing companies, you would have an aggregate almost unbelievable. Yet even that is but a fraction of the colossal totals of production and disbursements for labor, equipment and supplies cited at the beginning of this paper.

[No more important work faces the American Mining Congress, and the mineral interests generally, than that of impressing upon the people of the United States the tremendous value of the mining industry to the welfare of the country.]

This will strengthen the hands of the tireless, efficient secretary of the Congress, J. F. Callbreath, in his great work to secure legislation better suited to the needs of the industry; it will bring more encouragement and support from Congress to the United States Geological Survey; it will foster the growth of the United

States Bureau of Mines and it will attract to sound, legitimate mining enterprises the new capital constantly needed for development.

In this the mineral interests will have the vigorous backing of the mining press, and I can particularly pledge that of the one paper, cited above, which has consistently and persistently supported the American Mining Congress from its inception. With a long pull, a strong pull and a pull all together, there is much that can be accomplished in the immediate future to raise the mineral industries to the plane on which they belong.

Let us try our best to do this.

ADEQUATE ACREAGE AND OIL CONSERVATION.

Address Delivered by Max W. Ball, U. S. Bureau of Mines, at
19th Annual Convention of American Mining Congress.

Universal Use of Oil and Gas.

It is not necessary, before this Congress, to emphasize the necessity for careful conservation of our oil and gas supply. By January 1, it has been estimated, there will be 3,000,000 automobiles in use in the United States. More and more the American merchant depends on gasoline to deliver his goods; the American farmer to pump his water, plow his fields, and carry himself and his crops to town. Fords multiply and cover the earth. Very likely petroleum takes you to the office in the morning and takes you home at night. If it does not furnish the power it lubricates the bearings. In the evening it takes you and your family for a spin along streets lighted by natural gas or gas made from petroleum. It heals the burn you got from the engine, cures the baby's croup, and furnishes the family with chewing gum. Mr. Northrop, of the Geological Survey, has pointed out that every American industry is dependent in greater or less measure on petroleum or natural gas*; and indeed can you imagine modern life without gasoline, kerosene, vaseline, fuel oil, or lubricants?

Should it become necessary to defend our American life and American ideals against a foreign foe the first line of defense will be dependent on oil for fuel. All of the modern war-craft are being built to burn oil exclusively. I recently heard a naval officer say, "Yes, oil is more expensive than coal, but so is smokeless powder more expensive than black, and we might as well return to one as the other."

Limited Supply.

How great is our supply of these substances on which our daily life so much depends? An estimate furnished Congress by the Secretary of the Interior, early in the present year, based on the

*Paper by John D. Northrop, read before Convention of Oil and Gas Producers' Association of West Virginia, 1915; see *Petroleum Age*, October, 1915, p. 6.

most complete data in possession of the Government, gives the amount of oil remaining in the ground as perhaps 7,704,000,000 barrels. Independent estimates made about the same time by Ralph Arnold and Mark L. Requa do not differ widely from this. The figures at first glance seem enormous, but they represent less than 29 years' production at last year's rate.

This does not, of course, mean that in 29 years our oil fields will be exhausted. As exhaustion approaches, production will be slower and slower. Oil from Latin-American fields is already entering our markets. As soon as prices warrant, the great oil-shale deposits of Colorado, Utah and Wyoming will be made to yield petroleum and its products. Thus there is little danger that by 1945 the oil fields of the United States will have been exhausted and abandoned, but there is grave danger that by 1945, and in fact long before, we will be paying the increased prices consequent upon increased cost of production from depleted fields, transportation from foreign countries, and mining and treating deposits from which the oil must be distilled.

Necessity for Conservation.

It is evident that here is a resource the use of which is rapidly increasing the dependence upon which is well-nigh universal, and the readily available supply of which is limited. There could be no situation calling more clearly for prevention of waste, economical production, and careful use—principles of wise development and proper utilization which we comprehend by the word "conservation." If the American people have need to practice conservation with regard to any natural resource, it is with regard to their supplies of oil and natural gas.

Enormous Quantities Wasted.

Are we practicing this conservation? Within the last few weeks I have seen millions of cubic feet of natural gas wasting into the air—gas so rich in gasoline that it dripped from the trees like an April shower. I have seen wells capable of yielding 40,000,000 cubic feet of gas each being deliberately drowned out by pumping water into the gas sands. Reckless drilling, defective casing, careless plugging are flooding great areas with water and losing forever enormous quantities of oil. It has been testified before the Corporation Commission of Oklahoma that ordinary methods leave from 25 to 85 per cent of the oil in the ground, and this estimate is concurred in by careful engineers and practical oil men.* Think of it!

*McMurray, W. F., and Lewis, J. O., Bureau of Mines Technical Paper 130, 1916.

Twenty-five to eighty-five per cent of this valuable resource left underground, chiefly through ignorant, careless, wasteful methods.

Nor are these underground losses the only ones. When the oil is brought to the surface before transportation and market are ready for it, it must go into storage. Indeed, in many fields oil has been produced before storage was available and millions of gallons have gone down the streams or seeped away from earthen reservoirs. Even when the best steel tankage has been provided evaporation losses still go on. Cushing crude stored in steel tanks for a few months lost approximately a fifth of its gasoline content. The State Mineralogist's office of California has estimated that even with the heavy oils of that State the loss by evaporation represents perhaps 25 per cent of the total value of the production at the well. An official of one of the largest companies in the Midcontinent field recently told me that last year fire destroyed six per cent of his company's production.

Just consider these examples: twenty-five to eighty-five per cent left underground; twenty to twenty-five per cent of the value of oil produced lost through evaporation in storage; six per cent of stored oil lost by fire! These losses are staggering and are not exceptional! What a small percentage of this wonderful natural resource is saved to run your machine or to deliver goods at your door, or to plow the fields from which your food must come!

Forms and Proximate Causes of Waste.

If we feel these losses in the high prices of the present day, how much more will we feel them five, ten, twenty or thirty years from now? Is it not time we considered them seriously and tried to determine upon some remedy? Suppose we begin by studying in a little more detail the nature and forms of waste and the proximate causes: Hasty drilling and production methods.

What is the usual history of an oil field? Someone drills a wild-cat well and discovers oil. Immediately a horde of companies and individuals rush in, leasing every tract in the neighborhood of the discovery. Conservatism, competition for leases, and a general public sentiment against large holdings result in the fields being cut up into small tracts. Then everybody starts to drill at once, as fast as he can. Smith knows that unless he reaches the oil and before Brown, who is drilling just across the line, Brown will draw some of the oil from under his land. On the other three sides are Jones, Snider and Standard Oil, each drilling as many wells as he can get tools for, and Smith must race them all, well for well. If he doesn't

he might as well quit and throw up his lease, for they will have his oil.

Half way to the oil sand he encounters large quantities of gas. Just at present there is no available market for gas. Two years from now it may have a high commercial value; two months from now he may be paying a big price for enough to run his lease; but at present this great natural gas deposit is of no particular use to him. He is after the oil and he must get it as soon as possible. Perhaps to case off the gas properly would require a few days' time. It would be simplicity itself to seal the sand by the use of mud-laden fluid, but in his haste he has not provided himself with a pressure pump, and he can't stop now. So the gas is bradenheaded, allowed access to a few hundred feet of uncased hole, and in a little while has dissipated itself and been lost to human use, not only so far as Smith's well is concerned, but probably also in all the surrounding wells of the field.

Five hundred feet deeper Smith drills through a water sand. Here again a little mud properly applied would make everything safe, but that pressure pump is still lacking, and Smith hurriedly sets a string of casing and drills on.

At last he drills into the oil sand, about two screws ahead of Brown, Jones, Snider and the Standard, and finds that the oil is accompanied by gas at high pressure. Now Smith is no ignoramus. He has studied the habits of oil and gas wells. He knows that it is the gas which drives the oil from the sand into his well and forces it to the surface. He knows that if allowed to flow without restriction the gas will exhaust first, leaving much of the oil in the sand. He knows that by restricting the flow he can considerably increase the total flush production of oil. This is the course he would like to follow, but he knows that if he restricts the flow of his wells Jones and the rest will allow theirs to flow unrestricted and he will be drained of some of the oil that is rightfully his. Brown, Jones, Snider and the Standard each looks at it the same way, and as a result the wells of the field flow wide open, the gas pressure in the oil sand is soon exhausted, and the recovery of the remaining becomes an increasingly difficult and expensive, if not impossible operation.

About this time the wells of the field begin to make water with the oil. Jones is sure that Smith's hasty setting of the water string was defective, and that water has leaked through to enter the oil sand. Smith is equally sure that the leakage is in Brown's or Jones' well, and Brown is certain that Snider or the Standard is guilty. The chances are that each of them is right, but the great outstanding

fact is that the field has been ruined, and that the public has been permanently deprived of thousands of barrels of its oil.

Demoralization of Market.

So much for the drilling side of it.* Let us turn to another side. It is fair to assume, based on the history of the industry, that when the first well is brought in this field the market is already fairly well supplied with oil. A market for the oil of the new field must, then, be found or created, and this is a task which, if the general oil market is not to be demoralized, must be accomplished slowly. The new field should, therefore, be brought in gradually, a well at a time, as the market is built up for it, the oil being left in the ground until it is needed. The necessary pipe-line facilities would be installed in advance of any great production, little storage would be required, the operator would receive a fair price for his oil, and the drilling wastes already cited be reduced to a minimum.

Is this the way it works out in general practice? Not much! Smith has only a small lease. He must produce his oil as quickly as possible or lose it. Brown, Jones, the Standard, and the hundred and one other operators in the field are in the same fix. Everybody gets his oil out as fast as he can. He has to. As a result, the maximum production of the field is thrown on the market practically all at once. If the field is an extensive one the result can only be a demoralization of the market, with inadequate prices to the operators not only in this field, but throughout the region and perhaps throughout the country.

Premature Abandonment of Small Wells.

At first thought this lowering of prices would appear to be a good thing from the consumer's standpoint, but let us look a little further. All over the older fields are hundreds of wells which once were big producers, but which have now dropped down near the lower limit of profitable production. One of these wells will produce but a small amount daily, but its aggregate future production, if properly handled, may run into thousands of barrels. The total production from this class of wells is large, but if the price of oil drops the margin of profit in their operation is wiped out and the wells are abandoned. In most cases the abandonment is permanent, the wells are ruined, and the oil remaining in the ground is no longer available except at prohibitive cost.

*For actual examples of these wastes see Bureau of Mines Technical Paper 130, by W. F. McMurray and J. O. Lewis.

Inferior Uses of Oil.

Let us consider another effect of lowered prices. There are many uses for which coal and oil are equally adapted. The supply of coal in the United States is immensely greater than that of oil. To burn oil for a purpose for which coal is equally adapted is an economic waste. Yet that is what is done whenever the price of oil falls so low that it is cheaper for these inferior uses than coal. And this is not the worst of it. When the price of oil falls abnormally low as it did a year and a half ago, vast quantities of crude oil are burned as fuel without separating out the gasoline, kerosene, and other lighter constituents. Think of it! Burning oil under boilers without taking out the gasoline. Yet whenever prices are so low that it is cheaper to burn the crude than to refine it, the crude will be burned and the gasoline lost. Thus in the long run the result of these lowered prices is to increase the average price of oil and its products.

Storage Losses and Storage Charges.

Nor is the demoralization of prices the only result of suddenly throwing the maximum production of a field onto the market. Perhaps when the discovery well is brought in the pipe-line facilities of the field are inadequate; perhaps there are none at all. Can our friend Smith wait until transportation becomes available, leaving his oil in the sand, the storage nature provided for it? If he does he stands a chance of never getting it, for his neighbors will have it. No, he has no alternative. If he wants his oil he must bring it to the surface and store it as best he may until he can sell or transport it. If he sells, the purchaser probably stores, waiting for a market and the inevitable rise in price. Thus most of the field's maximum production goes into storage—steel tanks if they are available, earthen reservoirs if nothing better can be had—down the creek in too many cases. I have already pointed out what waste this means under even the most favorable circumstances; how Cushing crude lost approximately a fifth of its gasoline in steel storage; how California is estimated to lose a fourth the value of her oil through evaporation; how one large company lost six per cent of its stored oil from lightning. And there is another angle to this matter of storage. It costs almost as much to store oil in steel tanks for a considerable period as it does to obtain the oil in the first place. Think that over for a moment, and figure out who pays that storage charge. You know that neither the producer, nor the pipe-line

company, nor the refiner, nor the jobber, pays it, but that it falls on you and me and the rest of the consumers.

Unnecessary Wells.

While we are talking of charges against the industry, let us consider another and very heavy charge. We have supposed that Smith owned a small acreage, and that he is a man of keenness and foresight. Studying the character of the oil, the porosity and dip of the sand, and the gas pressure, he concludes that three wells, properly placed, will obtain all the recoverable oil from his lease. He knows also that a dozen wells will drain the tract far more quickly, though at four times the expense. He would like to produce his oil in the economical, careful way, but across one line is Jones, across the other Brown, and to north and south are Snider and the Standard Oil Company. Each has considered the same problem, each has competitors on every side, each is drilling as many wells as he can as fast as he is able. Smith doesn't consider long. He gets a dozen strings of tools dropping as soon as his finances let him. Of course the oil costs four times what it should, but so does everyone else's oil in the field, the general price is correspondingly high, and whoever buys the oil pays the extra expense.

Do not think this is an overdrawn picture, or that the item is a small one? Just have a look at this diagram of the famous Glenn Pool of Oklahoma, taken from hearings before the Senate Committee on Public Lands, January 12, 1915. It shows that the total cost of drilling in the Glenn Pool was \$11,250,000, and estimates that all the oil could have been obtained for \$3,177,000; a useless expenditure of \$8,073,000. Is that a negligible item? Is that the way the public's necessities should be produced? Eight million out of eleven millions expended uselessly! Three hundred and fifty-four per cent of what it should have cost! And who do you suppose paid the extra 254 per cent? Do you think for a minute that the companies that drilled those extra wells paid for them in the long run? Of course not! Those wells were paid for by the man with a machine, or a gasoline pump, or a farm tractor, by the laborer whose home is lighted by kerosene.

Fundamental Cause of These Losses.

These are some of the ways in which oil and gas are being wasted, some of the reasons why petroleum products are high in price. Let us see if we can discover in them some fundamental cause, some condition that may be remedied.

The first thought that suggests itself is that the operators must be grossly ignorant or grossly careless. Perhaps this is in a measure true. Smith should have had a pump and a slush-pit ready to mud off the gas and water sands he encountered. But does this go to the root of the matter? Why was Smith in such haste to start that he had neglected these precautions? Why wouldn't he wait for the equipment when he found he needed it? Because he feared his neighbors would drain his oil. Yes, and why was this an ever-present, driving fear? Because he held only a small tract. There we have it, gentlemen! There is the root of the whole trouble—the small holding. Let us go back over the history of the field.

We saw that as soon as the field was discovered it was leased up in small tracts. Then we saw the Smiths, the Browns, the Joneses and the Standard Oil drilling for dear life, each trying to get the oil from under his little tract and a bit of the other fellow's before the other fellow could get it. Why? Because each tract was so small it could be drained by wells on the surrounding tracts.

We saw that the race was so keen that wells were improperly drilled, that gas was allowed to waste into the air or dissipate itself through barren formations, that water was allowed to enter the oil sands, and that great quantities of oil were left underground, never to be recovered. Why? Because the small holding forced each man to race with his neighbor.

We saw the entire flush production of the field thrown on the market at once, demoralizing market prices, forcing the premature abandonment of wells in other fields, resulting in the burning of unrefined crude and the waste of the more valuable products. We saw the maximum production of the field go into storage, where the losses from evaporation and fire were enormous, and where the cost of the oil was nearly doubled. What caused these things? The fact that every holder of a small lease must drill it up as soon as possible.

Lastly, we saw the cost of production more than 300 per cent what it should have been. And what was the reason? That every man must drill his lines as fast as might be, and must completely drill up his land at the earliest moment. Why? Because the oil under his small holding could be taken from him by wells on surrounding tracts.

Ignorance there may be, carelessness there undoubtedly is, but back of ignorance, of carelessness, of reckless, headlong methods is the real cause—the fact that the average holding is so small that

speed is the owner's sole protection. Let him be careful if he can, let him be economical if he can find a way, but careful or careless, reckless or conservative, he must be speedy if he would survive. The small holding is his master.

The Remedy—Adequate Acreage.

Here, then, we have isolated the cause. Have we not at the same time discovered the remedy? If the small holding has brought the wastes and losses of the oil industry, will not adequate acreage cure these evils? Let us go over them again.

If Smith's lease is large enough so that he does not fear draining by Jones or Brown or Snider, he will undoubtedly drill more carefully. When he encounters the high-pressure gas sand he will mud it in, where it can be drawn on at some time in the future when it has a commercial value. He will mud in the water sand also, and none of the wells of the field will be flooded by infiltrating water. When he finds gas in the oil sand he will restrict the flow so that the maximum amount of oil may be brought out by the gas, the life of the well be prolonged, and its yield augmented. Thus the main dangers of waste in the drilling and handling of the wells are eliminated.

If the holdings in the field are of adequate size, Smith will not fear Brown, nor Brown, Jones. The field can therefore be brought in gradually, building up a market for the production as the production is increased. There is no demoralization of market prices, no premature abandonment of wells in other fields, no burning of unrefined crude, no letting of oil go down the creek, no storage of huge quantities, no great evaporation or fire losses, no tankage charges.

Finally, if the holdings are of adequate size, the number of line wells will be reduced to a minimum, and there will be no inside wells drilled from fear of drainage. The drilling cost will be little if any above 100 per cent what it should be, instead of more than 300 per cent.

Do you think these views of the benefits of adequate acreage are too rosy? Not long ago I had the pleasure of visiting first Cushing, a typical small-holding field, and then Augusta, Kansas, the major part of which is held in large blocks. You know the history of Cushing; how it was thrown on the market almost overnight, how the bottom dropped out of oil prices, how millions of cubic feet of gas went to waste, how millions of barrels of oil went into storage, and how the production suddenly fell off nearly 70

per cent. At Augusta physical conditions do not differ greatly from those at Cushing. The average wells of each field do about the same. Both have areas of great gas production. Around the outskirts of the Augusta field are small holdings and here Cushing conditions may in time be duplicated. But with these things the resemblance between the two fields ceases. In the large-block part of the Augusta field I saw no gas going to waste, no huge quantities of oil in storage, no feverish drilling activity. I gained an impression of order, of care, of efficiency and business like methods. And then, to show that the difference is not a matter of locality or state law, I stumbled onto a small holding, a church yard of perhaps ten acres, and there the derricks fairly jostled the tombstones.

I found some people in Augusta who complained because, although the oil field has brought the town prosperity, it has brought no such boom as other places have known. A dealer in acreage was very bitter. "It's all because of large holdings," he said. "If this field had been cut into small tracts like Cushing, it would have been and gone long ago." I agreed with him.

Arguments Against Adequate Acreage.

Is it monopolistic?

Failing to get from the Augustans any farsighted arguments against adequate acreage, I have tried to find some for myself. In the first place, large acreage somehow sounds monopolistic. I find that wherever I talk acreage someone holds up his hands and says, "Oh, but that would be creating a monopoly." But would it, now? What is a monopoly? According to Webster it is "the sole power of dealing in any species of goods, or of dealing with a country or market." Giving a man a large instead of a small oil lease certainly doesn't grant him any such "sole power" as that. The New Standard Dictionary gives a similar definition and adds, "especially * * * such control of a special thing, as a commodity, as enables the person or persons exercising it to raise the price of it above its real value, or above the price it would bring under competition." Now it is easy to see how granting a man a lease on all the oil lands in the United States, or in some part of the United States, or of all the oil of a particular grade in a given region might be giving him a monopoly as thus defined, but it is difficult to see how giving him an adequate lease in any given field would bring him within the definition. He could not raise the price above the real value, or above the price the oil would bring under competition, for he would be

in direct competition with oil produced from similar leases in other fields, or in the same field if the field were a large one.

Perhaps the idea that adequate acreage tends toward monopoly is based on a belief that each small lease represents the entire holdings of a company or individual in a given field. Of course this is not the case. In the major fields a company holds a tract here, another there, a third yonder, a fourth, fifth and sixth beyond. The trouble is not that the acreage held by one company is too small but that it is broken up into such small units, instead of being in a compact block. If each company operating in Cushing had held all of its acreage in a single unit, the history of the field might have been radically different, with no harrowing tales of waste and losses.

Does It Eliminate the Small Operator?

If we have laid the monopoly ghost, let us turn to another and more real objection to large acreage—that it eliminates the small operator. But does it? To my mind it would tend to eliminate the very small operator, but not the operator of moderate resources. The competition for leases would probably be less of a cutthroat struggle if the leases were larger, and the acreage price would perhaps be less. If so, the operator of moderate resources could swing a larger lease than he can now, particularly in view of the fact that he could handle his lease more economically after getting it.

Before we expend any sympathy on the very small operator who might be lost in large-unit operations, suppose we consider his present status. How many of him do you think get a foothold in any field of consequence? Very few indeed. And what happens to those who do? When the field is flooding the market and tankage is high, they cannot afford to buy or lease storage. They must produce their oil; they cannot care for it after it is produced. Talk about your upper and nether millstones!

What do they do? Sell their leases for a song to some big company with plenty of tankage, or, if not forced quite so far, sell their oil to the company at prices that do not cover the cost of drilling the wells. That is the way the small-acreage system encourages the small operator. How many genuine little fellows, for example, got rich in Cushing?

Then there is another angle to this small-operator question. Suppose for the moment that adequate acreage will put him out of business. Can we afford to continue wasteful, careless, extravagant methods for the sake of giving him a job? After all, whose interest is paramount, that of the public or that of the small operator?

Will Regulation Accomplish the Same Results?

There remains one point to be considered: Can the same results be accomplished by some other means? How about laws and regulations against waste? I believe thoroughly in such legislation. In Oklahoma the supervision of Indian lands by the Bureau of Mines and of commercial lands by the Corporation Commission has proved beyond a doubt that proper drilling methods can be enforced and enormous waste prevented under proper laws, but there are certain things which it is hard to reach by administrative regulation; such, for example, as the drilling of too many wells, racing along property lines, premature production, storage losses, and the like.

There is another phase of the regulation matter which to me seems important. It is much easier to regulate a man's business if your regulations run with rather than contrary to his economic interests. When economic necessity goes counter to regulation and statute, the operator can be depended upon to find some way to avoid the regulation and nullify the statute. And whenever it becomes profitable for the operator to prevent waste he can be depended upon to do so without compulsory regulation.

Conclusion.

Hear, then, the conclusion of the whole matter. If you would prevent waste of oil and natural gas, if you would do away with careless drilling methods, excessive production charges and storage losses, if you would insure the production of the maximum amount of oil at the minimum cost, if you would help to maintain a reasonable price for petroleum and its products in the years to come; then do your part in creating a public sentiment in favor of adequate acreage. You may not find it a popular propaganda just now. You will doubtless be accused of advocating monopoly and probably branded as a corporation partisan. But if you take one step toward imbedding the acreage idea in the popular mind, or incorporating it into state legislation, or embodying it in oil-field practice, you will have assisted in conserving the oil and gas deposits of the United States, and will have rendered a valuable public service.

RESPONSIBILITIES AND DUTIES IN MINE SAFETY WORK.

Address Delivered by Thomas M. Gann at Nineteenth Annual
Convention of American Mining Congress.

The subject on which I am to address you is of vital importance to the coal industry and those engaged therein, and one which should be discussed openly and frankly in a friendly manner, in order that the best results may be obtained and in order that each party thereto may know and understand the part he should play. I take it that the operators, the miners and the public, all being interested in this work, are willing to bear the responsibility, and to do their duty when they know and understand what is required of them.

Let us hope that whatever may be said along this line will be said with one object in view—that all may be benefited. The American Mining Congress, with the co-operation of the miners and operators, together with the assistance of the Bureau of Mines, should be able to reduce accidents and loss of life in the mines to a minimum.

The subject has been properly divided into three parts, viz.: "Responsibilities and Duties of the 'Operator,' 'Miner' and the 'Public.'"

The part which I am to discuss is that of the "operator." Permit me to say in the outset that if the responsibilities and duties of one party are greater than those of another, it is those of the operator; his responsibilities are great, and his duties are many. He invests his money in a coal mine, and he expects the miners to produce the coal; he expects the public to pay for and consume his product, and that isn't all he expects. His main object in going into the coal business is to make money. On the other hand, the miners require that he pay them a living wage (and a living wage does not mean just enough to keep body and soul together, but that there must be a margin between his earnings and what it costs him to live up to the American standard, in order that he may have a dollar for a wet day), that he equip the mine with those

safety appliances which are necessary for the protection of their health, life and limb. Every precaution should be exercised to protect them, for, after all is said and done, they have more at stake than all others interested. The operator should exercise care in selecting his managers and foremen, being sure that they are men who not only possess the necessary qualifications for intelligent work, but also men who are of a disposition which will invite the co-operation of the other employes in the making and enforcement of the rules which shall govern the operation of that mine. They should also invite the co-operation of the miners in the enforcement of the mining laws.

It has been said that an impartial investigation would demonstrate that cheap coal is the principal cause for the awful destruction of life incident to the development of the mining industry; and long as the consumer can buy coal at cost of production or less, there will be enforced economy in the development and operation of mines.

I am of the opinion that the statement is true, because I have had operators tell me that they were selling their best coal (not run of mine) for 80 cents per ton, and I understand also that quite a number of operators in my district are handling a large portion of their tonnage through coal brokers, who have no interest whatever in the coal industry, except their commissions. There cannot be any justifiable reason for continuing such a condition, this waste must stop and coal must command a higher price in the market, or everything which contributes to the safety of the mine worker, and the welfare of his family will suffer.

The operator should work in harmony with the miners, in securing better mining laws; with reference to protection and safety of the men in the mines, but instead we usually find them opposing all amendments in this respect, if there is any semblance of additional cost of the operation of their mines. And this simply reverts back to the evil of cheap coal, selling coal at or near, and sometimes below, the cost of production places them in a position whereby they are unable to pay a living wage; much less meet the cost of properly equipping the mine, and installing the necessary safeguards that should be thrown around those employed in the mines; these conditions apply more especially in the coal fields of the south.

The question of organization and co-operation enters very seriously into the Safety First Movement. In an address, delivered at the University of Illinois, May-9, 1913, on the subject, "Organi-

zation as Affecting Mining," by Mr. A. J. Moorshead, President and General Manager of the Madison Coal Corporation, he said: "That upon organization hinges the success or failure of all enterprises." With this statement we must all agree, and therefore if it is necessary to have organization for the successful operation of any business, it is just as essential in the Safety First Movement. The miners individually cannot do much, in this work, for without organization, they cannot have discipline and harmony; and in this respect, the operators of the south have lost sight of the Mine Safety Work. Because, as a general rule, they fight every move that the miners make to try to build up an organization by which they can obtain better working conditions. I am not telling of these things for the purpose of injecting unionism into this discussion, but simply to try and get the operators referred to to see that they are wrong. And if they are really interested, in protecting the miners in their employment and the industry itself; they will have to change their policy if they expect to make any progress. It is my purpose to only try, to point out some of the greater things, that should be done, and by a thorough organization of both the operators and miners, the lesser things can be worked out mutually by friendly discussions at the mines.

The coal industry of this country does not occupy that position which it should in the industrial world. And there is no one to blame, except those who are engaged in that industry, and it remains for the operators and miners through their own efforts to make out of the industry that which they are entitled to.

Let us hope that when we leave this convention we will all have a better understanding as to what our responsibilities and duties are, with reference to the Safety First Movement, and go with a determination, that when the convention may meet again; we can see some good results from these discussions.

REPORT OF COMMITTEE

Upon the Revision of the Mineral Land Laws to the American Mining Congress, November 13-18, 1916.

When the American Mining Congress a few years ago determined to bring about the reformation of the mining code, it appeared to many casual observers that the Congress had selected the most difficult and uninteresting of all tasks within its choice.

The foundations upon which vast structures stand are not exposed to view and never become subjects of popular enthusiasm. Only the few to whom this part of the world's work has fallen actively concern themselves about its workmanship, its safety and its effectiveness.

That the body of mineral land laws known as the Mining Code is the basis of all mining in the west and Alaska is generally understood. The industry is so vast and complex, however, that even within its ranks the overwhelming importance of this code to its health and its life is best realized by those who have had to do with the processes of creating mining property from public lands and also by those who are familiar with the record of such processes in past history.

Mining men know that it is fatal to the industry to treat mineral land like ordinary land; that an unwise mining code tends to rapidly paralyze the development of mining districts and that from ancient times mining men have had to struggle with the legislation imposed upon them by the superior power of non-mining men.

For over forty years, American industry has suffered increasingly from the defects of its mining code. By every means in its power it has called attention to these defects and has presented suggestions for their cure but all to no avail. In the face of these past failures, the American Mining Congress undertook to secure the reform by an organized effort which would for the first time be persistent and also by adopting a novel and practical plan of action which has made an unusual appeal to the common-sense of mining men and legislators.

This was the idea that a work so technical and important as the revision of the mining code should be based upon the practical experience and judgment of those who are actually engaged in the industry. If their wisdom could be assembled and condensed for the use of Congress by a commission composed of men whose competence was known to the industry and this commission should hold public hearings for the purpose throughout the mining regions of the west and Alaska, then mining men could feel assured of a satisfactory result.

For several years the American Mining Congress has now been working for the appointment of this commission; watching every chance at Washington and pressing its measure at every session of Congress. The discouraging indifference under which the work was begun has given place to a rapidly widening interest. The American Institute of Mining Engineers, the Mining and Metallurgical Society of America, and practically all the local mining organizations of the country have been actively co-operating in the work.

Two successive administrations have approved the measure and two successive Senates have passed it. For two successive years the bill has nearly passed the House, failing once because of pressure of other business and again last winter through the causeless opposition of one man. It is clear that success is only a matter of continuing the patient and persistent work which it was known in the beginning would be necessary.

In the meantime while waiting for the next opportunity at Washington, the interest created has caused the Mining and Metallurgical Society of America to take up a discussion of the details of a new code. This valuable and important work is now in progress and is further stimulating and extending interest in the problems involved.

EDMUND B. KIRBY, Chairman.

FEDERAL AID TO MINING EFFICIENCY—NATIONAL IMPORTANCE OF AGRICULTURE AND MINING.

Address Delivered by Van H. Manning at Nineteenth Annual Convention of American Mining Congress.

On two foundation industries, agriculture and mining, the welfare and prosperity of this country rest. Agriculture is unquestionably still the greatest of our industries, but mining is easily second in importance. The value of the products and the number of men employed by these two industries are sufficient evidence of this fact.

Agriculture, the source of food and clothing, is the older industry; mining developed with the growth of the arts. In this country agriculture received aid from the Federal Government and the states long before mining, and today, as far as official encouragement is concerned, agriculture is the best organized of all our industries. You will find agricultural organizations in every state of the Union; in addition, there are several great national organizations, any one of which is at all times ready to call attention to the needs of agriculture.

Mining is becoming better organized, and a number of organizations, notably the American Mining Congress, are now working in its behalf, but we have much farther to go to reach the stage of organization attained by agriculture.

This organization of agriculture is reflected in a most substantial manner by the activities of the Federal Government. With the great Department of Agriculture back of this industry and several thousand skilled men looking after its every interest; with Congress for many years educated to the needs of agriculture, it is a comparatively easy matter for agriculture to get what it wants in the way of appropriations.

I have had some comparative statistics prepared concerning the two great industries and some of the conclusions reached are almost startling. According to these statistics, mining is not receiving from the Federal Government anything like its just share of the appropriations annually made.

The statistics show that if mining were to receive the same consideration as agriculture, considering the relative value of the outputs of the two industries, mining would receive nearly four times as much as it now receives, or \$8,018,560 instead of \$2,333,075.

Another interesting comparison shows that the Federal Government in the present year has donated to the farmers one dollar for every \$295 worth of products of the farms. It has donated to mining one dollar for every \$1,017 worth of products from the mines.

Perhaps some of the figures in detail will be of interest.

The total amount of money appropriated by the Federal Government in behalf of agriculture for the present fiscal year is \$35,553,852.

The total amount of money appropriated by the Federal Government for this year for mining is \$2,333,075. This includes the total appropriations of the Bureau of Mines and the United States Geological Survey.

The per capita contribution of the people for the betterment of agriculture is 34 4-5 cents.

The per capita contribution of the people for the betterment of mining is 2 3-10 cents.

The gross value of all agricultural products in the year 1915, as estimated by the Department of Agriculture, is \$10,501,636,000.

The gross value of all raw mineral products for the year 1916, as estimated by the United States Geological Survey, is \$2,373,000,000.

The per capita production of agriculture is \$102.94.

The per capita production of mining is \$23.26.

While the value of the agricultural production of the country is less than five times that of the mineral production, the per capita appropriation for agricultural investigations is fifteen times the per capita appropriation for mineral investigation.

I shall allow the statistics to stand for themselves and permit you to make your own deductions. To me they seem to indicate a need of better organization, a more intelligent co-operation, and a general demand that mining shall receive more recognition from the Government.

In the Department of Agriculture single bureaus, such as the Bureau of Animal Industry, the Bureau of Plant Industry, the Forest Service, the States Relations Service and Meat Inspection, each received more money than is allotted by the Federal Government for all mining.

Under the Morrill Act alone each state in the Union receives more than \$67,000 each year for the colleges of agriculture and mechanic arts.

I am pleased to say, however, that mining is beginning to receive more recognition. Last year Congress passed a law providing for the establishment in the several important mining regions of the United States of ten mining experiment stations and seven mine-safety stations in addition to those already established, but providing that not more than three of the mining experiment stations and the same number of safety stations shall be established in one year.

Having thus called attention to the comparative financial aid given by the Federal Government to the two great industries, I shall summarize somewhat briefly the work being done by the Department of the Interior in its efforts to aid mining. That Department, as you know, includes the two Federal bureaus, the United States Geological Survey and the Bureau of Mines, whose activities relate almost wholly to the mineral industries.

The United States Geological Survey is much the older of the two, in fact it may be regarded as the parent of the Bureau of Mines. In its great task of preparing a geological map of the United States and its allied duties of measuring stream flow and classifying the public lands, the Geological Survey has done and is doing a work of primary importance. However, I shall not dwell on its activities, for its Director is here and will speak for it.

Why the Mining Industry Needs Federal Aid.

No country in the world has such vast and varied mineral resources as the United States. The development of these industries has been rapid and on an enormous scale. In 1880 the value of the mineral products of this country, according to the Tenth Census, was \$364,900,000; in 1900 the value had risen to \$1,063,600,000; in 1910 to \$1,991,200,000, and in 1915, according to the advance figures of the United States Geological Survey, to \$2,373,000,000. From 1880 to 1915 the population of the United States increased about 100 per cent, whereas the value of its mineral production increased nearly seven-fold.

But this tremendous increase in production has been accompanied by unparallel waste, in both the production and utilization of our mineral wealth, and altogether too little regard for the health and safety of the men whose labor converted the natural resources into the commercial products. A people of restless energy, individualistic, eager for immediate success, and having little regard for

the lessons of the past, we have indulged in an orgy of hasty exploitation, with the result that already we are nearing the limit of maximum production of some minerals, although the original supply, if wisely mined and utilized, would have lasted us many years longer and would have brought us ten times the wealth.

To conserve our remaining supplies, that is, to extract, prepare and utilize the minerals and ores in such manner as will be of most benefit to the nation, is clearly not a simple nor an easy task. Our mineral resources are many and extend throughout large areas, occur under widely varying geological conditions, and are subject in large part to state laws that differ greatly.

Evidently no one state should be expected to bear the cost of investigations that are of interest to all the states, and for each state to undertake such investigations would cause much duplication of effort and unnecessary expense. Private investigation of large problems, aside from the duplication involved, would necessarily be limited to concerns commanding abundant capital; and in any event the cost of the investigations will be borne by the consumer of the products, that is, by the public.

Work of the Bureau of Mines.

Investigations of the causes of mine explosions and the methods of preventing such explosions were begun by the Government in response to a general demand that measures be taken to lessen the loss of life in mining operations. When it established the Bureau of Mines, Congress directed the bureau to investigate not only mine explosions, but also mine accidents in general and the conditions that affect health and safety; and also to investigate methods of mining, treating, and utilizing mineral substances with a view to economic development and the prevention of waste.

Thus it happens that the motto of the bureau is safety and efficiency, the two words being in a way mutually supplementary, for safety is determined by efficiency, and true efficiency implies safety.

For purposes of administration, the investigations conducted by the bureau are grouped in five divisions; mining, fuels and mechanical equipment, mineral technology, metallurgy, and petroleum, each in charge of a chief engineer. However, for convenience of consideration in line with the title of my address, I will group them as safety investigations and efficiency investigations, and will give attention chiefly to the latter.

Safety Investigations.

The early activities of the bureau centered about investigations to determine the causes of explosions in coal mines, the methods by which such explosions could be prevented or checked, and the development of safer and more healthful conditions. Consequently, the most notable result of the bureau's efforts during the past six years has been the arousing of a wider interest in greater safety and more healthful conditions in mines and metallurgical plants, and the gaining of the co-operation and active aid of all possible agencies in the progress of improvement.

The Bureau of Mines makes no claim to having been the first agency to call attention to the high death rate among miners; nor does it claim it was the first to urge the need of safer methods. It has gladly welcomed the aid of all agencies that have sought to better conditions, and it freely concedes the credit that is due them for what they have done. The bureau does claim, however, that its work has served to stimulate a nation-wide movement for greater safety in all industries and that the value of this work has been great and can not be measured in dollars.

Among the results of this increase in safety and health are the saving of life among miners who received first-aid treatment; the enactment of state laws to increase safety, prevent accidents, and lessen waste; and the tendency to demand more efficient inspection in mining and other industrial establishments.

The Bureau of Mines has been responsible for a revolutionary change in the use of explosives in coal mines. It pointed out the dangers attending the use of black powder in mines that were gaseous or filled with coal dust, and urged the substitution of what it termed "permissible explosives," those that had successfully passed severe tests. In the year 1906 only 2,000,000 pounds of these permissible explosives were used in the coal mines of the United States. In 1915 the amount of permissible explosives sold was 27,360,000 pounds, or nearly fourteen times as much as in 1906.

By calling attention to the possible dangers attending the use of electricity in mines the bureau has led manufacturers to devise safer types of apparatus, especially electrical switches and motors, that can be used in gaseous atmospheres without danger of causing explosions by sparks or flashes. Also, the bureau's activities have led to the manufacture of approved types of hand and cap lamps for miners, by which mining is rendered safer. Several states have followed the bureau's recommendations in enacting stricter laws

regarding electrical equipment in mines. Recently the bureau has been investigating gasoline and storage-battery locomotives for mine haulage.

In co-operation with the Public Health Service the bureau has investigated the health conditions in certain of the metal-mining districts where miners' consumption, caused by the breathing of siliceous dust, is prevalent, and where the death rate from this disease was causing alarm. It has shown the operators and miners the injurious effects of breathing this dust and how, by the proper treatment of the rock dust, deaths from this cause may be greatly reduced if not entirely stopped.

The bureau has pointed out how the homes of miners can be made more comfortable and more sanitary, and has already witnessed its recommendations adopted by mining companies and construction concerns.

By its persistent campaign for "Safety First" the Bureau of Mines has added to the value of a human life. Its vigorous propaganda has resulted in not only a nation-wide but a world-wide campaign for greater safety for workmen, a movement that has reached beyond the mining industry until today it includes workers in all industries.

Some direct results of the safety movement and the workmen's compensation laws have been a saving of thousands of men to their families, a tremendous reduction in the amount of suffering through lessened injuries, and, where men have lost their lives through the hazards of industry, an adequate compensation to sustain the widow and the orphans.

The Bureau of Mines sends out to the men in the mines pamphlets called "miners' circulars," which tell of the dangers in the mines and the precautions a man should take to avoid injury and disease. The bureau is issuing a number of these safety papers for the especial benefit of foreign-born miners, each paper being printed in a foreign language with the English-translation on facing pages, so that the miner is enabled to learn English at the same time that he learns the safety lessons.

Since the Government began its educational work of demonstrating the use of rescue apparatus and of training miners in methods of recovery work and administering first aid to those injured by accidents, more than 40,000 miners have been trained by the crews of the bureau's stations and cars. Moreover, as a result of this educational work and of the efforts of men who had received

training, nearly 1,000 men have been rescued from mines after explosions or other disasters. It is estimated that at more than 1,000 mines there are now well equipped and trained rescue crews. Interest in first aid methods is being stimulated by contests between teams representing different mining companies and by teams representing miners' organizations in different states.

The additional safety stations that are to be provided under the terms of the act approved by Congress in 1915 will enable training to be given in districts where such training and proper training facilities have long been requested.

The bureau's engineers have been highly successful in developing devices for preventing dust explosions in coal mines. Dusts from hundreds of mines in different coal fields have been studied and their relative inflammability has been determined. In addition, suggested methods of rendering coal dust harmless have been tested at the experimental coal mine.

Since the bureau was created it has kept careful statistics of the number of men killed in coal mines, metal mines, and quarries throughout the country. These statistics now cover a period of five years and show in the first year, 1911, a total of 3,539 killed in all of the coal and metal mines and quarries of the United States, with a death rate of 3.52 for every 1,000 employed. There has been a steady decrease, not only in the number of men killed, but also in the death rate. For the year 1915, which is the best year mining has seen as far as safety is concerned, there were 2,970 men killed with a death rate of 3.01 for each 1,000 employed.

The greatest progress has been made in coal mining. The statistics for the year 1915 show these rather important conclusions.

The actual number of men killed was the lowest in the last eight years.

The death rate for each 1,000 men employed was the lowest in the last sixteen years.

The number of tons of coal produced for each miner killed was the largest in the entire history of coal mining in the United States.

I am pleased to be able to tell you that while 1915 was the safest ever known in coal mining in the United States, the figures for the first eight months of 1916 indicate that the 1915 record will be eclipsed. For these eight months of this year there are seventy-two less fatalities than for the same months of 1915, or a reduction of 5 per cent from the splendid record of that year.

To me these figures indicate very plainly that Safety First has come to stay in the coal-mining industry and that it is being practiced more assiduously than ever before. Every effort along this line spells lives saved, suffering lessened, and poverty and want prevented.

It is especially gratifying that this movement is progressing so rapidly in an industry that is one of the greatest in the world. The United States today mines 40 per cent of the world's output of coal, or as much as Great Britain and Germany combined; and its coal mines employ an ever increasing army of men which now numbers more than three-quarters of a million.

This reduction has been brought about by the many agencies striving to reduce mine accidents, and each deserves credit for the work it has done.

Recognizing the need of reliable figures of deaths and injuries in the mineral industries, as a basis for determining the hazards, and the rules and regulations needed for safety, the bureau complies and publishes annually accident statistics for coke ovens, ore-dressing plants, and smelters, as well as quarries. Under a co-operative arrangement with all state coal-mine inspectors it publishes a monthly report of coal-mine fatalities, showing their number, cause, and distribution by states. Recently the bureau published a compilation of all coal-mine fatalities (over 50,000) reported by state mine inspectors since the beginning of inspection by each state, the figures covering the mining of more than 89 per cent of all the coal produced in the United States since 1807.

Investigations of More Efficient Methods.

Investigations of the problems of miscellaneous mineral technology include safety and efficiency in the preparation and use of the minor metals, rare metals, and various minerals used in the arts. In these investigations especial attention has been given to the possibility of eliminating some of the great wastes that take place and, incidentally, to increasing the efficiency of manufacturing processes and the substitution of domestic for imported products. These investigations have already demonstrated the extent and variety of the losses occasioned by methods in current use.

The feldspar, mica, and kaolin resources of the Appalachian region and the kaolin resources of the Coastal Plain region of Georgia and South Carolina have been studied with reference to the needs of American potters. The results show that American feldspar is fully equal, if not superior, to that obtainable anywhere,

that many of the kaolin deposits of the southern Appalachian region yield china clay that is remarkably white and equal in quality to any imported, that by a simple and inexpensive treatment under careful technical control, the immense deposits of kaolin in the southern part of the Atlantic Coastal Plain may be made available for china and other white ware.

An investigation of the fuller's earth industry of the country has been largely instrumental in bringing about a great increase in the production and utilization of domestic earth during the past few years.

In cooperation with the American Institute of Metals and the chemical department of Cornell University, the Bureau of Mines has studied the manufacture of brass and other nonferrous alloys, with especial reference to preventing the known large wastes of metal in both dross and fume, that amount to at least \$2,000,000 a year. Methods of reducing this loss have been pointed out and the development of an efficient type of electric furnace seems assured.

Probably the most striking of the mineral-technology investigations has been that dealing with radium. Through the co-operation of the National Radium Institute a plant was built at Denver for producing radium from the carnotite ores of Colorado. This plant has been in successful operation for nearly three years, and has produced six grams of radium, which has not been sold but is to be used in the treatment of cancer and malignant tumors. This work has shown that the price the miners formerly received for their carnotite was entirely out of proportion to the value of the mineral contained, and that from Government-owned ore, at least, radium can be supplied to the hospitals of the Army, Navy, and Public Health Service at a cost not exceeding \$36,500 per gram, or one-third of prices that had been asked by foreign producers.

Incident to this work, methods for determining radium, concentrating the low-grade carnotite ores, and extracting uranium and vanadium from carnotite were developed.

The metallurgical investigations of the bureau have been confined chiefly to the smelter smoke problem, the treatment of low-grade and complex ores, and the safety and health of employees at blast furnaces and steel works.

In its endeavor to find ways of lessening damage to vegetation and to animals and of recovering and utilizing substances being wasted in smelter smoke, the bureau co-operated with the Selby and the Anaconda Smelter Commissions. The report of the Selby commission, published as a bulletin by the Bureau of Mines, has re-

ceived much attention, and the methods of procedure described are being followed in other metallurgical-smoke investigations both in this country and abroad. The Anaconda commission is continuing its investigations. Each commission has been entirely independent of the Bureau of Mines, but the Director of the bureau has served as a member of each, and the bureau has co-operated in the investigations, in an effort to obtain results of the widest value. Especial attention has been given the removal of sulphur from smelter gases.

Investigations of methods of treating the low-grade and complex ores of Utah and adjacent states are showing what new methods are needed or how old methods should be improved in order to treat millions of tons of ore that now lie unworked because of the lack of efficient and profitable methods for saving the contained metals.

Summarized, the principal results of this work have been as follows:

The development of a brine-leaching process for extracting lead from low-grade and complex ores; the development of a process for the recovery of lead and zinc from lead-zinc sulphides; the application of the floatation process to the recovery of the lead in carbonate ores; the development of a process for the recovery of zinc from low-grade and complex ores of that metal; and the development of a process for the production of zinc dust from solutions of zinc.

The investigations of fuels and mining equipment have thrown light on the processes of combustion in furnaces and gas producers, have shown how heat is transformed from the burning fuel to the water in a boiler, and have led to the design of more efficient boilers. Another result has been the publication of many thousand analyses of coal, both mine samples and samples from coal delivered to the Government, thus enabling fuel engineers to plan boiler equipment with reference to the quality of the available coal. Still other results have been the extension of the specification system of purchasing coal, the development of an improved type of breathing apparatus for use by rescue men in mines after explosions or fires, and the demonstration of the precautions that should attend the use of gasoline locomotives in mines.

The petroleum investigations have already yielded results worthy of far more extended notice than I can give them. They have shown that the enormous wastes of natural gas and petroleum

which have attended the development of gas and oil fields have not been confined to the gas that escaped into the air, to the losses by fires, and to the evaporation of oil in reservoirs or tanks. The unseen wastes underground through improper methods of drilling and casing wells, by which gas has dissipated into porous beds from which it can not be recovered, or water has drowned out oil fields before more than a small proportion of the oil has been obtained have annually resulted in decreasing our national wealth by many millions of dollars.

The Bureau of Mines has shown how these wastes in production can be largely eliminated by improved methods of drilling, especially by sealing porous beds with fluid mud and by making suitable provision for the control of high gas pressures. Also, the bureau has been instrumental in increasing efficient utilization of natural gas petroleum, and products through its studies of the recovery of gasoline from natural gas, and the attention it gave to the development of the Rittman "cracking" process for obtaining gasoline, benzene, and toluene from petroleum. In addition, it has examined and tested the makes of gasoline most sold throughout the United States, has indicated their merits as motor fuel, and is now preparing specifications for the purchase of gasoline that are expected to be of great public service.

Mining Laws and Regulations.

In the endeavor to promote both safety and efficiency in mining by aiding state legislatures to enact more effective laws, the Bureau of Mines has examined all Federal and state statutes relating to mines and mineral property, and all decisions of courts of last resort in which these statutes have been construed or interpreted. A large bulletin recently issued embrace all the United States mining statutes and is annotated by references to all important decisions. Also, the bureau is publishing at regular intervals digests of decisions bearing on mining that have been handed down by State and United States courts of last resort. Still another work has been the publishing of proposed rules and regulations for metal mines. A proposed code of rules to govern the installation of electrical equipment in mines is now in course of publication.

Training of Chemists and Engineers.

My statement of the work the Bureau of Mines is doing for safety and efficiency in the mineral industries would be incomplete if I did not call attention to the increasing importance of the bureau

as a training school for engineers and chemists. The services of the expert chemist and engineer are probably in greater demand today than ever before. This fact has been brought home to me by the number of men who have recently left the bureau to engage in private work at salaries far larger than the Government now pays. Although their going has hindered work on investigations under way or projected, yet I have not felt that they should stay in Government employ when they can do so much for national advancement by applying in outside undertakings the knowledge that they have already gained.

In fact it seems to me that, in considering Federal aid to mining efficiency, we should endeavor to realize the profound influence that these men will exert in making our industries safer and more efficient.

Federal Appropriations for Bureau of Mines.

For the present fiscal year the appropriations for the bureau's work are more than 100 per cent larger than for the fiscal year 1911, the first year of the bureau's existence. Still larger appropriations were virtually promised by Congress when it voted early in 1915 to establish and maintain ten new mining experiment stations and seven new mine safety stations.

The specific purpose of the appropriations made has been largely influenced by the earlier investigations dealing largely with mine explosions.

Thus, in 1911, 60 per cent of the funds appropriated were for investigating mine accidents, 20 per cent for testing fuels, 13 per cent for general expenses, and 7 per cent for inspecting mines in the territories and making public reports. As a result, most of the investigations made hitherto have been incidental to mine-safety work and related to coal mining rather than to metal mining.

The appropriations for the present fiscal year provide \$100,000 for mineral mining investigations, and \$70,000 for investigations of petroleum and natural gas. These funds will enable the bureau to extend its activities in fields that previously have received only incidental attention.

Projected Activities of Bureau of Mines.

As regards the ten new mining experiment stations to be administered by the Bureau of Mines and to be located at those points in the different mining regions of the country where work can be done to best advantage, plans have already been perfected for the immediate establishment of the first three of these stations—one

in Alaska, one in the Pacific northwest, and one in the southwest.

Also, plans have been prepared for developing the ten stations into individual centers of research, each attacking those problems of most interest to the locality in which it is situated, yet having regard to the needs of other localities throughout the United States.

One of the great needs of the mining industry is the development of electrometallurgical processes for the reduction of the base metals. In certain parts of the country, as the Pacific northwest, vast water power is available and electricity can be generated at minimum cost. There a satisfactory electrometallurgical process would make commercially profitable the working of millions of tons of mineral deposits that can not now be worked at a profit.

Perhaps none of the projected investigations is of more immediate importance than the study of ventilation in metal mines, for the health of a large number of metal miners is impaired by the character of the air that they breathe in deep or remote mine workings. In many respects the problem has been unsolved in metal mining even by the operators of large mines. Preliminary work and the data obtained in related investigations have shown the scope and character of investigation needed and the bureau hopes to be able to resume the work in the coming fiscal year.

A study of subsidence, earth pressures, and roof supports in mining, promises results of great importance, not only to coal mining, but also to metal mining and to various engineering enterprises.

In tunneling under bodies of water or in shaft sinking through water-bearing ground special methods are required. Many cities are driving tunnels under bodies of water for transportation purposes or for water supply, and the bureau has been asked from time to time to give advice, more especially at Milwaukee and Cleveland, where tunnel disasters have occurred. If the funds are made available the bureau will take up this work, and also study methods of insuring better ventilation in tunnels.

In investigations relating to the iron and steel industry the bureau will endeavor to develop methods of producing iron and steel with a smaller consumption of fuel, to discover and make available materials now imported, and to develop processes for recovering useful substances from waste products. Among these proposed studies are: An investigation of blast-furnace coke; the use of an oxygen-enriched blast at furnaces; the feasibility of recovering manganese and other ferro-alloys from the wastes of the metallurgical industries; determination of the amount of potash and phos-

phorous salts available theoretically in the fumes, gases, and slags of the industry, and the practicability of recovering them on a commercial scale.

Usage of Mining Terms.

In any proposal recommended as a basis for mining laws that seek to increase safety or efficiency it is absolutely essential that the mining terms used shall be such as are known to be precise and to have more than a local use, or that the terms be carefully defined in the act itself. The confusion and uncertainty caused by using terms of varying significance without defining them is well illustrated in the legal decisions construing the Federal mining land law. Recognizing the need of a comprehensive glossary that shall define mining terms with particular reference to their usage in the United States, the Bureau of Mines is now preparing a glossary that will contain all available terms used in coal and metal mining quarrying, and metallurgical practice; geological terms as related to mining; names and definitions of the commoner useful minerals; and also terms used in the oil and gas industry. The work has progressed to such an extent that about 10,000 terms have been arranged alphabetically, and work is being conducted to verify terms selected from former glossaries and to add new terms.

After the War.

So much has been said in regard to probable industrial conditions in this country after the war, and so wide are the differences of opinion among those who have given the matter intensive study that I shall not undertake to discuss the matter at length. There are a few points, however, to which I call your attention.

American industries have met and overcome foreign competition in the markets of the world by reason of the abundance of our natural resources, the ingenuity of our inventors, and the use of improved machinery by which higher wages paid here are compensated by the greater value of the output per man. Today embattled Europe is being forced to increase the per capita output of its artisans, to "hustle," to use labor saving machinery on an unprecedented scale, and to make a larger use of female labor in many occupations. After the war many of the millions now under arms or engaged in making military supplies will be employed in the industries of peace, much of the labor-saving machinery will not be scrapped but will be used in making products that will be needed, and the increased efficiency developed through the necessities of war may be expected to persist for an indefinite period.

In the readjustments that will follow the coming of peace, the American producer will have to consider not only the mineral industries of a different Europe, but also the effect of these differences on the output of mines and works in Canada, Mexico, South America, Asia, and Africa.

Clearly some of our old standards of trade are liable to disappear; new conditions will create new problems.

It seems to me that the chief needs of the United States, if it is to meet these new conditions successfully, are a wider and deeper co-operation among our industries, an elimination of factionalism and sectionalism, and the growth of a desire to work together for the common good.

Inasmuch as no plan of co-operation can be most effective unless based on willingness and desire rather than on compulsion, and as everybody can aid in some way, I ask the members of the American Mining Congress to endeavor in their undertakings to bring about the substitution of what has been termed "co-operation in competition" for that intense and selfish competition which has led to ruthless waste of our natural resources and shocking disregard of human life. The Bureau of Mines has sought and seeks your co-operation in all its efforts to benefit the mineral industries and the men who labor in them. Nothing has given me greater pleasure than the manner in which the American Mining Congress and other organizations, as well as mining companies, and miners, engineers, and chemists have responded to that appeal, and I gladly take this opportunity to express my gratification.

But, after all, the work for greater national efficiency is hardly more than started, what remains to be done is far larger than what has been accomplished, and for this reason I hope that you will continue to aid the bureau in its investigations, offering suggestions or making criticisms as you see fit, and adopting such of its recommendations as you find practicable. Federal aid to efficiency can not accomplish what it should unless you feel that the Government is endeavoring to help you, and the Department of the Interior and the Bureau of Mines can not do what they wish to do unless you perceive that behind their efforts to aid efficiency in mining is the desire to advance the welfare of this country and through that to contribute to the betterment of all mankind.

DIFFICULTIES I HAVE MET IN COAL LITIGATION.

Address Delivered at Nineteenth Annual Convention of American Mining Congress by R. W. Ropiequet,
East St. Louis, Ill.

We have somewhat wondered whether the builders of this program, perchance, had in mind that historical assembly depicted in the oldest book in the world, wherein it is stated:

"Now, there was a day when the sons of God came to present themselves before the Lord, and Satan came also among them;" and whether this induced them to intersperse the program with representatives of that really oldest profession in the world, of which, according to a most commonly accepted revised version of Scriptures, his Satanic majesty was not only a member, but the pogenitor of members.

For the people ("Vox Populi, Vox Dei") have almost universally accepted the old darkey preacher's version:

"The devil is a lawyer and the father of lawyers."

As for the coal man, certainly "these are they who have passed through great tribulations," and like Lazarus of old, have needs been content "to be fed with the crumbs that fell from the rich man's table," and therefore it would seem logical, should come under the compensatory provision of the parable.

Who else, since the days of Job, has borne up so manfully under "the stings of outrageous fortune," contended with boils of economic disasters, withal bidden oft-times "to curse God and die," and yet throughout it all maintained his integrity as has the coal man?

In view of the generally accepted operation of the legal profession echoing the "woe, upon you lawyers," it was certainly gracious and charitable, on the part of "the powers that be" to grant unto a representative of our profession an opportunity of presenting some of the woes to which the profession is subjected.

For be it known unto you all, the speaker expressly denied the parentage of the topic under consideration. The child if his, is simply so by adoption, having been left, a foundling, at his door.

Howbeit, we would they had selected another for this presentation. No pleasant task is it, indeed, to thus dwell and recall difficulties "the memories of which are grievous unto us." For if there be any truth in the favored commencement motto "ad astra per aspera," those in charge of coal litigation should be continuously traveling the milky way "where the morning stars stand together."

Permit us, however, to change the "I" to "WE." For the same innate modesty that is the badge of our profession, like unto that which of old led the mighty Roman to iterate and reiterate "Caesar" did thus and so, and which has induced the great modern Roman, ex-leader of progressives or leader of ex-progressives, the which, time alone can tell, to submit to such remarkable self-effacement—will not permit the speaker to personalize this presentation.

The impropriety of such an action is obvious; for this is not a legal class or experience meeting. Besides, some of the personal experiences might better be related in executive session. This and the danger of subjecting ourselves to the charge of violating professional ethics, not to speak of the exercise of due caution, leads up to present a "composite," rather than a personal picture.

If in this composite delineation you fail to find evidences of your own individuality, perchance, you may be able to see that of your neighbor.

Since our coal litigation has been largely that relating to railroad rates, we will confine ourselves thereto.

Litigation Defined.

Litigation may be freely defined as the procedure of presenting questions of right or wrong to tribunals for the adjudication thereof under principles of law applicable thereto.

"Law is the perfection of reason." For this we have no less authority than Blackstone, with the unanimous endorsement thereof by the myriads of his followers since that time.

True it is that laymen are oftentimes unable to appreciate this truth; but that is because it reaches them via human instrumentalities, through which it must percolate or oftentimes triturate; behold it, as it were, "through a glass darkly."

For this laymen opinion in this matter there may be an excuse. Even lawyers at times fail to appreciate it; especially as it is interpreted in litigation in which they are interested, by human instrumentalities "clothed with a little brief authority."

As a result, the lawyer himself, though he be a total abstainer, may find himself "too full for utterance," silent not only for precautionary reasons, but because he really experiences the truth of the poet's words:

"I would that my tongue could utter
The thoughts that arise in me."

Litigation is derived, the dictionary tells us, from two words "lis" and "ago," to wage disputes.

The mispronunciation of the first derivative, applying thereto the long vowel "i," making "liēs" instead of "lis" is perhaps responsible for the unfortunately prevalent misconception of the true activity of the lawyer.

Litigation, again, is the presentation of facts, and the application thereto of principles. And that brings us to the second difficulty.

Lack of Basic Principles.

Law, the perfection of reason, does not apparently apply to that which is designated as rate law. This latter as a science, might well be included in Paul's admonition, "beware of science falsely so-called." For in it we find a heterogeneous growth of so-called principles bearing in many respects the birthmark of their origin; for they were conceived in sin and born in iniquity in the good old days of unrestrained railroad revelry.

Shakespeare says that "the devil can quote scripture for his purpose." Lest we be misunderstood, our own leaning thereto, of which we have been accused by our friends, we can assure you, is not the result of intimate acquaintance with that mighty personage.

But whether the "fallen angel" was thus rightly changed by the Bard of Avon or no, certain it is that the carriers (and we intend no invidious comparison) can quote from the scripture of rate interpretation principles so-called, to meet any views for which they may be contending, with such a degree of inconsistency that under the Emersonian theory that only a small man fears to be inconsistent, they are certainly entitled to the crown of true greatness.

This lack of scientific consistency in the principles to be applied to this litigation is one of the great difficulties with which we must contend. Why this continues so to be, we do not know. It cannot be because both in its presentation and application, those "learned in the law" are to a large extent ignored, and laymen, without creden-

tials either as to moral character or mental acumen, such as is required of those of the profession, mingle with the latter upon basis of absolute equality.

Shades of Littleton and of Blackstone, of Kent and of Story. Here is a difficulty indeed: To battle with the layman who knows not, and therefore does not observe the laws of the game which have been recognized for a period of "time to which the mind of man runneth not to the contrary." For how can you meet attacks when you cannot even guess upon principle where your opponent is likely to hit.

The remedy is obvious. For us, however, to present it, might have the appearance of legal selfishness, and we therefore leave the solution to the broad-minded laymen.

The lack of real consistent basic principles and the further absence of even the most basic rules of evidence in the presentation of the facts, both, however, present real difficulties that cannot be ignored.

Difficulties In Securing Proper Evidence.

We have said that litigation is the presentation of *facts* for adjudication under principles of law. In the securing of such facts for presentation, lies our greatest difficulty.

Opposed by a unified body of carriers with a large force of experts continually in their employ, fortified by the addition at hearings of the best of experts money can secure, led by legal specialists, the coal representative is often forced into litigation, backed by a divided constituency without the evidentiary basis which is essential for the proper presentation of his own case, not to speak of meeting that of his opponent; and this even though he may know that this important evidence is actually in existence.

The average coal man thoroughly imbued with the righteousness of his cause is content to trust therein, and to expect his representative some way to secure victories to which his client is entitled, even though the ammunition needed is not forthcoming, forgetting that while "truth crushed to earth will rise again," the resurrection morn is in the rather uncertain future.

Facts within the knowledge of his clients, this representative is unable to produce because of their not being readily available and the unwillingness, or inability, of the coal men to compile them from the records at hand within time for presentation at the hearing.

So that in many cases, the coal representative in this litigation is forced to depend upon the evidence of the carriers, or upon com-

pilations hurriedly deduced from public documents, and largely partaking of the nature of glittering generalities, or even upon those compiled by the carriers for their own purposes.

Is it to be wondered then that with such evidence all lacking the force of primary evidence, it is difficult for the coal representative to establish the proof necessary to win the victory?

And even when facts are available, there is the dearth of witnesses to present them. The prevailing cry of those who state they are unready and unwilling to be the "goat," is, (to localize the matter a little for illustration), "let George" or perhaps "Fred," or "Charles," do it.

It is evident that we cannot expect to meet and overcome the enemy with its efficient organization and its large flotilla, from dreadnaughts to submarines and torpedo boats, with an equipment akin to that "tub-navy" with which Jefferson attempted to meet the preparedness cry of his day, or by the Bryanesque program of calling for the outpouring of volunteers when the enemy is at the door; for in the first place, the outpouring will most likely be but in drops, and even if the multitude came, 'twould be a mob and not an army.

Our experience in coal litigation reminds us somewhat forcibly of a brief personal experience under Uncle Sam in the Spanish American War, when under the patriotic fervor "Remember the Maine," not being "ashamed to fight," we enlisted with some other Illinoisans, and spent some months in the swamps of Florida, wearing the blue, of flannel ill adapted to the tropical clime where we sojourned, and supplied with Springfield rifles of, perhaps, the vintage of 1861-65.

And there comes to the mind, now, an incident, which fanciful as it may appear, is true in substance and in fact. A box of bacon sent to the camp displayed such evidence of the life abundant that it was subjected to an additional examination and was found to be inscribed "U. S. A. inspected at Tampa, Fla., May 2nd, 1868." The topsyturviness of the third number, accidental though it may have been, appeared quite in harmony with the provender to which it applied.

Lack of Preparedness.

We have lately passed through a great era of preparedness, of great parades with the blare of trumpet and the beating of drums: A wonderful opportunity to testify to patriotic fervor of the multitude.

"And for these vile germs I might myself have been himself a soldier."

Effervescent in quantity even so it was in quantity.

For when the boys had gone to the front, in one of the large cities at least, an appeal for aid for their dependents evoked as little response as that of the average coal men's committee appeal for the wherewithal necessary to meet expenses incurred in real preparedness in response to a preceding enthusiastic rate preparedness-parade or meeting of operators.

The evidence offered for presentation to the commission for their consumption oftentimes bears, as it were, the inspiration marks of 1886; the enthusiasm of the initiatory stages of contentions wanes and almost disappears before the days of the real conflict.

Lack of Real Co-Operation.

Years ago the speaker saw a cartoon that would seem to illustrate another difficulty we have often met.

A large mastiff, chained inside a fence to his kennel. Within reach of his massive jaws a ball, and through a hole in the fence Johnny timorously reaching therefor, whilst Jimmy on the outside encouragingly cries "Grab the ball, Johnny, I'll stand by while you do it."

This fairly represents one of the difficulties we have met. We were Johnny, the mastiff the carrier, the ball the desired rate, while the litigant, Jimmy, valorously stood by encouraging with "Grab the ball, Johnny, I'll stand by while you do it."

Lack of Organization.

These difficulties thus confronting us are chiefly due to the inorganized condition of the industry in respect to traffic matters.

Here and there may be organizations partaking of the nature of militia; but in none of the real essentials of rate warfare is the organization or equipment in any way sufficient to meet the organized regulars of the opposition.

"In their ragged regimentals stood the old continentals fearing not."

But ragged regimentals will not serve the present conditions.

But "tempus fugit." I saw that in a Latin Beginner's Book my boy was studying the other day. And why, as was stated by a very brilliant brother who proposed to apply logarithm to the solu-

tion of carriers' rate exhibits, "Why have an education if you don't use it?" Tempus fugit.

We must hasten to the

Remedies.

A. From the general standpoint:

First: The unification of rate-regulating bodies, centralization for efficiency, if you will, but with sufficient flexibility to assure accessibility and expedition.

Second: The sifting of the present heterogeneous mass, yclept rate law and the settling upon principles more nearly approximating some uniform basis of legality.

Third: The application of at least the basic rules of evidence in reference to materiality, to the presentation of evidence at rate hearings.

B. On the part of the coal operators:

First: The supplanting of the "guerilla" by these more akin to regular army methods—real organization for real war.

Second: Real co-operation and the elimination of the "let George do it" spirit.

Third: Perseverance—a spirit that starts well but also continues well, displaying none of the "yellow of the quitter."

Fourth: Real preparedness including the maintenance of traffic bureaus by the larger territorial units upon the plan similar to those elsewhere suggested, these to be organized and maintained efficiently for all traffic purposes, including the regular gathering of statistical information germane to issues involved in rate litigation and their ready compilation and presentation to the commission by witnesses familiar therewith and able to support them and to meet the experts of the carriers.

Such intelligent co-operation in organization and continuous preparedness by the coal operators will not only tend to remedy many of the difficulties we have met, but to make unnecessary the disturbance of the equanimity and harmony of the self-approration of operators in gatherings such as this, by the injection therein by those not "of the faithful," of their views conserving the weaknesses of these "sons of God."

COMMISSION PLAN OF PREPARING MINING LEGISLATION IN THE STATE OF ILLINOIS.

Address Delivered at the Nineteenth Annual Convention of
American Mining Congress by A. J. Moorshead,
Chicago, Illinois.

The subject for discussion before the Mining Congress on the "Commission Plan of Preparing Mining Legislation in Illinois" should be no less interesting to those engaged in all classes of mining than it is to the coal mine operators and coal mine employes of Illinois, who will try to make it a permanent institution.

In the past twenty years of evolution the coal mine industry it has kept well apace with the economic advancement made by all others of the nation, both in regard to the electrical as well as mechanical power of every description, and not only are the more modern mines thoroughly equipped with automatic and other devices for the greatest economy in production, but are well fitted for conservation of life and property. The thoughtful operators (and there are many of them) do not give their greatest consideration to the subject of how cheap a ton of coal may be produced, regardless of the future of the mine, as the wrecks of many coal mines plainly testify was too often practiced in the past, but on the contrary, plans are prepared and carried out that will bring the greatest total income on the investment. Mines so conducted, and in addition, equipped with the injury-preventing and life-saving devices, not only lessen the anxieties of the executive officers and the local supervising officers, but create the greatest reliable security for the owners of the property.

It is altogether too true that the best of rules and regulations have had to be forced upon operators and miners alike, and therefore it is not at all surprising that in legislative matters, both the employers and employes should vigorously oppose any legislation sought independently by either party, and the operators and miners of Illinois, up to and including 1909, were not an exception to the rule.

If we had a single government, the laws of which affected all alike, there would, no doubt, have been less contention and opposi-

tion to many measures offered for enactment, because there are but few new bills and amendments to existing laws offered that do not entail additional expense, which would widen the operating cost with respect to other states; consequently many beneficial measures are opposed for economic reasons only, and the coal mining industry as a whole suffers in consequence of our government by states.

No better illustration of this condition of affairs can be cited than the situation of the Illinois coal mine operators in 1909. At the general session of the Legislature in that year, there were presented to the House and Senate about twenty-seven bills for amendments and additions to the existing mining laws and they largely covered everything vital in mining and would, if permitted to pass, have very materially added to the cost of production.

To promote the passage of the bills, the miners maintained a large and extremely active lobby, and to oppose the passage of them the operators maintained an equally strong and aggressive lobby, with the result that bitter contention occurred at every meeting of the committees on mining of both the House and Senate, and it was not until the end of three months of spirited campaigning, that the legislators of both Houses were equally as relieved as the operators and miners, when the operators presented a bill for the establishment of a mixed commission, to be composed of miners, operators, and representatives of the public to consider the bills in connection with the revision of the mining law, for enactment at the general session of the Legislature in 1911, and the Governor appointed the following:

Dr. J. A. Holmes, Director, Federal Bureau of Mines.

H. H. Stoek, Professor of Mining Engineering.

Dr. Graham Taylor, Chicago, Ill., University of Illinois.

John H. Walker, representing the miners.

Chas. Burch, representing the miners.

Bernard Murphy, representing the miners.

Richard Newsam, President of the Illinois Mining Board, representing the operators.

Glenn W. Traer, representing the operators.

J. W. Miller, representing the operators.

The work of this commission was so satisfactory that the miners and operators joined in petition to the Governor for its continuance and since then the Legislature has made reasonable appropriations for its support.

Among the important changes made were :

First—Reorganization of the State Mining Board.

Second—Established a standard for illuminating oils.

Third—For more efficient work, increased the number of state mine inspectors and required them to be examined periodically.

Fourth—Made the law with reference to safety lamps more specific.

Fifth—Standardized the quality and sizing of powder.

Sixth—Provided uniform plan for sinking, filling and operation of gas and oil wells for the protection of the mines.

Seventh—Made rules for the establishment and operation of underground fire-fighting apparatus.

Innumerable changes were made affecting ventilation, storage of oil, maximum electric voltage and protection of live wires, together with more specifically defining the duties of the mine examiner, etc., and these additions and changes were adopted as the result of thorough investigation of the mining laws, not only of this country but those of other countries.

The work of the commission since 1909-1911 has been equally as active keeping the laws well up to the necessities of the changing order of affairs among which are :

Fire-fighting and rescue stations.

Amendment to the shot firers' law.

Amendment to the law regarding the miners' qualifications.

Gave the Mining Bureau full control of the state mine inspectors.

Provided for protection at shaft landings as well as the keeping of passage ways leading to escape ways and refuge places clear of obstructions.

Additional precautions regarding the handling and distribution of explosives.

Made the plan of examining miners more thorough and complete.

Changed rules for qualifications of mine examiners.

Made provision for protection of abandoned shafts, and many other no less important changes.

The present Mining Investigation Commission is composed of nine members :

H. H. Stoek, Urbana, Ill. ; J. G. Grossburg, Chicago, Ill. ; J. E. Williams, Streator, Ill., representing the public.

John A. Tuttle, Harrisburg, Ill.; William Hall, Springfield, Ill.; R. J. Wilson, Marissa, Ill., Secretary of Commission, representing the miners.

Thos. Jeremiah, Willisville, Ill., Chairman of Commission; W. D. Obcamp, Lincoln, Ill.; Rice Miller, Hillsboro, Ill., representing the operators.

In the evolution of coal mining practices in Illinois, nothing is more creditable to the operators and miners alike than the establishment of the commission plan of changing old laws and making new ones for an industry, which from tippie head to the face of the workings, is so surrounded with danger, and how much more sane and businesslike it is to submit such important matters to a competent tribunal than to fight them out before a legislative body, which, with rare exceptions, is totally incompetent to pass upon the subject even if it had the time necessary to devote to it.

It is now, I believe, very generally the feeling among those who have given the subject study, that no one thing could add to coal mining efficiency and protection of all those interested in the industry, more than the establishment of a similar commission in every mining state and coupled with it, the organization of an interstate mining investigation body to take up the subject of unifying the laws as far as practicable, and this step in itself would place the industry on a higher scientific mining scale and help to dignify it among the industries of the nation, as it deserves to be.

PRESENT STATUS OF THE OIL FLOTATION PROCESS.

Address Delivered at 19th Annual Meeting of American Mining Congress by D. A. Lyon* and O. C. Ralston.†

As is well known to all those interested in mining of the non-ferrous metals, no milling process in recent times has so revolutionized ore-dressing practice as has the introduction of the flotation process. Due to the fact that the technical press during the past two years has been full of discussion on this subject, and as many papers have been presented before technical societies dealing with the theory and practice of the process, the authors will not attempt in this brief paper to do more than to outline the present status of the process.

Definition of Process.

Flotation as practiced today is a method of causing one mineral or another to stay on the surface of water or other liquid or to be entrained in the froth lying on the surface of water or other liquid. Only certain minerals will so float and the remainder of the finely ground ore sinks. Flotation finds its present application in the recovery of sulphide minerals or of native metals from a finely ground pulp. Such a finely ground pulp has for many years been known as slimes and has often been a source of much trouble and loss due to its finely divided condition.

Previous to the development of flotation no process for successfully extracting slimed values from low-grade ores existed. Flotation is needed as a process for treating such material. Now that it has been developed, its principal applications are to the following materials.

(a) Accumulations of old tailings containing minerals which were not recovered at the time the ore was treated by ordinary gravity concentration methods.

(b) Tailings from ores now being treated by ordinary gravity concentration processes, for the recovery of the value not recovered by the gravity concentrating machines.

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(c) Ores containing valuable minerals in such small crystals as to necessitate very fine grinding in order to permit of the valuable particles of the ore being separated from the gangue. It is, of course, understood that this applies to only sulphides or metallic minerals.

Outline of Process.

Several different kinds of flotation have been proposed and used, such as film flotation, bulk oil flotation, and frothing flotation. This last type of flotation is the one largely responsible for the great metallurgical advances which have recently been made in the treatment of non-ferrous ores and is now practically the only commercially important method of flotation. A frothing agent, usually an oil, or a substance closely relative to an oil, is used in order to make the water of the pulp froth easily. In addition, the substance added must be such that the valuable minerals will adhere to air bubbles introduced into the pulp. These air bubbles in rising to the surface must carry only the valuable minerals and the froth formed on the surface can be allowed to overflow or to be raked off in some manner, separating the valuable minerals from the gangue. Hence, the first operation in flotation after the ore has been finely ground in readiness for the application of the process is the mixing in of the "oil" and other addition agents. Whether rightly or wrongly, flotation men have come to call this operation, emulsifying of the oil. Whether it is emulsion or not, the oil is distributed throughout the ore very thoroughly by mechanical or pneumatic methods of stirring. A soluble frothing agent can, of course, be very easily mixed in with the pulp, but when an insoluble frothing agent is used, the pulp usually needs considerable mechanical beating. The fact that very often only one pound of oil, such as wood creosote, or coal creosote, is used for every ton of ore, which is suspended, say in four tons of water, makes considerable stirring necessary in order to divide up this oil equally throughout the pulp. Just exactly what function the oil performs is still obscure.

Oils have been classified as frothers and collectors, because some oils make abundant froth but collect very little mineral into the froth, while others seem to have the property of collecting plenty of mineral, but do not tend to froth well. The presence of both properties in an oil, or the use of an oil having each of these properties, seems to be necessary. Occasionally an acid or an alkali or various metallic salts, are added. There is a serious question as to the feasibility of flotation in perfectly pure water. Many instances

are known where the addition of an electrolyte of one type or another has improved the flotation work, but the reason is not clear. It is possible that acid helps clean off the surface of the particles of sulphides in case they are partially oxidized, and when a better recovery is effected by the addition of an alkali, something takes place, but at the present time nobody knows what it is.

Kinds of Machines.

The operations of mixing in the oil and introducing small air bubbles to form a froth, and finally separating the froth, are performed in machines of two broad classes, namely, mechanical and pneumatic.

In the mechanical machines, the mixing of the oil and the introduction of air bubbles takes place usually simultaneously. This is generally effected by a rotating member of one type or another, so arranged that in its rotation air bubbles are beaten into the pulp. As examples of the most successful machines performing this operation are those of the Minerals Separation Company, the Janney machine, and the Krout & Kohlberg machines. After beating the air into the pulp in such machines the pulp is allowed to pass into a Spitzkasten where the froth is allowed to rise to the surface and be removed.

There are likewise three general types of pneumatic flotation machines, namely, the Callow, the Inspiration and the Cole-Bergman machines. In all of these the oil must be previously mixed with the ore by any method, while air is introduced through any kind of a porous medium, such as a canvas blanket, on the bottom of the machine.

The present status of the mechanical side of flotation is the designing of new machines along two general lines, namely, those which will consume less power, or less oil, than the earlier types of machines. In other words, one of the greatest advances now being made in flotation is in the designing of machinery.

Handling of Concentrates.

After the froth is carried off, or flows off from a flotation machine, it must be broken down and dewatered, leaving a concentrate to be sent to the smelter, or otherwise metallurgically treated. At first, considerable difficulty was met in the breaking down of froths, but it is believed that there are now appliances developed which will break down almost any froth. The use of oils which will give an easily handled froth is one thing which is to be considered. A finely divided jet of water issuing from various patented nozzles,

such as garden spray nozzles, has been found to be a very efficient breaker of froth. Passing the froth through a bucket elevator has been known to be a good method of breaking it up. Almost universally the pulp resulting from breaking down and concentrating the froth is dewatered in such apparatus as the Dorr thickener, to a consistency which can be filtered. Vacuum filters have become very popular in the filtering of flotation concentrate especially the filters of the continuous type, such as the Oliver and the Portland. However, they do not give concentrates with as low a percentage of moisture as do the pressure filters, where high pressure can be used in blowing out the water from the filter cake. In some cases it will probably pay to even dry out the moisture in filter cakes in order to save freight when shipping the concentrate to the smelter. As the material is very finely divided, tight railroad cars are necessary for its shipment.

Effect on Smelter Practice.

The effect of flotation on smelter practice has been considerable in copper metallurgy and promises to cause extensive changes in zinc and lead smelting practice. The finely divided flotation concentrates are not adapted to smelting in a blast furnace because of the formation of too much flue dust. In copper metallurgy the trend had been toward reverberatory furnaces before flotation was developed on a large scale, and the effect of the sudden development of flotation was the almost complete change to the reverberatory furnace. The reverberatory furnace smelts flotation concentrates with very little previous preparation. The most serious problems in the treatment of any flotation concentrates are the roasting problems. In lead metallurgy it is possible to pass this material over a Dwight-Lloyd, or other centering machine, and obtain a product adapted to blast furnace smelting. It is possible that this could be done in copper metallurgy if the sulphur content of the material were not too high. In the case of zinc sulphide concentrate, the case is not quite so easily handled. The fine subdivision of the zinc sulphide should lead to new methods of roasting and smelting zinc in order to prevent the dusting losses during roasting. In the field of gold and silver it has been found that flotation is a more economical process than cyaniding for many ores and the effect will be the sending of flotation concentrate to the lead and copper smelters for the extraction of the silver and gold contained in them. It would seem that the present state of the art is such that further important developments in smelting practice are liable to take place in the

effort to meet the difficulties encountered in treating flotation concentrate.

Present Scope of the Process.

As intimated above, the flotation process at the present applies mostly to sulphide ores, notably of zinc, lead and copper, although the process seems to be well adapted to the concentration of silver sulphide ores and considerable success has been had in concentrating gold ores with or without the presence of pyrite.

Notable installations where zinc sulphide is being floated are the Butte and Superior at Butte, the Mascot in Tennessee, and the Interstate-Callahan in Idaho. Galena is being successfully floated in the southeast Missouri district and in the Coeur de Alene district of Idaho. Copper sulphide ores are being most successfully treated at Anaconda, Inspiration, Chino, etc. Silver and gold ores are being treated with success throughout Colorado and Nevada.*

In the copper country they are finding that the finely divided native copper is also amenable to flotation. During the past year considerable experimental work has been done in flotation of carbonate ores of lead and of copper with the promise of considerable success. This flotation has been accomplished by first treating the ore with the solution of a soluble sulphide such as sodium or hydrogen sulphides. The flotation of the artificial sulphides so formed seems to be a comparatively simple process. While the present state of the art has not seen the successful commercial accomplishment of this method it is probable that the immediate future will see flotation of carbonate ores of both lead and copper. All attempts at the flotation of carbonate ores of zinc have thus far failed.

We are informed that important developments are on foot making possible the concentration of iron oxides such as magnetite

*Those desiring further information on the subject of flotation will doubtless find the following references of assistance:

Bibliography.—Concentrating Ores by Flotation.—Bulletin of School of Mines and Metallurgy, University of Missouri, Rolla, Mo., 1916. This bibliography gives a very complete list of references up to January 1, 1916, on concentrating ores by flotation.

Bibliography on Flotation, January 1 to July 1, 1916.—U. S. Bureau of Mines Technical Paper, now in press. Contains a complete list of references on the subject of flotation from January 1 to July 1, 1916, and likewise a complete list of patents that were taken out in the United States during those months. It also includes references to some foreign patents. It is the intention of the bureau to publish a bibliography on this subject twice a year, and in addition to issue each month a list of references to the articles which have appeared in the technical press during the preceding month on the subject, and also to give a list of the patents granted. Those desiring the above U. S. Bureau of Mines bibliographies or the list of references as they are issued by the bureau, may obtain the same by applying to the Director of the U. S. Bureau of Mines, Washington, D. C.

The bureau has also issued the following preliminary papers, in mimeograph form, on the subject of flotation, which may also be had on application:

Flotation processes for concentrating ores.

Statement on flotation oils.

Flotation of oxidized ores.

and scheelite and fluorite, and such related minerals which break up with marked cleavage planes.

What We Do Not Know.

Very little is known as to the "why" of flotation. We only know "how." During the past year some very important theoretical papers have appeared, but the discussion of the underlying principles involved in flotation has only begun. We do not know enough of the properties of the various oils used and we do not know what becomes of them during flotation. We do know why certain minerals will stick to air bubbles in water contaminated with such oils and it is probable that there are too many things involved for a very immediate complete scientific explanation of the process.

Predictions.

In spite of lack of knowledge as to the underlying principles, its scope is being rapidly widened and it seems safe to predict the commercial success of the extension of the process to flotation of lead carbonates, and of copper carbonates during the coming year. The solution of the problem of the mixed sulphide and oxidized copper ores, so common in Arizona, also seems to be nearly in sight. The extension of the process to the flotation of non-sulphide minerals of a valuable nature seems to be a more remote possibility, but there are reasons for thinking that a better understanding of the theory of flotation will finally result in the development of methods which will allow the flotation of any kind of mineral. Differential flotation of two flotative minerals in the same ore is at present only mildly successful and we feel justified in predicting important developments along these lines as well. The art is still in the stage of development. It is experiencing a vigorous youth and its full growth has by no means been obtained.

THE POSITION OF ENGINEERS TOWARDS THE QUESTION OF WATER POWER DEVELOPMENT IN THE WEST.

A Paper Presented at the Nineteenth Annual Convention of the American Mining Congress, by Henry Sturgis Drinker, LL. D., President of Lehigh University, South Bethlehem, Pa.

Essentially the position taken by engineers in the matter of the conservation of our natural resources is one founded on reason and experience, on expert knowledge and engineering good judgment, not on emotional deductions born of a faddish conception that conservation of our natural resources means locking them up for the needs of an indefinite future when other agencies may have been found to take their place. The real question is,—does the present generation need these resources; if it needs them, the need is exactly that which would be supplied were they held for the use of future generations. Conservation was well defined by Dr. C. W. Hayes when Chief Geologist of the U. S. Geological Survey as “Utilization with a maximum efficiency and a minimum waste.” That is the purpose and should be the effect, of conservation. The mining profession may well take pride in the fact, not generally known or appreciated, that this matter of the need of conservation of our natural resources, particularly of our mining and timber resources, to which the public, and our statesmen have only recently awakened, has been the subject of careful study and outspoken warning by our engineers for years. At the first meeting of the American Institute of Mining Engineers, at Wilkes-Barre, Pennsylvania, in May, 1871, at which, as a young mining engineer, I had the privilege of being present, a committee was appointed “To consider the report on the waste in coal mining,” and from that time to the present, mining engineers have followed up the study of conservation, and no discussion of the subject has been more thorough and exhaustive than that by the engineering profession at large, when in March, 1909, the four great engineering societies—The American Society of Civil Engineers, The American Institute of Mining Engineers, The American Society of Mechanical Engineers, and The American Institute of Electrical Engineers, met in

New York to consider the matter of the conservation of our natural resources.

In view of the superficial utterances constantly put forth on conservation, it is the duty of engineers to keep in close touch with this matter, and to do their share towards shaping the policy of the nation to a course based on reason and technical knowledge, rather than on sentimental diatribe. A greater danger today to the public interests is threatened by the untrained, spasmodic, emotional, semi-political, and careless presentation and handling of these matters before the public, by men (and by women), on whom their importance has suddenly dawned, than even by the continuance of the wasteful methods of the past.

It is folly for a man untrained in engineering to venture opinions on questions like the conservation, development and economic utilization of our minerals and our water powers which require the judgment and experience of engineers. The trouble with many of the plans for coal and water power conservation proposed by men untrained and inexperienced in engineering and in business methods, is, that their plans are ideal rather than real, their dicta negative rather than positive, and their remedies theoretical rather than practical. You have doubtless observed that the fear that is uppermost with such men is often rather that our public resources will pass into the control of what they term the "monopolistic interests of the few," than the crucial question of what is the best plan or system for the economic winning of our natural resources in the interest of the public. What engineers should urge and impress upon the public mind is the importance of looking at these industrial questions in a wholly cold-blooded, business way,—without any obsession or oppression of undefined hysterical fear of the results or dangers of a so-called corporate monopoly that are often as visionary as the nursery tales of bogies to frighten children into being good. Corporations, as we know, are, as a rule, only aggregations of capital to promote some useful industrial or transportation purpose; they are, like other agencies of the day, capable of use and of abuse.

The difficulty, and the probable error, in criticising all large development enterprises as being so-called monopolies is that the superficial critic is apt to consider and discuss the situation on one side only. The conservation,—the careful mining,—of our minerals, and the economic development of our latent water powers, for instance, can only be managed properly by the investment of large capital, and this can today be supplied only by the association of

many individuals having capital to invest, into large corporations controlling such aggregate capital, or by the Utopian plan of state or Federal ownership and the use of the public funds in an industrial enterprise. As to corporations, the stronger they are the more surely are they in a position to handle mining and water-power problems conservatively and economically. The economic mining of minerals—the proper development of a water power site, involve purely expert questions, but it takes capital to command the best expert talent and the investment of large capital to economically develop and erect a plant to produce economical results. Any other course raises the cost of production, and the consumer ultimately pays. As a rule, operations on a large scale, lawfully exercised and regulated (and with the public service commissions of today they are surely abundantly regulated)—result in conserving our resources for the benefit and service of the consumer and save their waste by the producer. When we talk of large aggregations of capital it is well to consider the good they have done, and can do, with the apprehended evil. It will not do to assume broadly that what is mitermed the “monopolizing” of our mineral and water-power interests, for instance, results in waste of our natural resources and in injustice to the public, and those who preach this doctrine are but the blind (or the unscrupulous), leading the blind. Mr. J. F. Callbreath's paper, presented at the second Pan American Scientific Congress, held in Washington in January last, relative to Government control of minerals on the public lands, fully and exhaustively treats of the paralysis in mining development on government-held lands resulting from our present system, and of the need of broader and more liberal Congressional action. It is the object of this paper to present succinctly the present aspect of the struggle our western states have been making, and are making, for more liberal and equitable treatment of the development of their latent water-powers so needed for the benefit of their mining, industrial, and transportation interests, the lagging condition of which, promoted by so-called conservationists, is working so deterrent an influence on the development and prosperity of the west. In his paper Mr. Callbreath quotes the principle as to our public lands laid down by Abraham Lincoln, “The public lands are an impermanent national possession held in trust for the maturing states.”

The National Conservation Congress composed of delegates from all sections of the country, at its meeting in Washington in November 1913 unanimously adopted resolutions supporting a policy in respect to the unappropriated public lands of the nation

"intended to encourage and promote the settlement and development thereof," and asserting "that any act of Congress, or any administrative construction thereof, which is not in harmony with this policy, does an injustice to the new states by placing them on an unequal footing with the original states, and by discouraging and preventing the settlement of such new states and the development of their resources."

These resolutions on unappropriated public lands, which are very full and emphatic, were reasserted and adopted again by the conference of the National Conservation Congress which met in Washington in May last, and they represent a broad, liberal view that should be supported and prevail.

The Conservation Congress of 1913, and again the conference of the Congress in 1916, considered very fully the question of water power development. In the Congress of 1913 the question had been given for study to a committee of able, representative men, with Dr. George F. Swain, head of the Department of Civil Engineering at the Massachusetts Institute of Technology, as chairman. This committee made majority and minority reports. In the majority report it was said:

"It is perfectly clear that in order to induce the investment of private capital in water power enterprises, three things are essential:

"1. Definiteness in the contract entered into.

"2. The prospect of a sufficiently attractive return, commensurate with the risk involved.

"3. The protection of the courts in case of dispute.

"Without these three things the utilization of water powers by private capital cannot be brought about."

Commenting on the existing legislation controlling the development of water powers on government lands at the west this report said:

"Notwithstanding the fact that electricity is playing every day a more important part in our social and industrial economy, and the fact that the development of hydro-electric properties should be proceeding rapidly, there seems no doubt that present Federal laws, and the permits hitherto issued under them, have brought about a condition of relatively slow development of water power. These laws constitute in many cases a practically insuperable obstacle, and while many developments have been made under these laws, many more possible developments have been postponed. Several Secretaries of the Interior have called attention to these facts, and to the urgent need of a revision of the laws regulating the use of water power.

"One of the most serious obstacles to the development of water powers under Government permits is that these are by law, revocable, at any time, at the pleasure of a member of the Cabinet. Under present laws the only way by which water power can be developed on the public lands is under revocable permits prescribed by the Act of February 15, 1901."

The majority report closed with the following words:

"Finally, we repeat that for the conservation of our water powers it is essential that capital shall be attracted to these enterprises, and while we must, of course, fully protect the interests of the public, both present and future, we are not conservationists if we advocate the imposition of terms which restrict rather than encourage development. We must also remember that under present conditions water power investments are not especially attractive, and that steam power is a more desirable form of power, since it can be located wherever needed, and the supply regulated according to demand. Water power is more variable and furthermore, it requires, in general, a very much larger investment per horsepower than steam, though its running expenses are less. Because of the large first cost of water power developments the risk of loss in case of failure of the enterprise is correspondingly large. Capital, therefore, does not need water power enterprises, and it will not take them up to any considerable degree, unless fully protected.

"It is from a point of view of pure conservation that the development of water power is most important.

"It has been estimated that we use annually over four hundred and eighty million tons of coal, worth nearly a billion dollars, in addition to many million dollars' worth of other fuels; and that some two hundred million dollars' worth of this fuel annually might perhaps be saved by the utilization of water powers. When we consider also that the development of water power not only conserves fuel, but directly serves to promote the navigability of rivers, we should be very careful how we discourage this triple conservation in order to secure other results which we may consider desirable. If we do discourage it we may be anti-monopolists, or something else, but we are certainly not conservationists."

A minority report on the water power question was also submitted, and a third report embodying conclusions in which all the members of the committee agreed,—and among the resolutions finally adopted by the Congress were the following:

"We recognize the firm and effective public control of water

power corporations as a pressing and immediate necessity urgently required in the public interest.

"We recognize that there is no restraint so complete, effective, and permanent as that which comes from firmly retained public ownership of the power site.

"It is therefore the solemn judgment of the Fifth National Conservation Congress that hereafter no water power now owned or controlled by the public should be sold, granted or given away in perpetuity, or in any manner removed from the public ownership, which alone can give sound basis of assured and permanent control in the interest of the people."

These resolutions were unfortunately preceded by a rather sensational and irrational preamble, on behalf of the ultra conservative element in the Congress, attacking so-called monopolistic control of water power.

The resolutions themselves are simply the statement of platitudes,—of truisms, to which the Shields bill, passed by the Senate at its last session, and the Myers bill, now pending in the Senate, practically conform. These bills, which have been unjustly attacked as too liberal in their provisions, contemplate time leases, but of sufficient duration to warrant the investment of capital.

At the conference of the Conservation Congress in May last a committee with B. M. Hall of Atlanta (who had been a member of the same committee in 1913), reported on the question of water power after a further study of the question, and again majority and minority reports were presented,—the majority report, which was adopted by a large majority of the conference when presented, discussed fully the present condition of the water power question in our forty-six states, and particularly characterized "the efforts and the sentiments which act merely to block early development of water power and postpone benefits until a distant future," as improvident, unworthy, and as not constituting real conservation. The report commented on the fact that "for a period of years the greater part of our water power development must be accomplished by private capital." That such being the case, "such development must be voluntary on the part of private investors and must be induced by a promise of reasonable reward and an assurance of the safety of the principal invested." * * *

"Therefore, the public must, if it would derive immediate advantages from the water power resources, extend reasonable assurances to investors, and at the same time hold fast to the control of rates, service and conduct, provide for a fair deal for all con-

cerned, and reserve the right to recapture the properties on payment of the fair value thereof at the end of a stated period."

Commenting on the water bills pending in Congress, and which had been developed as the outcome of exhaustive and prolonged hearings before committees of the Senate and House extending over two years, the report concluded with these recommendations:

"Summing up the whole matter and having due regard for the present vital needs for power development as related to national defense, the cost of food and our comfort and convenience in all departments of life, we believe that our duty will not be completed unless we make definite and concrete recommendations as to the future. This course does not necessarily involve participation in political issues or any unwarranted interference with legislative procedure. There are before Congress two water power bills which comprise the best thought of the day and represent a reasonable common ground upon which all may safely stand for the present at least.

"In view of the acute necessities of the present, we urge such action by the Congress of the United States as will result in immediate water power development, and inasmuch as H. R. 408 as reported by Mr. Myers, chairman of the Committee on Public Lands of the United States Senate, with amendments, on March 14, 1916, rendering available water powers on public lands, and S. 3331, as passed by the United States Senate on March 8, 1916 (commonly known as the 'Shields' Bill), relating to navigable streams, contain provisions adequately safeguarding the interests of the public and the rights of the investors, we hereby endorse both of these measures in principle and express the hope that they may be speedily enacted into law."

This may be taken to be the last word on the subject.

The Myers and Shields bills represent conclusions reached on the basis of opinions submitted by experts and after full opportunity had been given by legislative committees for the presentation of the views of those favoring or opposing the bills, and the action of the conference of the National Conservation Congress in approving the majority report and thus endorsing in principle these bills, represents the judgment of a large body of men attending the conference as delegates from all sections of the country,—covering some thirty-six states and the District of Columbia, and appointed, as the constitution of the Congress provides, by the governors of the states and territories of the Union, by mayors of cities, by universities and colleges, and by other responsible organizations,—

a typically fair representative body of intelligent American citizens, well fitted to pass on questions of such importance.

This action in May last of the conference of the Conservation Congress was followed by the adoption on June 16 of the following important resolution by the Joint Conference Committee of the National Engineering Societies, copy of which was sent to President Wilson:

"The Joint Conference Committee of National Engineering Societies believes that the development of the country's undeveloped water powers will increase national prosperity; that private enterprise should be encouraged and stimulated to expedite such development; that unnecessary legal burdens should be removed and existing doubts as to the safety of investment eliminated. It commends to the support of engineers all efforts made to secure the fullest publicity as to the underlying facts regarding this subject."

The actual issue as to the legislation now required to relieve the present lamentable state of affairs was well presented in a paper by H. W. Buck, president of the American Institute of Electrical Engineers, and published in the *Electrical World* of May 20, 1916, entitled "Factors that have hindered the building of water power plants and how such obstacles can and should be eliminated," in which Mr. Buck said:

"There is probably no branch of engineering quite so confused and misunderstood at present by the general public, and even by technical men as that connected with the development of water powers. The mental chaos existing has brought this important industry to a standstill, with great economic loss to this country. The advocates of the steam turbine plant proclaim loudly that the evolution of the steam turbine has put the water power permanently out of business. On the other hand, the ill-informed and over-zealous legislators and so-called conservationists preach that water power plants hold such a monopoly of the power supply of the country that this economic grip must be broken by force. Between these two adverse influences the legitimate development of water power is being crushed." * * * "In spite of the active competition between steam and water power, which is, in many instances, unquestionably in favor of the steam plant, there are still a number of situations where a water power development can be legitimately and profitably made. Furthermore, many new water power developments will be made if rational legislation is passed by Congress which will give such enterprises the required security. Public opinion is apparently swinging around toward a more sensible point of view with respect to water powers, and the recent action by the Conservation Con-

gress in Washington, in which extreme hostile views in the matter were repudiated, confirms this belief."

Now what are the actual conditions in our great west from which the urgent appeal for legislative relief comes. One of the very clearest and best presentations of the subject is given in Dr. George F. Swain's work on "The Conservation of Water by Storage," being a collection of studies by this eminent engineer, fitting one into another so as to present a harmonious whole, based on addresses delivered by him in the Chester S. Lyman lecture series, in 1914, before the senior class of the Sheffield Scientific School of Yale University.

The author luminously weighs the important questions surrounding governmental control, and well says:

"Indeed the conservation movement in the past, particularly as regards water powers, has been too much dominated by the idea of enforcing the arbitrary powers of the Federal and state governments, and extending regulation and restriction to their utmost limits."

And Dr. Swain quotes the remark of a well known Senator who said:

"That is the trouble with the present craze for restriction and regulation of private investment in these enterprises. You regulate and restrict to the extent that you have nothing to regulate."

To show the serious economic question presented by the Government's continued ownership of lands, in our western states, Dr. Swain quotes from testimony given in the hearings of the 63rd Congress, the following table showing approximately the "Percentage of the Area of far Western States owned by the Federal Government":

State.	Total Acreage owned by United States.	Percentage of Total.
Arizona	67,097,293	92.00
California	53,276,547	52.58
Colorado	37,702,033	56.67
Idaho	45,218,919	83.80
Montana	61,049,263	65.80
Nevada	62,219,423	87.82
New Mexico	49,315,409	62.83
Oregon	32,229,745	51.90
Utah	43,564,645	80.18
Washington	17,684,198	40.00
Wyoming	42,613,499	68.00

These percentages are lessened in a table given in a recent article on "Western Public Lands and National Forests" in the October, 1916, issue of American Forestry, as follows:

Per Cent of the Total Area of Each of Eleven Western States, Owned by the United States, and Status of the Lands so Held.

	Total per cent owned by United States.	How divided.		Division of land reserved for public purposes.		Per cent of total area granted to State by National Government.
		Unappropriated and unreserved lands open to entry.	Reserved for public purposes.	National Forests.	Other Reservations.	
Arizona	70.2	{ 50.7	{ ...	{ 17.2	{ ...	{ 17.1
		{ ...	{ 19.5	{ ...	{ 2.3	
California ..	44.1	{ 21.0	{ ...	{ 20.4	{ ...	{ 9.3
		{ ...	{ 23.1	{ ...	{ 2.7	
Colorado ...	49.6	{ 28.5	{ ...	{ 20.2	{ ...	{ 9.7
		{ ...	{ 21.1	{ ...	{ .9	
Idaho	65.5	{ 30.6	{ ...	{ 33.2	{ ...	{ 12.2
		{ ...	{ 34.9	{ ...	{ 1.7	
Montana ...	43.4	{ 23.8	{ ...	{ 17.4	{ ...	{ 7.3
		{ ...	{ 19.6	{ ...	{ 2.2	
Nevada	89.8	{ 79.0	{ ...	{ 7.5	{ ...	{ 5.6
		{ ...	{ 10.8..	{ ...	{ 3.3	
New Mexico	49.8	{ 38.4	{ ...	{ 11.0	{ ...	{ 16.2
		{ ...	{ 11.4	{ ...	{ .4	
Oregon	49.3	{ 26.1	{ ...	{ 21.6	{ ...	{ 8.7
		{ ...	{ 23.2	{ ...	{ 1.6	
Utah	78.9	{ 64.2	{ ...	{ 14.2	{ ...	{ 17.3
		{ ...	{ 14.7	{ ...	{ .5	
Washington.	30.8	{ 4.3	{ ...	{ 23.0	{ ...	{ 9.0
		{ ...	{ 26.5	{ ...	{ 3.5	
Wyoming...	68.2	{ 50.5	{ ...	{ 13.5	{ ...	{ 9.8
		{ ...	{ 17.7	{ ...	{ 4.2	

Whether these figures, or those cited above from the testimony before the Senate Committee, are the more correct, the sixth column in the table last above cited is of great interest as indicating the small

percentage of land within their respective areas granted by the national Government to these western states, when we contrast it with the fact that in the eastern and middle states, the entire state area is in citizen ownership and subject to state taxation. Surely a curious anomaly in a land of "free and equal" people. This large retention by the Government of lands originally in the public domain, and retained in the several states when given statehood rights, constitutes, on the part of the national Government an "*Imperium in imperio*" in the sovereign states of the west, apparently opposed to true American principles of government, and involving complicated questions of control and ownership by the Government in such lands, and of exemption of immense areas from state taxation, wholly different from any presented in the eastern and middle states.

Of this situation Governor Ammons of Colorado in his testimony before the Senate Committee on Public Lands (December 22, 1914), said, "Nineteen-twentieths of the taxes of our state come off of about one-eleventh of the territory, and only a small fraction over thirty-two per cent of the territory of our state is now on the tax roll. More than half of that is cheap pasture land; and yet we are attempting to maintain all those institutions out there that other states are maintaining." (He is referring here to their public institutions—their irrigation school, school of mines, bureau of mines, forestry school, agricultural college, etc., etc.)

Governor Spry of Utah testified to the same general effect as to Utah. Senator Shields of Tennessee in speaking in the Senate (February 9 and 11, 1916), in support of his bill (Senate 3331, endorsed, as above noted, in May last by the conference of the National Conservation Congress), said (commenting on the lack of adequate development of our great latent water powers):

"I will undertake to show that this is not the fault of our great civil, hydraulic and electrical engineers, nor of those who have ever been willing to invest capital in the development of the resources of their country when a reasonable return upon the investment and protection of their property is afforded, but that it is caused entirely by a false policy of conservation which for a while exerted some influence in the Congress, and succeeded in placing upon our statute books certain impracticable, restrictive, and confiscatory laws which have absolutely throttled and prohibited water power development in the United States, notwithstanding the great beneficial results that are known to have followed the utilization of that power by other countries of the world."

After quoting expressions of opinion from President Wilson, Secretary of War Garrison, and Secretary of the Interior Lane, in favor of legislation promoting the use of our latent water powers and commenting on the defects of the existing legislation which discourages such development, Senator Shields further said, and said well and to the point.

“The same persons who are said to have inspired this prohibitory legislation are now actively and officiously endeavoring to prevent the enactment of laws which will unshackle this valuable natural resource and permit its utilization by the present generation, for fear, as they say, it will fall into the hands of a trust, evidently upon the assumption that Congress has not the intelligence to properly and honestly discharge its duties in the premises. They seem to think that conservation means tying up and preventing the use of natural resources instead of opening them up for beneficent commercial and manufacturing purposes. This is a false and unsound policy, for true conservation consists in making the greatest use of these resources for the benefit of the people.”

It is to be hoped that in all fairness to the great west and in the interest of our national development west of the Mississippi, Congress will, at its next session, deal promptly, vigorously, and liberally with this matter. It has been so fully discussed,—the facts—and the law—have been so fully presented in the exhaustive testimony taken by the House and Senate committees, that “he who runs may read” the obvious deduction. Those who wish to see the whole matter summed up and balanced in its latest phases of discussion should study the excellent summary given in that admirable little book, “Looking Squarely at the Water Power Problem,” published recently by Henry J. Pierce of Seattle.

In urging action by Congress Mr. Pierce well presents the situation in these homely words from the far northwest:

“Confidence in water power investments cannot be restored by mudslinging speeches and writings. We cannot hasten the day of water power development by calling each other fools or rogues, or by inciting class against class or by promoting prejudices. The man who is skillful enough to build and operate a water power, and the man who is brave enough to finance it, are surely deserving of reward, and they are not, by such acts, necessarily made over into thieves and oppressors, as some would have us believe. On the other hand, the man who stands fast for a fair and righteous deal to the public is not a charlatan and a seeker for cheap notoriety, as others would have us believe.

“As has already been remarked, all parties are very close together. Some of the remaining differences are mere matters of terminology. Instead of ‘bawling out’ a proposal merely because it is advanced by a water power man, would it not be better to get beneath the surface and judge it upon its merits? Instead of scoffing at another proposal merely because a ‘conservationist’ without water power experience, expresses it, let us see whether it does not have that estimable advantage of perspective. We want water power development as soon as possible, and it makes not a shade of difference who, in the controversy of the past eight years has been right and who has been wrong. The cause is bigger than any man or group of men. Let us forget the past and start new.”

THE REVISION OF THE UNITED STATES LAND LAWS AS THEY AFFECT MINERAL LOCATIONS.

Delivered at Nineteenth Annual Convention of American Mining Congress, by F. F. Sharpless of New York City.

“General, our shells are not heavy enough; they hit the mark constantly but do not more than scratch it, shall we discontinue the bombardment?”

“No! If you can dint the wall often enough in the same place, you will make a breach sufficiently wide to permit of entering.”

The quotation, the verbiage of which is not vouched for, is, nevertheless, applicable to the work done by your Committee on Mining Law Revision, supported, as it has been, by similar committees from other mining organizations.

Repeated attacks have been made upon the old laws in their strongly fortified positions. From a distance it would appear that little impression has been made. Closer observation reveals the fact, however, that a very material impression has resulted from the frequent bombardment. The generals know this and they know that by eternally keeping up the fire, the walls of this fortification will fall sooner or later.

Carrying this simile a little further—the guns inside, the laws referred to, were good but are now old fashioned—new guns, new conditions on the outside are coming on and are bound, in time, to break through.

Some of you may be discouraged, may be tired of the fight, and pointing to your committee of seven years' standing ask what it has accomplished—if anything.

Not having gained its ultimate purpose in all of these years, those who have not been in the thick of the fight may well ask of what use it has been.

Your committee, however, your commanding officers in this campaign, would, if I mistake not, be reticent to quit at this point. They have seen a slow awakening, by a vast number of operators, to the injustice and inadequacy of our existing laws; they have heard the prospector complaining of the growing scarcity of ground where he can prospect; they have seen vast areas of mineral land

taken from the public domain, taken away from the prospector, and now lying idle, lacking capital or energy for its development; they have seen, in many instances, a growing harmony in the realization of what was the matter with these laws, and what particular points needed alteration and how. They have seen at first no interest, then a little, and finally a great deal of interest taken in the subject at Washington, culminating in very nearly obtaining from the last two sessions of Congress the desired first steps for a revision.

Far from being discouraged, your committee and the other committees having this matter in hand, have been continuing their work steadily since their failure to get action at the last session of Congress.

Many of those who have been most intimately connected with this work and most deeply interested in the outcome, have felt that the whole matter was so complicated that the only way in which to get satisfactory results was through the appointment of a commission to take evidence and report its findings to Congress with suggestions as to needed legislation. Last winter the strongest kind of efforts were made in this direction, practically all mining organizations in the country co-operating.

As a result of representations made at that time, and on previous occasions, the necessity of alterations was recognized by a number of our legislators.

The Senate Committee on Mines and Mining was favorably disposed toward granting the request of the miners and there is no prospect of any change in this sentiment at the next session of Congress.

The House Committee on Mines and Mining felt some hesitancy in approving of the appointment of a commission. Its members, however, gave the miners a number of hearings. They were obviously impressed with the fact that many changes should be made and would have undoubtedly reported a bill favoring a commission had it not been for the fact that one of its own members, totally disregarding the desires and interests of his constituents, spent two days in explaining to his co-committeemen that the demand for alterations came only from the "moneyed interests of lower Broadway."

Influenced by this misstatement the House Committee failed to approve of the commission plan but in lieu thereof said, in substance:

"You fellows get together, decide on exactly what you want

changed and how you want it changed, put it down in black and white and if it seems right we will enact it into laws."

Recognizing the necessity of certain changes but failing to comprehend the intricacies of the subject or how radical and comprehensive the alterations should be, several bills were prepared by Congressmen proposing a few specific modifications.

These bills showed upon their face that they were prepared by persons unacquainted with our requirements, and, naturally, failed to gain the approval of those whom they were intended to benefit, and, likewise, failed of passage.

In view of the experience at the last two sessions of Congress, it is now no time in which to abandon our efforts but a most proper time for renewing and increasing them.

The Mining and Metallurgical Society of America, which organization took the lead in the activities at Washington last winter, acting upon the suggestion made by a number of Congressmen, is now at work on the subject and by a systematic canvass is endeavoring to secure and tabulate the views of the largest possible number of mining organizations and individuals upon many of those points which must be considered in a revision.

Other associations are giving consideration to still other features which appeal to them as of great or greater importance.

When all this work is done the representatives of our various mining societies will be able to say to Congress: "Upon these points we are all in practical agreement, and upon these points there are important differences of opinion, which are here noted, while as to this third set of propositions we are dissatisfied with existing conditions but are unable to suggest satisfactory solutions."

This much an organization, or a committee of an organization can do, but there will remain work to be done by every member and by every man interested in mining.

Changes will be made, if any are made, by Congress, and they will not be made at the behest of any small committee no matter how representative.

We can rely upon many of our Congressmen and Senators from the mining states to do their duty, but all the Congressmen from those states together do not equal New York's representation in that body.

Many Congressmen from eastern states have no knowledge or interest in the subject and do not even know that they possess constituents with such interests.

The committees of our various mining organizations may be able to lay the matter before the House Committee in such form as to receive favorable consideration, but it remains for you, individually, the eastern operator, perhaps more than the man whose home is in the west, to urge upon your Congressmen the importance of the subject, the urgency of the demand for the changes. We cannot get these changes without votes; three-quarters of our Congressmen know nothing about the subject and perhaps not one-tenth of them feel any personal interest in mining laws.

Congressmen are in Washington to do your bidding, but unless you inform them of your views and that, too, in no unmistakable language, they are not to be blamed for failing to act in your interest.

Before closing, permit me to remind you of one point upon which your committee has had some experience: One loud talking, incompetent or unscrupulous advocate, of the "let-well-enough-alone doctrine" can do more to prevent alteration of laws than can the most careful, painstaking and conscientious committee can do toward changing them.

One individual honestly opposed to alterations will be more seriously heard than many honestly favoring them.

Therefore, once again I say, it is the duty of every one of you who feels that the mining industry can be benefited by alterations in our existing laws to do your utmost with the one or more men in Washington whom you have a right to approach and make such representatives feel that you are asking no favor for yourselves but pointing out a duty that he should perform.

CO-OPERATION THE BASIS OF SAFETY, EFFICIENCY AND CONSERVATION IN THE USE OF THE NATIONAL MINERAL RESOURCES.

Address Delivered by Carl Scholz of Chicago at Nineteenth
Annual Convention of the American Mining Congress.

Recently the Nation's industrial, social, and political affairs have undergone most radical changes from that which was. These changes are now an established fact, yet it cannot be said that we sought to procure them or even desired them. They were forced upon us being the resultant, here, of forces operating wholly outside our geographical boundaries. While in no vital sense responsible for the new order of things in our own house, we must make the best of it and out of it.

To understand how greatly our most important relations in life have been subject to revolution, a study in contrasts is necessary.

Less than two years ago the whole mining industry was in distress. In the metalliferous districts many mines were closed down and indeed only those properties which were strong financially were producing. Many of them did so at a loss. Hope of a profitable market price was abandoned and effort to obtain better returns on investment were directed toward milling and smelting processes. This was a commendable course no matter what its origin but the financial status of many companies made this far less than a general remedy. Indeed, it required a courageous man to send good money into a metal mine seeing the limited chances it had of returning and bringing the other money out with it.

Then the European war came. For a moment business was paralyzed by the shock. But so soon as it became known the war was to be confined mainly to land, shipping became confident and ventured. Then the products of our factories and mills sprang into a commanding position in the world markets. We began to enjoy a prosperity, which, while sectional and slow growing at first, produced a collateral effect which enveloped the entire country. That is to say, wages in the munition factories were advanced to spur the workers to larger efforts. And other factories planted side by side with the makers of war munitions had to pay equal rates or lose their employes. This stirred them to seek business vigorously.

Thus furnaces and mills long idle were started and of course the idle mines were reopened.

The coal mining division of the mining industry recovered last in the list. Perhaps it is more exact to say that because of the large surplus productive capacity it felt the growth last. But in the last two months it has undergone a great change. Its supposed excess capacity has been swallowed over night and prices have risen at an astounding rate. While these prices, so far, apply on only a small percentage of the output, the larger profit is a boon to those who have been struggling under an ever-increasing financial load with no relief in sight.

Our rough and our semi-precious metals and our coal, both as raw material and in combination, as finished material came to be in demand abroad. Thanks to the skill of our manufacturers and to the ingenuity of our bankers not only these things but our food-stuffs found ready sale abroad and this country was placed in the very enviable position where for the first time Europe wanted our money as well.

The outstanding fact is that this fundamental change in our position was not due to any superhuman efforts of our own people but springs from the grave misfortune of many others.

It is even true that we were but little better prepared to meet the emergency which came upon us than we were to force America into the position it now occupies. Indeed, we were in such a position industrially that it is a grave question where we would be today if this war had not come. Since we have not improved our form of organization vitally, we must ask ourselves in all seriousness what will we do when it ends. When we seek relief, we realize that political differences have contracted to such narrow limits we can hope for little by any party changes. And both parties are alike in that they studiously contrive to enact class legislation while calling it by another name.

If we despair of getting a change of business organization by legislative consent and hope to solve our problems in selling our stuffs abroad, we still face defeat. Our foodstuffs are no longer a necessity to Europe in the old sense. Germany has been able to subsist, no doubt with privations, without food imports. England and France will do better in future but, most of all, Russia has been aroused at last. It is unreasonable to expect that we will, after the war, sell as much and at high prices to a nation like Germany which has existed without any imports and which, as the result of

the war costs, will not have much money to spend with foreign countries. This must be equally true of the other nations.

We are thus left with the naked truth that we have become a manufacturing nation forbidden at home to regulate output to need and, by commercial treaties abroad, stripped of an overseas market for our factory output. As a nation, then we have work to do in setting our own house in order. What are we to do when our tottering business cannot lean upon war orders?

This Congress, which represents the mining industry, cannot evade the responsibilities ahead of it. Much harder work must be done than ever before to secure merely a continuance of conditions, however trying they were, which prevailed before the war. The metal trades must feel especially the new conditions because those who are now our best customers will, when war is over, become our competitors. They will compete being seasoned by war experience in handling metals and will have acquired that efficiency which is born of hardships. They will practice economy taught by poverty and will display endurance and courage which comes from years of struggle with death as the adversary. Meanwhile, America has had the opposite of these experiences being satisfied by ease and luxury. How can we face the future unless we pass through some such great change as was suggested by Bishop DuMolin when he said: "You must be born again." Maybe we must say that to our industries.

It is unfortunate that in suggesting we seize upon the only remedy at hand, I must use a word which has come to be popular under another and an impossible meaning. Men cannot co-operate successfully if the sole aim is the satisfaction of selfishness. The line between proper co-operation and restraint of trade is as clearly defined as is that between community action to reduce waste and monopoly. That cleavage must be maintained, even as we must differentiate between socialism and democracy which are in no sense synonymous.

In this larger and better sense, the Congress stands for co-operation. It construes it to be a form of community action participated in equally by the Government, the employer and worker. It must be literally a case of all for one and one for all with the common aim of mutual helpfulness. To give my meaning of the word a simple every-day setting: The miner says:

"I'll load another car before I set the props."

But he never sets those props because he is buried beneath the rock fall, imposing a financial burden on the employer and hence upon the public.

Or the foreman says:

"Time is too valuable to change that rope now. I will wait until Sunday."

But on Saturday the cage falls. Thus working days instead of hours are lost and life sacrificed, imposing a burden upon the workers and the public. Or, again, the public says:

"We want this, that, or the other. The cost is high. The thing is not necessary. Still we want it. Let us buy it and make the miners pay. They are rich."

But the money that goes to pay the tax was set aside to buy something to make the mine more safe. That thing isn't bought and the mine explodes. This is a burden upon everyone.

As you see, co-operation and self seeking move in opposite directions. How futile and how foolish it is to speak of them as being one and the same thing. The kind of co-operation I have in mind was that which was the animating spirit of the guilds of other days. In them the employers and the workers of one industry stood together to protect self interest but did it by improving craftsmanship on both sides. I can see no obstacle to such a spirit among the mine operators and the mine workers who will study to produce the best in the mining industry.

To indicate that this is no new doctrine on the part of this organization, I call your attention to the fact, the American Mining Congress was active in advocating the establishment of the Bureau of Mines. Through that we get a centralized effort to control mine disasters by carefulness of the miner. We get the effort of the operator to improve coal preparation. We get the effort of the public to use coal economically. Thus through correct and three cornered co-operation, we get practical conservation.

This Congress is seeking similar results elsewhere by advocating prescribed limits in which shall be found the solution of the public land question, the proper and hence harmless expansion of the authority of the Federal Trade Commission, and the opening of the Alaskan mineral deposits.

In the coal industry in particular there is need for co-operative work done in the right spirit and the right way. That is to say, co-operative selling methods are essential if the waste in that direction is to be stopped. Also, co-operative work among producing interests alone can solve such problems as how to coke the western

coals that the buyer may have a smokeless and efficient fuel while valuable by-products, such as benzol, ammonia, and a thousand other products may be reclaimed to meet known national needs.

There can be no greater need for proper co-operation than in such matters as those which came to a focus in the recent railway legislation. On the one side we had an example of a democracy which had gone over to socialism. On the other side, we had a union which had construed co-operation to mean monopoly. In between, there was a breakdown of everything which makes for the dignity and the sacredness of our government. From this warping of things which in themselves are good, we must be redeemed. The only way out is a newer and better meaning of co-operation.

The Mining Congress has concerned itself for years with a discussion of this very important matter. It will continue to discuss it until the better basis for understanding can be found. In the immediate future the members of this Congress for the reasons I have given will be much preoccupied by the demands of their business. They will not have time for either work or thought on public matters. Even so, I want to close my address as Washington closed his career by admonishing that "in time of peace, prepare for war." Only, the burden of my present thought is the reverse, namely, "in this time of war prepare for peace and for continuous peace." In this time, I can think of no greater need we have as citizens, as workers, and as employers, than that which is to work out a plan by which we can co-operate without harm to anyone but with good for all and to be as considerate of those who are to follow as we are to those now here.

THE NATIONAL NEED OF NAVAL PETROLEUM RESERVES.

Hon. Franklin D. Roosevelt, Washington, D. C.

It seems a pity that the issues of petroleum reserves for the United States Navy has, to a certain extent, been clouded by legal or other claims which do not in any way affect the broad proposition. The chief consideration must be that of the good of the country from the point of view of its national defense.

The very life and future existence of the United States Navy is at stake. This may be easily proved by the following simple statement:

First. Oil-burning naval vessels possess great advantages over coal-burning vessels. The following may be quoted as some of the reasons:

- (a) Large excess of speed.
- (b) Absolute control over the emission of smoke so that advantage may be taken of the ability to utilize smoke screens.
- (c) Greater radius of action.
- (d) Reduction in fire room force of about fifty-five per cent.
- (e) Ability to refuel at sea, thereby increasing the effectiveness of the fleet by at least twenty-five per cent, as that percentage of coal burners would be absent from their station for refueling.
- (f) Ability to maintain maximum speed for as long as the fuel lasts, because fires do not foul and fire room force does not become exhausted.
- (g) Flexibility in regard to increases and decreases of speed without loss of fuel, water and time.
- (h) Greater safety of the vessel from submarine attack because of greater permissible subdivision of ship.

Added to those advantages is the consideration that the scouts, destroyers, and battle cruisers authorized by the last naval appropriation could not be built if coal were used as fuel. As a result of these and other reasons the Navy Department some time ago definitely adopted the policy of building exclusively oil-burning vessels. It may be set down as a definite conclusion that the navy

cannot revert to coal-burning vessels without enormous loss of efficiency, and, furthermore, that the navy will not so revert.

Secondly. In regard to the amount of oil necessary for the future of the naval reserve, the subject must be considered under three heads:

1. A reserve supply in tankage away from the immediate coast line for reserve in time of war.
2. A current supply in tankage at fueling ports.
3. A natural underground protected reserve to insure supply for the future of oil-burning ships.

Little need be said about the reserve tankage supply for use in time of war. It is estimated that the navy should have on hand in time of peace storage tanks capable of holding enough oil for a full two years' supply to the fleet for war time. This system of tankage should be begun immediately and expand as the number of oil-burning ships in the navy increased from year to year. For our present needs we should have probably 2,000,000 barrels so stored. Ten years hence we ought to have 20,000,000 barrels.

In regard to the current supply in tankage at fueling ports, this is being gradually provided by the navy. An important factor of this is the construction of additional fuel ships, so that the navy may be in a position to obtain its oil from all the markets of the world to its best advantage. Suggestion has even been made that it would be the wiser policy to take care of the navy's current needs in time of peace from oil fields outside of the United States, thus causing less depletion of our own petroleum fields.

In regard to the last and by far most important form of supply—the natural underground protected reserve—we have but to look certain well-known facts frankly in the face. We must admit that the total amount of oil within our continental limits is growing less from year to year and the number of available sources of new supply is necessarily diminishing. We already know the general figures in regard, for instance, to the Appalachian oil field, and we know also that the peak of supply has been, or will soon be, reached in other fields, and that there is not much probability of discovering new fields of the same magnitude as those already opened. Add to this the known fact that commercial consumption of oil is increasing and one must reach the inevitable conclusion that there must be soon either importations from foreign fields or a serious shortage in this country. Oil men are much inclined to ridicule the idea that there can ever be a shortage

of oil for naval purposes. They base this perhaps on a lack of knowledge of what our future needs are to be, and the following figures may be perhaps a surprise to people who have not gone into this question from the point of view of the future. The Navy burns today in time of peace about 842,000 barrels of oil. The construction of new ships during the next few years, *already authorized by Congress*, will call for approximately the following annual consumption:

Fiscal year	1917,	1,475,000 barrels
"	"	1918, 1,942,000 barrels
"	"	1919, 2,845,000 barrels
"	"	1920, 4,175,000 barrels
"	"	1921, 5,854,000 barrels
"	"	1922, 6,574,000 barrels
"	"	1923, 6,721,000 barrels

Further, if the General Board recommendation for the replacement of battleships after they have been in service twenty years is carried out by Congress, the total consumption of oil in the fiscal year 1927, or ten years hence, will reach the enormous total of 10,237,000 barrels! You will not blame me if I wonder whether the engineers of this country have carefully weighed the naval needs for the next ten years in the light of these startling figures.

From the military point of view, in fact from the broadest point of view of national defense, it is absolutely vital that we should be able to obtain within our own borders this amount of oil of our navy is to be kept at the highest point of efficiency. It is perhaps not strange that the Navy Department has, therefore made strenuous efforts to obtain oil lands sufficient for the navy's needs. I do not want to take up any controversy relating to the rights of any individual or of any private company to certain specific lands. I take it for granted that the government of the United States ought not to and will not deprive any citizen of his legal property without adequate compensation. There is no reason why such protection cannot be given either by the courts or by a specially created tribunal created to adjudicate all matters in dispute.

The important matter is that the government has the right to and must set aside reserve oil lands and prevent absolutely the taking of oil from these lands for private purposes. If private individuals have valid claims on these lands they must be adequately compensated for these claims, but they must cease to

remove oil from these lands. It would be the height of the ridiculous for the government to set aside certain oil bearing properties and allow private concerns to take out oil from any portion inside of the outer limits of such a reserve. Any child knows that oil flows to a greater or less extent over large areas underground, and government oil lands must be absolutely and definitely protected against tapping from other sources.

There is in the first place no question that the government has the right to create such reserves; there is in the second place no question of the military necessity for creating such reserves, and there is in the third place no question that the government, backed by the people of the United States, is going to get these reserves. What is needed now is not a fight by those who see the possibility perhaps of personal exploitation and possibly large gains; what is needed is the co-operation for the sake of the nation as a whole on the part of the hundreds of patriotic Americans who have today interests in the production of oil. There is no question that a fair method can be worked out by which the rights of the individual will be wholly protected and the defense of the country in this vital respect thoroughly safeguarded.

LEAD AND ZINC RESOURCES OF THE UNITED STATES.

By C. E. Siebenthal, Washington, D. C.

The lead and zinc producing districts of the United States have responded well to the extraordinary demands made upon them since the beginning of the war. The lead content of ore mined rose from 500,000 tons in 1913 to 523,000 tons in 1914 and 562,000 tons in 1915. The recoverable zinc content of ores mined was 406,000 tons in 1913, 407,000 tons in 1914, and 606,000 tons in 1915. Both the lead and the zinc industries have been speeding up in 1916, and there will doubtless be notable increases in the output of each metal, especially in zinc. Zinc increases are to be expected in New York, New Jersey, Virginia, Tennessee, the upper Mississippi Valley region, the Joplin region, New Mexico, Montana, Idaho, and California. When the Downtown district of Leadville is drained, and work has begun in the mines there, the zinc output of that district will be increased, but that will not happen until 1917.

The following table shows the production of lead and zinc by the different States in 1914 and 1915:

Mine production of lead and zinc in the United States, 1914-1915, in short tons.

State	Lead content of ores.		Recoverable zinc content of ores.	
	1914.	1915.	1914.	1915.
Alaska .....	.....	437	.....	.....
Arizona	7,502	10,869	4,896	9,110
Arkansas	41	63	608	3,209
California	2,126	2,290	195	6,547
Colorado	37,106	34,405	48,387	52,297
Idaho	174,263	173,000	21,006	35,077
Illinois	717	954	4,811	5,534
Kansas	1,409	1,212	11,284	14,365
Kentucky	16	251	230	764
Missouri	192,612	210,440	105,994	136,300
Montana	4,828	6,878	55,790	93,573

Nevada	6,405	8,319	6,490	12,188
New Hampshire .....	....	*9	6	24
New Jersey .....	....	....	74,253	136,042
New Mexico	882	2,271	9,202	12,702
New York .....	....	....	....	2,455
Oklahoma	7,556	7,306	13,992	14,314
Oregon	8	31	....	....
South Dakota	2	2	....	....
Tennessee .....	....	1	10,425	16,461
Texas	75	110	108	15
Utah	85,662	99,984	7,995	12,146
Virginia	127	339	174	1,267
Washington	33	148	....	122
Wisconsin	1,494	2,322	31,113	41,403
Totals.....	522,864	561,641	406,959	605,915

Eastern States.

Zinc and lead were produced in the Eastern or Atlantic States at an early date, but the only states making long-continued production of either metal were New Jersey, Pennsylvania, and Virginia.

In northern New York, at Edwards, a zinc mine has been under development for several years. The main difficulty encountered was the separation of zinc blende from pyrite and barite, which after much experimentation was finally accomplished by a wet magnetic table devised at this mine. The output of the mine for 1915 was 5,618 tons of concentrates, containing 2,455 tons of recoverable zinc. The mine is at present producing at the rate of 900 tons of concentrates a month, and the output for 1916 will be about 5,000 tons of recoverable zinc. The mineralized area is in a belt of dolomitic limestone about 2 miles wide by 15 miles long, and it is known to contain ore at several places, notably at the old Balmat mine. Other areas in this belt are being prospected, and a zinc mine is also being opened near Summitville, in Sullivan county.

New Jersey was an early producer of zinc ore, and the output has been continuous and large. The Franklin Furnace mines are famous for the long time that they have been producing, for the quality and quantity of their zinc, and for their unique assemblage of zinc minerals—zincite, willemite, and franklinite. According to

*Includes small quantity of lead from Pennsylvania.

J. D. Whitney, the only zinc produced in this country in 1853 and 1854 was recovered in the form of zinc oxide from New Jersey ore. About this time the method of manufacturing zinc oxide was greatly improved, and thereafter considerable Franklin Furnace ore was used for making zinc oxide. Spelter from refuse zinc oxide from New Jersey ores was first manufactured about 1865. Afterward it was learned that if anthracite is mixed with franklinite ore and highly heated, the zinc is driven off and immediately condenses as zinc oxide, and the manganiferous iron residues are suitable for making spiegeleisen, which is used in the Bessemer process of making steel. Therefore the franklinite concentrates are used for making zinc oxide and the willemite and zincite concentrates for making spelter. The spelter made from these ores is free from cadmium and lead, ranks as "high grade" spelter, and commands a premium. The great demand for spelter of this quality during the war has resulted in a notable increase in the zinc output of the Franklin Furnace mines. The output almost doubled, from 74,253 tons of recoverable zinc in 1914 to 136,042 tons in 1915. New shafts were sunk at the Franklin and Sterling mines and a new mill was built at the Sterling mine.

The Friedensville mines, in the Saucon Valley of Lehigh County, Pa., were large producers of the zinc ore in the early days of the zinc industry, but no ore has been mined there for 30 years. It is reported that all the land in the vicinity of the old mines has been acquired by the New Jersey Zinc Co., which prosecuted a campaign of drilling a year or so ago. As this paper is being written a trade journal carries the item that the company is preparing plans to reopen the mines very soon. The mines gave no evidence of exhaustion when they were closed, but they could not be operated in competition with the much more cheaply mined Franklin Furnace ores.

Prior to 1876 zinc had not been mined in Virginia, but lead mines were first worked there in 1621. The lead output, though never large, amounting to 25 or 30 tons yearly about 1787, was sufficient for pioneer needs. In 1879 the Bertha zinc mines were opened and the smelter built. The Bertha spelter had a splendid reputation for excellence. Considerable prospecting is being done, and there is a possibility of opening other productive mines in the limestones of the Great Valley region, but apparently the most promising field for increased zinc production is in the pyrite belt of Louisa and Spotsylvania counties. The pyrite mines have

always contained a little lead and zinc ore, but only very small shipments have been made. The ore of the Allah Cooper and Holladay mines contains more lead and zinc, and the latter mine especially is being actively developed as a zinc mine. The vein has been opened by several shafts and drifts, which are reported by the company to have proved 50,000 tons of mixed sulphide ore of practically shipping grade.

Tennessee has become a considerable zinc producer in the last few years, owing largely to the operation of two mines. The American Zinc Co.'s mine at Mascot is equipped with two concentrating mills and a flotation plant that will treat nearly 3,000 tons of ore a day. The last annual report of the company credits the mine with ore reserves of 5,000,000 or 6,000,000 tons. The Embreeville mine is an old iron mine in which were recently discovered extensive deposits of oxidized zinc ores. During 1915 both these mines, as well as some smaller ones, made a gain of more than 50 per cent in output over the preceding year. The zinc output of the State during 1916 will be larger still, because the Mascot mines are increasing in production and because a new mill equipped with flotation machines has been operating all the year at the New Prospect mine, in the old Lead Mine Bend district.

The recoverable zinc content of ores produced in the Eastern States in 1915 was about 156,000 tons, compared with 85,000 tons in 1914, an increase of over 80 per cent. The zinc produced in the Eastern States constituted over 25 per cent of the output of the United States, compared with 27 per cent produced by the Joplin region. The lead output was practically limited to the few hundred tons produced by Virginia.

Central States.

The lead and zinc ores of the Kentucky-Illinois region are associated at many places with deposits of fluorspar, and lead concentrates often form a by-product in the preparation of the fluorspar for market. Processes recently developed have successfully separated sphalerite from fluorspar, and the production of some zinc concentrates as a by-product of fluorspar concentration is also to be expected. There are some deposits of zinc and lead, however, which are free from fluorspar, and the mines working these deposits made a larger production in 1915 than for many years previously. The productive area includes Caldwell, Livingston,

and Crittenden counties in Kentucky and extends northward into Pope and Hardin counties, Illinois.

The upper Mississippi Valley region produced some lead as early as 1690 and has yielded considerable lead ever since colonial days. In 1860 a zinc smelter was established at La Salle, Illinois, and the region became for that period an important zinc producer also. The total output of lead in this region from 1821 to 1915, inclusive, is estimated at 650,000 short tons, and the output of zinc from 1860 to 1915 at more than 600,000 tons. The district made a good gain in 1915. The lead and zinc ores are found in Grant, Iowa, and Lafayette counties, in southwestern Wisconsin; in Jo Daviess county, in northwestern Illinois; and in Dubuque, Clayton, and Allamakee counties, in northeastern Iowa. There has been no output of lead or zinc from Iowa for several years. Illinois maintains its output from the mines near Galena, where one of the largest producers in 1915 is one of the oldest mines in the region, the Black Jack-Marsden mine.

Most of the lead and zinc produced in the region is mined in Wisconsin. The ore bodies are found in "openings," "crevices," "flats," and "pitches," which may extend for a considerable distance in a straight line and form a "range." In some of the mining areas smithsonite is plentiful, and it is mostly made into zinc oxide at Mineral Point. Most of the deposits of zinc blende contain so much pyrite that it has to be removed before the blende is salable. This is accomplished by roasting and magnetic separation. There were 10 districts or camps which produced ore in 1915, of which Benton yielded nearly half the state output. Under the stimulus of great demand and high prices developments were directed toward larger size of plants and greater output, better equipment, and higher recovery.

The southeastern Missouri "disseminated" lead deposits, on the northern and eastern flanks of the St. Francis Mountains, have been known and worked for about 200 years. Each of the eight companies now operating has large holdings either owned in fee or under lease. These tracts have been core-drilled, and large ore reserves are known to have been developed. The ore occurs in dolomitic limestone, so that the diamond drill is available for prospecting, both for vertical drilling in new territory and for horizontal drilling in the mine headings to assist in following the ore. One of the older and larger companies is reported to have claimed a few years ago that it had reserves sufficient to keep up production

at its rate at that time for 70 years, and the other companies have doubtless commensurate reserves. The limits of the productive territory have not been sharply defined, and there are indications that it may be extended somewhat both northwestward and southeastward. The lead content of ore produced in southeastern Missouri since 1720, including 1915, totals over 2,400,000 tons. The lead produced in 1915 amounted to 184,000 tons, compared with an average of 150,000 tons during the preceding years, and this figure will no doubt be exceeded in 1916 owing to more active operations consequent upon the higher price of lead during the current year. The output for 1915 was one-third of the total production of the United States and was considerably in excess of the output of the Cœur d'Alene district of Idaho, the district having the next largest production. The immense ore bodies in the southeastern Missouri district insure long continuance of operations, and as a result the concentrating equipment is most modern and complete. All the milling plants are large, most of them are comparatively new, and each has recently been equipped with a flotation section. The Federal Lead Co. will soon complete a 2,500-ton mill at Flat River.

The Joplin region, in southwestern Missouri, southeastern Kansas, and northeastern Oklahoma, has for many years been the main dependence of the United States for zinc, and it also produces a considerable quantity of lead. The output of zinc in 1915 was about 165,000 tons, or 27 per cent of the total output of the United States, compared with 131,000 tons in 1914. The production for 1914, however, was below normal for the region, which for several years preceding has averaged 150,000 tons of zinc annually. On the basis of 43 weeks' reported production, the output in 1916 will not differ materially from that in 1915. Owing to the fact that the Joplin ores are used to make spelter almost exclusively, while ores from other regions are used partly to make zinc oxide, the spelter made from Joplin ores constitutes 36 per cent of the total output. The total output of zinc by the Joplin region to and including 1915 is estimated at 3,300,000 tons, and the output of lead at 950,000 tons.

Ordinarily less than half the ore produced in the Joplin region is derived from the deposits known as "sheet ground," but in 1915, owing to high prices, leaner sheet ground could be worked, and as a result much more than half the output came from the sheet ground. The average metal content of these ores in 1915 was 1.38 per cent, compared with 1.65 per cent in 1914. The average metal

content of soft ground ores was 2.26 per cent in 1915, compared with 2.64 per cent in 1914. In the "sheet ground" the ore bodies are in chert and have a flat, tubular shape and a thickness of 8 to 25 feet. These ore bodies may be worked out as in a coal mine by leaving regular pillars. Owing to the low prices for zinc ore prevailing two or three years ago, many of the sheet-ground mines could not be profitably worked. Under the stimulus of the high prices in the second quarter of 1915, these mines began to be unwatered and new mills were erected where old plants had been moved away or upon new deposits. The increase in production came in time to bring the output for the year considerably above the average. There will be a larger production during 1916 from the southwestern part of the region, lying in Oklahoma, where several very rich mines have been recently opened. These mines are in the northward extension of the Miami district, in which development has progressed northward to the Kansas line. Just at present the most actively prospected section in the Joplin district is an area in Kansas $2\frac{1}{2}$ miles wide and reaching from Baxter Springs 8 miles westward, adjacent to the Oklahoma State line. In this area four shafts are being sunk and 33 drill rigs are in operation. The ore is encountered at depths of 165 to 315 feet.

In Arkansas lead was known in 1819 and present development dates from 1899, but until 1915 the State had not made any notable output of either lead or zinc. The high price of ore during 1915 furnished the needed incentive to thorough prospecting and exploitation, and there was more mining activity in Arkansas in that year than ever before, and the activity still continues. The output of zinc concentrates in 1915 was 606 tons of blende and 7,925 tons of carbonate and silicate. The output for 1916 will be not less than 25,000 tons.

The ores produced in the Central States in 1915 contained 222,548 tons of lead, or 40 per cent of the mine production of lead for the whole country, and 215,889 tons of recoverable zinc, or 36 per cent of the whole production.

Western States.

Colorado, since the early days of Leadville, has been a considerable lead producer. When the silver-lead carbonate ore gave place in depth to mixed sulphide ores the state became also a large zinc producer, and the output of zinc was further increased by the discovery of zinc carbonate deposits at Leadville in 1910. The

production of zinc carbonate ore at Leadville in 1912 was 143,000 tons, containing 29 per cent zinc, and in 1915 it was 83,000 tons, containing 22 per cent zinc. The draining of the Downtown district of Leadville, which is now about complete, will reopen a great many old mines and make available additional lead and zinc ores. The sulphate belt, reaching from Boulder County to the San Juan region, in which Leadville is at about the center, contains many districts yielding lead and zinc ores. The numerous mills newly equipped with flotation and electrostatic separation machinery in these districts will considerably augment the state output of these metals in 1916.

Montana in 1915 continued the spectacular gain in zinc production which was begun a few years ago when the Butte and Superior mine started on its present career. The output of this mine in 1915 was over 72,000 tons of recoverable zinc, and on the basis of 9 months reported production will be well over 80,000 tons for the current year. The Butte and Superior and Timber Butte flotation and concentration plants contributed most of the zinc output of Montana in 1915. In 1915 the Anaconda Copper Co. developed a successful electrolytic process for reducing zinc ores in order to be able to handle zinciferous ores from the copper mines. The company will operate several large zinc mines and a large flotation plant as well as smaller flotation plants to treat the large zincky tailing piles left by the older wet concentrating plants. The old Ophir mill has been rebuilt and equipped with flotation machinery and will treat the output of the Butte-Detroit mine and, for the present, the output of the Butte Copper & Zinc Co.'s mine. The zinc output of Montana in 1916 will undoubtedly show a large gain over that of 1915, but will hardly exceed the zinc production of the Joplin or Franklin Furnace districts. From present indications it seems possible that Montana may take first rank in zinc production in 1917. The gain in lead production made by Montana in 1916 was mostly due to the lead concentrates recovered in treating zinc ores.

The Cœur d'Alene district of Idaho is the second district in the United States in the production of lead, being exceeded only by the southeastern Missouri district. The zinc occurring with the lead ore was for years a nuisance and was disposed of as zincky middlings. The advancing price of zinc and the more general occurrence of zinc with the lead as well as in considerable deposits by itself induced the operators to make provision for its

separate recovery. The general adoption of flotation in this district and the high price of zinc in 1915 resulted in nearly doubling the production of zinc. The Interstate Callahan mine is the third largest zinc mine in the United States, being exceeded only by the Franklin Furnace mine in New Jersey and the Butte and Superior mine in Montana. In 1915 it produced zinc ore and concentrates containing 23,000 tons of recoverable zinc, but its output during the last quarter of the year was at the rate of about 35,000 tons of zinc annually. Idaho produced 35,000 tons of zinc in 1915, and this output will undoubtedly be greatly exceeded in 1916.

Utah is one of the large lead-producing states, the output coming principally from the Bingham, Park City, and Tintic districts and amounting in 1915 to 100,000 tons, about one-third of which was yielded by oxidized ores. The zinc ores of the state are associated with the lead ores, and in consequence of the increase in lead production as well as of the higher prices for zinc, there was a larger output of zinc, which came largely from the same districts but included some from several other districts, particularly from the newly discovered zinc district on Promontory Point, where there was much activity and a considerable production. Flotation machinery has been extensively installed in the concentration plants of the Bingham and Park City districts, and an electrolytic zinc plant is building at Park City, all of which will tend to greatly increase the zinc output of the state.

The mines of the famous Magdalena district of New Mexico have produced lead and zinc for many years. Zinc carbonate ore is mined in the Tres Hermanas, Hanover, Cook's Peak, and other districts of this State, and new developments and additional concentrating mills in the Hanover and Pinos Altos districts promise a greatly increased output of zinc sulphide.

Under the stimulus of high prices for zinc, Arizona nearly doubled her output, largely from mines in the Union Pass and Chloride districts in the Cerbat Mountains of Mohave County. Nevada also doubled in zinc production, mostly from the Yellow Pine district of Clark County, but some came from the Pioche district of Lincoln County.

California made her greatest zinc output in 1915, nearly two-thirds coming from the Mammoth and Bully Hill copper mines in Shasta County and practically all of the remainder from the Cerro Gordo mine in Inyo County. The copper ores of Shasta County contain so much zinc that some of the mines were compelled to

shut down on account of the penalties assessed against the zinc. At the Mammoth smelter, at Kennett, large quantities of zinciferous bag-house dust have accumulated as a result of fume neutralization. The high price of zinc and copper has led to much effort to separate and use the zinc ore. That produced in Shasta County in 1915 was obtained by hand sorting. At both the Mammoth and Bully Hill mines processes have been developed for reducing zinc ores by leaching and electrolytic precipitation of the zinc. These processes will also be applicable to the bag-house dust, and will doubtless operate to greatly increase the output of zinc by 1917.

The lead output of the Western States was 339,000 tons in 1915, compared with 319,000 tons in 1914. The output of recoverable zinc was 234,000 tons, against 154,000 tons in 1914. The lead constituted 60 per cent and the zinc about 40 per cent of the total output of these metals by the whole country.

PRACTICAL PHASES OF THE STANDARD OIL.

Dissolution and the Necessity of Combinations Among Independent Producers to Meet Unfair Competition.

R. L. Welch, Chicago, Ill.

The oil business is the best and the worst organized business in the world.

The Standard Oil Company is the most efficient and the best organized business on earth. The Independents, on the other hand, are almost completely unorganized and in some respects inefficient.

The Sherman law has been applied to the Standard Oil Company and the application universally has been conceded to be a failure. That organization had gone too far toward unity for the application to be successful. On the other hand, the same law stands in the way of the producer, the refiner and the jobber making such trade agreements as would seem to be logical and proper if the vast power of the Standard Oil Company is to be unassailed by government action.

If more than sixty per cent of the oil business is to be done by one concern, it seems difficult to understand why there would be anything inimical to the public interest in permitting the common competitors to join together in any co-operative agreement which would enable them to present a united front in competition with an industrial giant.

If one organization is to name the price at which it is willing to purchase crude, and that price automatically becomes the market price, it is difficult to conceive why an agreement among producers which would give them a fair opportunity to contest on an equal footing the question whether the price offered was reasonable, should not be lawful. If there is to remain vested in one concern the power which under present conditions results in its paying one price for crude, and the independents paying another, there would seem to be nothing harmful in permitting producers and refiners to combine to force a uniform price policy on the part of producers.

Again, if there is to remain vested in one concern the power and right to restrict a prospective overproduction of crude by producers, by reducing the price to stop drilling, then by the same token ought it not be possible for those same producers by agreement to accomplish the same result? In both instances is not the question the same? Is it not a question whether power has been abused rather than the methods of its exercise? Yet, do we not know that if the producers in any field were to combine to restrict production, they would promptly be haled into court, and be taught the vast difference between tweedle dum, which is lawful, and tweedle dee, which is unlawful.

If this remarkable condition exists concerning the Sherman law and its application to the oil industry, there can be no escape from the conclusion either that the law is not in harmony with modern industrial conditions, or that the law has failed because of its defective application to the Standard Oil Company. It makes no difference which horn of the dilemma you choose to take,—for one leads to the conclusion that the Government has done too much and that it should retrace its steps, and the other to the conclusion that the Government has not gone far enough, and that it should go further.

That there should be in the self same business such an enormous organization which is immune from the law, with its competitors unorganized and incoherent, is an anomaly in industrial life which challenges attention and invites inquiry.

The foundation of industrial liberty is supposed to be freedom of commerce. Modern industrialism found the world emerging from a period of fierce individualism, of savage competition. This individualism, this competition, this cruel commercial warfare, this freedom from all restraint except the freedom to give and to take blows, was supposed to bring the greatest good to the greatest number.

Commerce, it was thought, flowed freely like the seas, and any combination, any agreement which restrained that natural flow was artificial, contrary to nature, and therefore wrong. And it was to preserve the supposed natural order in industry that the Sherman law was passed.

What more natural, therefore, than to try the law upon what was popularly supposed to be the most conspicuous violator of it—the Standard Oil Company. The facts concerning this great dissolution suit are very simple and easily understood. The Standard

Oil Company of New Jersey was a holding company which owned the subsidiary companies. Each of the subsidiary companies so owned occupied distinct and apparently arbitrary geographical lines. The effect of the entire structure was a national incorporation of the immense business of the company. It was the theory of the government that these subsidiary companies were naturally competing, and that if the artificial structure, namely, the holding of the stocks of the subsidiary companies by the Standard of New Jersey, were destroyed, the subsidiary companies in response to natural law would compete. Attorney General Wickersham expressed the opinion that if the Standard Oil Company and similar concerns were broken up into five or six or seven parts, the tendency toward competition would be irresistible; in other words, natural law would be free to operate, if artificial restraint were removed. If the Government were right, and successful in its litigation, free competition between the subsidiary companies would follow; on the other hand, if the Government were wrong, no such competition would follow. The Government succeeded in its law suit. The holding capacity of the Standard of New Jersey was destroyed. Each subsidiary was given a territory of its own, and the alleged great and natural law of competition was given its opportunity. For five years we have waited for the subsidiary companies to rush at each others' throats, and last June when asked why they did not do so, the frank answer was that it was not profitable to do so. And, gentlemen, this is simply another way of saying that those companies have found co-operation (I do not mean co-operation in an illegal sense necessarily, but co-operation in the sense of a failure to compete which is just as strong as though founded on an illegal agreement) is more natural under the circumstances than competition. The predicted inevitable tendency toward competition has not developed, and the practical situation remains precisely as it was prior to the decree. The geographical lines which marked the division of the United States into districts occupied by the subsidiary companies remain the same. The device, the holding company, was destroyed. And yet, all the substance remains. The old questions of power, of control of the market, remain. The same enormous ability is still in existence. And most remarkable of all, yesterday the enormous power was unlawful and wrong because of the mere method of its exercise, and today the same power used for the same purposes and ends and having the same results, having the sanction of the

Government, is lawful and right. I ask you, gentlemen, whether the results do not require that we should ask ourselves whether the law itself is in harmony with modern industrial life, whether after all under modern conditons, decrees of courts will force men to compete.

Ought we not also to ask ourselves not whether the *method* of the exercise of power is legal or illegal, but rather whether power, great or small, and irrespective of the method of its exercise, is being used to the public detriment? Ought not this question to be answered in the light of the actual conditions and not according to any theoretical rule of thumb? For example, suppose there were no such organization as the Prairie Oil and Gas Company and suppose further that each of the stockholders of that great company was a purchaser of crude oil, and that for the purpose of supplying the Standard refining companies they should combine together to purchase crude oil as a unit and to avoid competition among themselves and to get crude oil as cheaply as possible through the tremendous power that arises from purchase in enormous quantities. Does anyone imagine that such a purchasing combination would withstand attack in the federal courts? And, on the other hand, does anyone question the legality of the present organization of the Prairie Oil and Gas Company? Are we, therefore, being honest with ourselves when we condemn merely methods and not results?

On the other hand, if, say, 60 per cent of the producers, for instance, in the mid-continent field were welded together in a corporation, does anyone question the right and the power of that corporation to say that it would enforce as to Standard and independents alike a uniform policy as to price, and that it, too, as well as the seller, would stop prospective overproduction by not drilling wells? Yet if 60 per cent of the producers of the mid-continent field were to join in a contract to accomplish the same result, would surrender their liberty of action, would the ink be dry on the contract before the Department of Justice would be after them? Does not such a conception of law rest upon artificial and unnatural reasons? What is a modern industrial corporaton except a combination of stockholders who but for their joint ownership of the corporation might well be individuals competing with each other in the same line of business. The village smithy at one time stood under the spreading chestnut tree of ten thousand villages. Today ten thousand smithies are stockholders in the steel corporation and

eat chestnuts hauled from place to place by the stockholders of giant railroads who in the olden days would have been driving stage coaches or holding them up on ten thousand highways. Have we not reached the place where we may well ask ourselves, what is the natural law of our day. We do not in transportation, today, ask ourselves what was the law a century ago. We do not in communication ask ourselves what was the law before electricity was discovered. We do not in lighting ask ourselves what was the law of lighting when a spluttering wick and some grease lighted an acre lot. When we wish to telephone we do not ask what was the law of conversation at a distance a century ago. We do not cling to the old in these things. The people who didn't want railroads because they scared horses occupy choice spots in the cemeteries, and those who would not ride in them because they were dangerous are now gracing aeroplanes. Gentlemen, in an age when even war cannot be carried on between a few nations, but when the whole world is so unified that nation after nation falls headlong into the war because the whole world is combined; when a French general can sit in Paris and a German general in Berlin and know before the shells fall how many are screaming through the air, is it not time for us to ask whether these giant forces which have made the whole world flow together as though it were a fluid have not created a new and natural law—a law which legislatures and congresses and courts and decrees can only hinder but not destroy? Is not the law of modern life, whether we wish it or not, the law of combination and concentration? And therefore should not our statutory law reflect that fact? And should not this Government which must compete with Germany and other countries where the individual has been swallowed up by the State, where producers, manufacturers, farmers and distributors are allied in great producing, manufacturing and distributing groups, ask itself not how it can break up business, but rather how it can unify business; ask itself not how can we make American business men fight each other, but rather how can we unify American business and make American business men fight for world supremacy?

In the oil business, gentlemen, the Government should go in one of two directions. It should either push its disorganizing tendencies against the Standard Oil Company to the point where it has wrecked that great organization, or it should freely, frankly, and sincerely co-operate with the jarring, warring, disunited independents to enable them to present to their common enemy a front

which will mean competition—not competition of a hundred years ago, but the competition of today, which strives not merely for low prices, but which also strives for quality, for service, for stability and contentment.

In which direction, gentlemen, should the Government of the United States go?

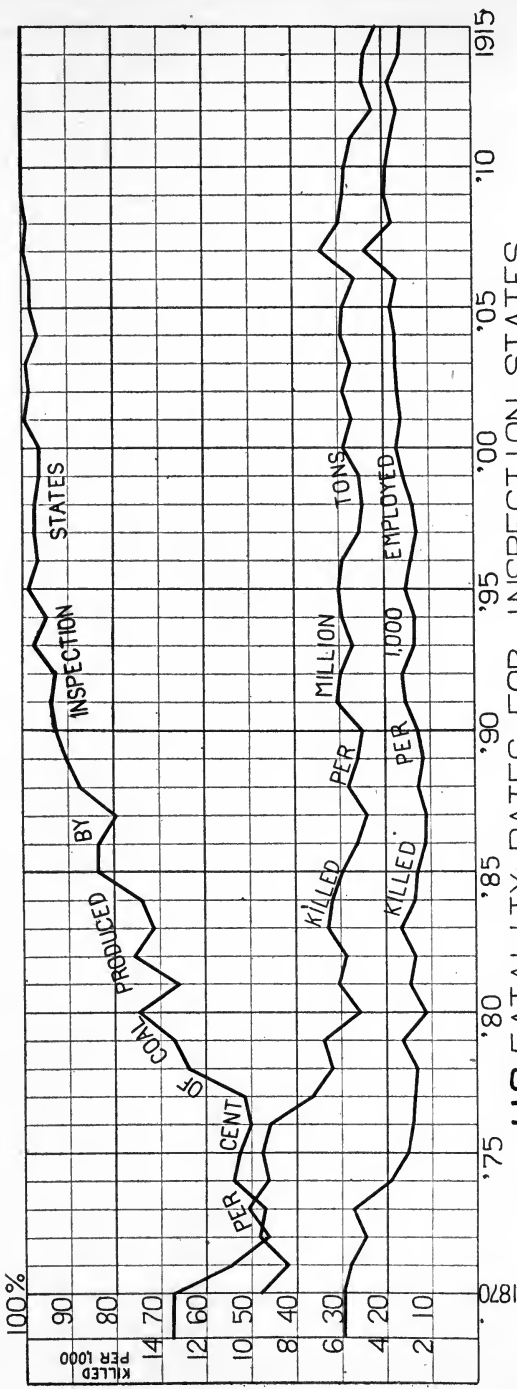
RECORD OF MINE-SAFETY WORK.

By Albert H. Fay, Washington, D. C.

The enactment of mine inspection laws in each state may be taken as the first public recognition of the need of safety methods in and about the mines. In many cases the inauguration of mine inspection was preceded by some disastrous mine explosion or other catastrophe, as for example the Pennsylvania inspection service was preceded by the Avondale fire in which 179 men were killed. The inspection law of Oklahoma was likewise preceded by one explosion in which 100 men were killed; Arkansas, by a mine accident in which 14 were killed; Iowa, by a disaster in which 8 were killed; Missouri, by an explosion killing 24 men; Wyoming, after two disasters in which 51 men were killed; and Virginia with two disasters within two years of the appointment of the first inspector, in which 46 men were killed. Wyoming also had a number of other disasters, but these were not immediately preceding the enactment of inspection laws. Virginia, during its pre-inspection period, had 9 disasters in which 329 men were killed. The establishment of the Federal Bureau of Mines was also largely brought about by a series of 18 disasters in 1907 in which 918 men were killed. Three of these disasters alone killed 684.

Reduction in Fatality Rates and the Growth of Mine Inspection Service Compared.

The relation between mine inspection service and fatality rates at coal mines from 1870 to date is shown in figure 1. The upper curve represents the actual percentage of coal produced under inspection service to the close of 1909. The coal produced in the non-inspection States is less than 0.1 per cent of the total, so that the curve from 1910 to 1915 may be accepted as representing the inspection service. Pennsylvania was the first State to establish a mine inspection system, the law becoming effective for the anthracite mines in 1870. From 1870 to 1873 the curve shown represents the anthracite field only. The fatality rate in 1870 in the anthracite mines was 5.93 per 1,000 men employed, whereas the number of fatalities per million tons mined was 13.47. Corresponding figures for 1915 for the Pennsylvania anthracite field are 3.32 fatalities



U.S. FATALITY RATES FOR INSPECTION STATES

Figure 1—Relation between coal mine fatality rates in United States and the percentage of industry covered by inspection service, 1870-1914.

(Based on Table 4.) (Bureau of Mines Bull. 115.)

per 1,000 men employed, and 6.58 fatalities per million tons mined. There are no records to show what the fatality rate in anthracite mines was for years previous to 1870. It was, however, high in 1869, on account of the Avondale disaster. The year 1870 was apparently normal as shown by the actual number of men killed in the anthracite field during the next few years, so that the number of fatalities in 1869 must have been more than 350, with not to exceed 35,000 men employed.

The next State to appoint a mine inspector was Ohio, in 1874, and the first complete inspection year for the Pennsylvania bituminous mines was in 1878, so that after 1874 other States have been added to the inspection list.

During the first 10 years of mine inspection the fatality rate per 1,000 men employed and the number of fatalities per million tons of coal mined declined rapidly. From 1880 to 1897 the fatality rate per 1,000 men employed remained practically stationary, while the number of fatalities per million tons mined showed a slight reduction. From 1897 to 1907 the number killed per 1,000 employed increased considerably, reaching the highest point in 1907. Since that year there has been a marked decline.

The increase in the fatality rate from 1897 to 1907 is not necessarily due to less efficient mine inspection. The ever widening range of operation, the constantly expending magnitude of the mining industry, and the increasing complexity of machinery and methods are daily bringing about new conditions which must be met by the safety engineer. The conditions under which mines are operated today are much different from what they were thirty years ago. The mines are growing deeper; there are more abandoned workings for accumulation of gas and dust; and more men are employed in the individual mines than in former years; so that in case of a gas or dust explosion, the likelihood of trapping more men is greater by reason of a larger number of men being employed. During recent years there has been an influx of foreign laborers, many of whom come from the agricultural districts of southeastern Europe. They have had no experience in mining, do not know the English language, and hence are not capable of understanding and carrying out orders that are given in a tongue foreign to them. Every new machine or appliance in the mines introduces a new hazard which requires special measures for accident prevention; and last, but not least, accident reports are more complete than in earlier years. Although the inspection service

has been increasing in efficiency from year to year, the various hazards, for the reasons mentioned, are also increasing.

The increasing fatality rate due to mine disasters, from 1897 and culminating with 1907, has been the means of the passage of more stringent laws concerning the operation of coal mines. Every disaster is thoroughly investigated by state and Federal authorities, as well as by the local engineers of the operating company, to determine the exact cause, so that similar disasters may be prevented in the future. States are establishing rescue and first-aid stations, and nearly every large mining company has its safety engineer and safety-first committees with the necessary rescue and first-aid equipment. An educational campaign on mine-accident prevention has been conducted since 1907 with the result that there is much closer co-operation of miner, foreman, operator, and inspector than in former years. Permissible explosives and improved types of safety lamps have been introduced into many of the mines. Explosibility of coal dust has been studied and precautions adopted to render it inert. The work of these various agencies has resulted in a gradual decline in the fatality rate from 4.81 in 1907 to 3.09 in 1915. This is the lowest rate since 1898, when the number killed per 1,000 men employed was 2.71. The amount of coal produced in 1915 per fatality was 234,297 tons, the largest in the history of the United States. The average production per fatality in Great Britain for 10 years, 1901 to 1910, was 227,000 tons; Belgium, 180,000; Germany, 133,000; Japan, 44,000; New South Wales, 297,000; Austria, 198,000, and France, 128,000.

Figure 2 shows the fatality rate in recent years, with various groups of the mining industry compared on the basis of the number of 300 day workers.

Prevention of Mine Accidents.

In a brief paper it is impossible to give details of the various means of accident prevention. As a general statement, it may be said that there should be more stringent laws concerning the operation of mines; rigid rules and regulations on the part of the mining companies; a strict enforcement of the laws and regulations by state inspectors, operators, and employees, with penalties for all who violate them, whether he be operator or employee. A standard coal mine law embracing all of the good features of the present varied laws will be a big stride toward safety. With the same basic law for each state, miners who migrate from one state to another will be familiar with the fundamental requirements. The

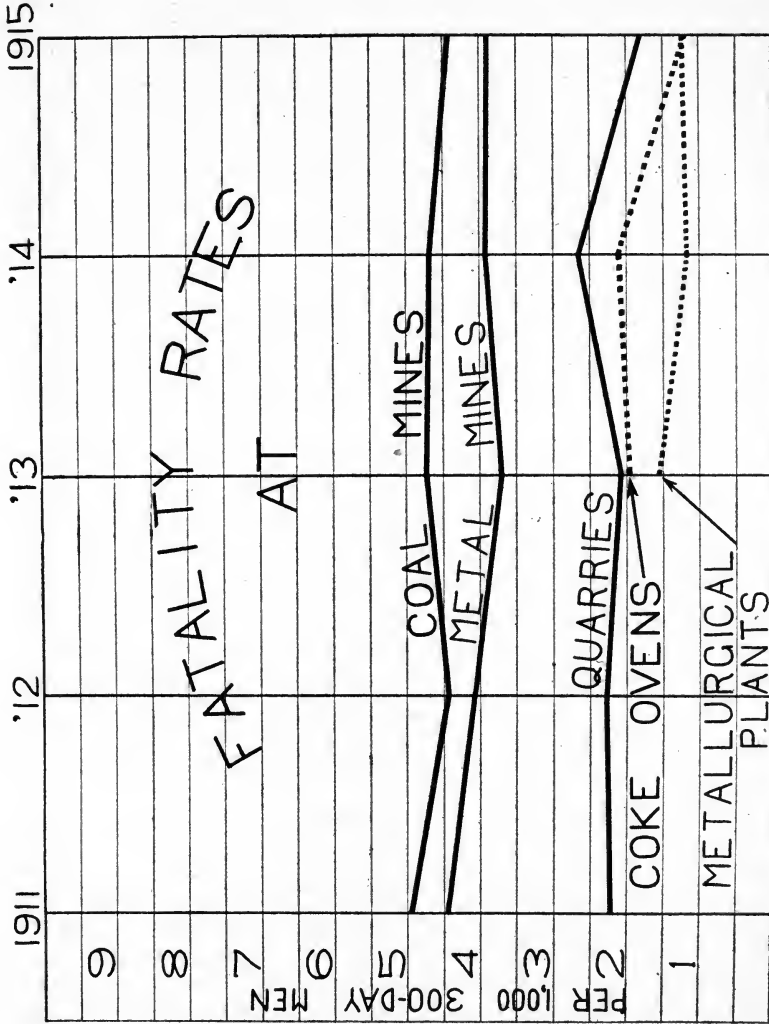


Figure 2.—Fatality rates compared on the basis of an equivalent number of 300-day workers.

education of the miner to realize the dangers under which he works will have much to do with accident prevention. A common language understood by both foreman and miner is of prime importance. Improved safety methods and appliances will reduce the dangers incident to the industry. Among these may be mentioned the general use of safety lamps; the marking and guarding of all dangerous places, as shafts, winzes, raises, and other openings in the mines; a systematic inspection of all working places for gas, ventilation and roof conditions, safeguarding of machinery and electric wires, the employment of shotfirers or, better yet, electrical firing apparatus, and shooting only when all men are out of the mine; the use of permissible explosives; the co-operation of state and Federal organizations with operators' associations, labor organizations, operators, and employees; and last, but not least, eternal vigilance on the part of all. There must be no let-up on any phase of safety work, lest we lose the gains we have made within the last few years. The dangers are lurking in every nook and corner of the mine awaiting the opportunity to find the safety man resting on his laurels.

Science an Aid to Accident Reduction.

As the war in Europe is a gigantic struggle fought with weapons devised by the chemists and engineers, so the war on the hazards of the mining industry must be waged largely by engineers and chemists. It is often considered that the engineer's duty has ended when he satisfies the requirements of his employer by producing the required amount of coal or ore at a minimum mining cost. The employer today recognizes that both he and his technical assistants have still another duty to perform, that of safeguarding their employees.

The wonderful advances in mechanics, chemistry, and electricity should combine to reduce mine accidents. While the hazards are increasing in many ways, progress is being made, but it is only within the last five or six years that the combined efforts of all parties interested are showing a gain on the increasing dangers.

Among the causes of accidents which show an increase since the close of the first five-year period of inspection (Table 3) are: "Falls of roof or pillar"; "Haulage systems"; "Gas and dust explosions"; "Suffocation from mine gases"; "Electricity" and "Mining machines." Those which show a decrease in the fatality rate are: "Explosives"; "Animals"; "Mine fires"; all "Shaft accidents" and "Miscellaneous" causes.

Causes.	Fatalities per 1,000 employees.		Percentage of fatalities.	
	First Period.	Second Period. 1911-1915	First Period	Second Period 1911-1915
1. Falls of roof (coal, rock, etc.)	1.083	1.350	32.73	39.67
2. Falls of face or pillar coal . . . . .	.431	.256	13.01	7.37
3. Mine cars and locomotives . . . . .	.282	.513	8.51	15.13
4. Gas explosions and burning gas . . . . .	.297	.232	8.98	6.83
5. Coal-dust explosions (including gas and dust explosions) . . . . .	.193	.260	5.83	7.65
6. Explosives . . . . .	.225	.201	6.80	5.93
7. Suffocation from mine gases . . . . .	.018	.024	.53	.71
8. Electricity (shock or burns) . . . . .	.008	.116	.24	3.43
9. Animals . . . . .	.016	.008	.47	.25
10. Mining machines . . . . .	.003	.019	.09	.57
11. Mine fires (burned, suffocated, etc.) . . . . .	.030	.026	.91	.78
12. Other causes . . . . .	.368	.083	11.12	2.46
Total	2.994	3.091	89.21	90.78
13. Falling down shafts or slopes . . . . .	.065	.058	1.97	1.73
14. Objects falling down shafts or slopes . . . . .	.017	.003	.50	.10
15. Cages or skips . . . . .	.075	.017	2.27	.51
16. Other causes . . . . .	.003	.003	.08	.06
Total . . . . .	.160	.081	4.82	2.40
17. Mine cars and mine locomotives . . . . .	.055	.093	1.68	2.76
18. Electricity (shock or burns) . . . . .	.004	.011	.12	.33
19. Machinery . . . . .	.084	.038	1.62	1.13
20. Boiler explosions or bursting steam pipes . . . . .	.025	.006	.76	.19
21. Railway cars and locomotives . . . . .	.019	.016	.56	.48
22. Other causes . . . . .	.045	.064	1.35	1.91
Total . . . . .	.198	.228	5.97	6.80
Grand Total	3.312	3.400	100.00	99.98

Table 1—Coal-mine fatalities in the United States by causes during first 5-year period of inspection, and latest 5 years available.

Falls of roof: Falls of roof, being the principal cause of accidents in both coal and metal mines, is one that should command the serious attention of engineers, inspectors, operators, mine foremen, and the miners. Falls are bound to occur, yet with proper precautions, use of sufficient supports, and care on the part of the foremen and miners their number should be reduced to a considerable extent. The scarcity of timber and the continually increasing price of material suitable for mine supports are changing methods of mining in order to meet the new conditions, as, for example, the caving system in metal mines, whereby a minimum amount of timber is used. During a twenty-six-year period (Table 3) fatalities due to this cause have increased nearly 6 per cent, but since 1909 this group of accidents in coal mines has shown a gradual decline in the fatality rate from 1.84 per 1,000 men employed to 1.47 in 1915, the latter figure being below the general average of 1.55 for forty-four years.

Haulage: On account of the increased tonnage of material handled underground, and the magnitude of the underground haulage systems, the fatalities both per 1,000 men employed, and the percentage of fatalities due to mine cars and locomotives has practically doubled since the beginning of inspection, and it is in this phase of the work that the efforts of the mechanical engineer should result in improved and safer haulage systems.

Gas and dust explosions: Like mine fires, mine explosions occupy prominent headlines in the newspapers and are therefore considered by the public to be one of the greatest hazards in coal mining. The number of fatalities due to gas and dust explosions in 1915 was 13 per cent of the total number killed, or slightly more than one-fourth of the fatalities due to falls of roof, where only one or two men are killed at one time, notices of which seldom appear in other than the local papers.

Accidents due to gas and dust explosions in the United States were comparatively few from 1875 to 1890, the fatality rate being about 0.30 per 1,000 men employed. Since 1890 the fatality rate has been very irregular, owing to a large number of disasters occurring at various times. The climax was reached in 1907, when seven explosions occurred, in each of which more than twenty men were killed. The number killed by gas and dust explosions in 1907 was 1.417 per 1,000 employed in all coal mines, or 1.796 per 1,000 for the bituminous coal mines alone.

On account of the hazard of gas and dust explosions, and the ill effects resulting from vitiated air in many underground workings, it devolves upon the chemist to make complete analyses of mine gases, and coal dust, not only with the view of preventing explosions, but for the purpose of bettering the ventilation, and devising means to render the dust inert. As a result of the chemists' research work and laboratory experiments, the real hazards are exposed and safety measures are being devised, improved and installed so that a reduction of 70 per cent in the fatality rate has been obtained for 1915 as compared with 1907, our worst year.

Explosives: The use of high explosives in mining and tunneling is universal. The demand for an explosive which can be more safely handled and which on explosion or detonation produces a smaller amount of gas, which will not injure the health of the miner, nor delay the resumption of work after each round of shots is fired is being met by the investigative work of the chemical laboratory. Irregularities in the composition of explosives, length of flame, quantities of heat and gas generated, variations in the strength of detonators, and differences in the speed of fuses are fruitful sources of accidents. By chemical analyses and physical tests explosives may be so standardized that certain accidents will be reduced, as has been the result of the introduction of permissible explosives in many of the gaseous mines of the United States. The first permissible explosives were used in the bituminous coal mines of the United States in 1901. In 1903 the total amount used was 288,661 pounds, at which time the fatality rate due to explosives was 0.339 per 1,000 men employed. The quantity of permissible explosives used in the bituminous mines has increased rapidly from the above figure to 16,804,609 pounds in 1915, with a fatality rate of 0.13 per 1,000 men employed, or a reduction of 60 per cent, which shows the results obtained by the use of this type of explosives.

Electricity: With the introduction of electricity into mines there is also introduced a new underground hazard and it devolves upon the electrical engineer to install proper electric lights in the mines; safeguard trolley wires; provide efficient electric safety lamps, explosion-proof motors, and electric shot firing for gaseous mines; extend the use of electric signal systems, and telephones. The percentage of fatalities due to the use of electricity in coal mines in the earlier years was less than one-fourth of 1 per cent, while in recent years it has increased to 3.43 per cent.

Shaft Accidents: When the Comstock mines were working at greatest capacity, Nevada recognized the dangers connected with hoisting from deep mines, by passing a law requiring safety gates on mine cages. Since then the mechanical engineer, at both coal and metal mines, has done much to perfect hoisting apparatus by installing overwinding devices, automatic breaks, closed skips or cages for hoisting men, fireproof construction of shaft buildings, and inclosed ladder-ways with alternating landings in shafts. Largely as a result of these improvements there has been a decrease of about 50 per cent in shaft accidents at coal mines. Metal mines show a reduction of 28 per cent in shaft-accident fatalities since 1911.

Mine Maps: Accurate mine maps are essential to the safety of the workers. They furnish the superintendent and manager with accurate data as to the condition of neighboring mines and all workings in the mine under consideration. With accurate maps, such accidents as inrush of water, mine squeezes, and mine fires may be so controlled as to reduce the loss of life, if not prevent it entirely. Mine maps are also an important aid to ventilation, for without them it is impossible to keep tab on the many ramifications of the underground workings of large mines.

Ventilation: Less attention has been given to the ventilation of the metal mines than in almost any other department. It has not received the consideration which it deserves. The ventilation systems of eastern coal mines may well be adopted by engineers in our western metal mines. Although many of the metal mines have two or more openings at such levels as to give natural ventilation, yet there are some where artificial ventilation must be applied, not to prevent explosions as in the coal mines, but to give the miner sufficient air in order to maintain his physical condition such that he may work most efficiently. Poor ventilation affects the miner's health very materially. This is only another phase of the safety problem, the preservation of health.

Sanitation: It is only in recent years that the sanitation of mines and mining villages is receiving attention. This has only an indirect bearing upon accidents in that the healthful conditions so maintained will result in improving the physical conditions of the miner. A strong healthy man will often recover from a serious injury where a weakling would die within a short time, or remain an invalid for years.

Early and Recent Fatality Rates Compared.

United States: Table 1 shows comparative figures for the number of men employed, and number killed during the first five years

States and Countries	First 5 years of inspection.			Latest 5 years available.		
	Men employed	Number killed per 1,000 employed	Short tons produced per man	Men employed	Number killed per 1,000 employed	Short tons produced per man
Alabama	10,555	2.65	509	23,160	5.59	647
Arkansas	3,855	2.96	494	4,423	2.17	440
Colorado	5,036	3.45	435	12,367	6.95	765
Illinois	24,319	2.52	464	77,678	2.13	551
Indiana	5,719	1.54	427	22,166	2.14	724
Iowa	8,654	2.59	481	16,117	1.91	462
Kansas	4,891	3.27	433	12,331	2.55	583
Kentucky	6,002	2.60	456	22,297	2.04	696
Maryland	3,287	3.19	789	5,791	2.45	424
Michigan	3,011	3.01	469	9,890	1.80	418
Missouri	6,699	2.90	457	3,488	3.55	654
Montana	1,342	2.68	509	4,088	16.52	869
New Mexico	1,321	8.63	523			
North Dakota	712	2.81	337			
Ohio	15,218	1.63	634	44,951	3.47	808
Oklahoma	3,708	6.96	408	8,619	2.42	840
Pennsylvania (Anthracite)	43,887	5.19	501	178,989	4.69	432
Pennsylvania (Bituminous)	32,877	3.01	589	172,448	3.52	507
Tennessee	5,132	3.86	434	10,352	2.72	908
Texas	4,196	1.31	443	4,956	4.15	609
Utah	648	1.85	648	3,722	1.04	442
Virginia	6,728	6.24	852	8,818	4.41	809
Washington	2,528	7.20	565	5,841	5.49	900
West Virginia	7,821	3.30	465	-72,936	4.31	560
Wyoming	7,269	6.74	887	7,969	5.78	951
United States	214,942	3.31	508	738,748	4.29	868
Great Britain	229,468	4.29	244	1,052,716	1.41	287
France	48,501	2.00	158	575,526	2.26	284
Prussia	50,615	3.72	152	197,018	1.16	217
Belgium	57,750	3.32	135	144,343	1.02	179
Austria	32,321	2.80	182	69,685	1.04	220
New South Wales	4,411	1.45	373	16,859	1.09	577
British Columbia	7,720	7.50	302	6,833	3.39	459
Nova Scotia	2,745	2.91	236	13,024	2.73	562
Alberta	3,637	3.52	496	7,061	2.94	516
Japan	--	--	--	158,233	2.94	120
India	--	--	--	115,121	1.34	124

Table 2—The first 5-year period of coal-mine inspection compared with the latest 5-year period available.

of inspection in each coal-mining State and for the years 1911-1915 inclusive. While the first period is not made up of the same 5-year period, for each State, it does represent an average of the early stages of coal mining in each State, and a composite for the United States as a whole. At the bottom of the table similar data from the principal foreign coal mining countries are also shown.

The composite for the first five years of inspection in the United States shows the average number of men employed as 214,942 with a fatality rate of 3.31 per 1,000, and the amount of coal produced per man per year as 508 tons. The year most nearly corresponding with this number of men is 1885 with 213,178. The interval between the first and second periods is, therefore, approximately 26 years. The average for the last five years, 1911-1915, inclusive, shows fatality rate of 3.40 per 1,000, which is a slightly higher rate than for the first five years under inspection, but the production of coal per man per year has increased 208 tons, or 40 per cent.

Foreign Countries: With reference to the foreign figures, the earliest figures available for Great Britain are for the year 1851. During the five years following, the average number of men killed per 1,000 employed was 4.29, or one unit higher than for the United States. However, the amount of coal produced per man per year was only 244 tons, as compared with 508 tons in the United States, or less than half. After an interval of 54 years, however, the number of men employed has more than quadrupled, while the fatality rate has dropped from 4.29 to 1.141 per 1,000 men employed. The production of coal per man per year has increased only 43 tons, or 19 per cent. The fatality rate for Prussia was 2.00 per 1,000 during the early years, and after an interval of 52 years it has increased to 2.26 per 1,000. The production per man per year has increased from 158 tons to 284 tons, or 80 per cent. Figures for other countries as France, Belgium, Austria, Japan, and India are given. Statistics for the coal mines of British Columbia, Nova Scotia and Alberta are very similar to those of the United States. The first five years for British Columbia shows a fatality rate of 7.50 per 1,000, with 302 tons produced per man per year; after an interval of 30 years the fatality rate has decreased to 3.39 or practically the same as in the United States. The production of coal increased slightly over previous years, but it is still below that of the United States. Figures for Nova Scotia in the early years show a fatality rate of 2.91 per 1,000, and after an interval of 40 years the rate is

2.73 per 1,000. Alberta, however, shows a decided increase in fatalities, the average for the first five years being 3.52 while for the last five years 9.19. This latter figure is unfortunately augmented by reason of one serious explosion.

The record presented in the foregoing figures is not an enviable one for the United States. It would seem to be more of a warning as to what we may expect, than to indicate that the safety movement has nearly reached its goal. The years 1911 to 1915 represent current practice in coal mining with many improvements in mining methods and safety appliances, yet the fatality rate is higher than in the earlier years of the industry. Many companies and a few states as Illinois, Iowa, Kansas, Michigan, Missouri, Oklahoma, Pennsylvania, Washington and Wyoming show marked decreases, while in other states the rates have increased to such an extent that there is an actual increase represented for the United States as a whole. There has, however, been a marked reduction in recent years; the average rate for the five-year period, 1901-1905, was 3.454; for the five years 1906-1910, 3.938; and for the years 1911-1915, 3.40, while the rate in 1915 alone was 3.09.

On account of the large tonnage of coal handled per man in the United States, it is doubtful whether we can ever hope to attain the low rates obtaining in many foreign countries. For example, the fatality rate in Great Britain is 1.41 per 1,000 with a production of only 287 tons per man. The production in the United States per man is 716 tons per year, so that a rate per 1,000 men employed proportioned on the basis of the amount of coal produced in the United States would make the rate for Great Britain 3.51, our average rate with present practices being 3.40. In the United States a little over 50 per cent of the coal is machine mined, while in Great Britain between 5 and 8 per cent. Germany has a fatality rate of 2.26 and a production of 284 tons per year per man, which on the United States tonnage basis would raise the German rate to 5.69. Japan has a production of 124 tons per man per year and a fatality rate of 1.34, which proportioned on the basis of the production of coal in the United States would raise the Japanese rate to 7.74, as compared with our rate of 3.40. The fatality rates in the United States, when based on the number of men employed, are apparently high, yet they are much lower than are the rates in foreign countries, when reduced to the tonnage basis. The latter comparison, however, is not strictly fair by reason of different geological conditions,

Countries.	Earliest Year included.	First 5 years of inspection. (1872-1876)		Interval years.	Latest 5 years available. (1911-1915)		Latest Year included.
		Men employed.	Number killed per 1,000 employed.		Men employed.	Number killed per 1,000 employed.	
Australia:							
New South Wales.	1884	11,841	.81	23	17,953	1.52	1915
New Zealand.	1898	12,919	1.27	8	6,034	1.36	1914
Queensland.	1879	3,647	3.02	28	9,329	1.42	1914
Tasmania.	1893	3,790	1.53	13	5,486	2.92	1914
Victoria.	1874	41,235	1.61	32	64,787	1.10	1914
West Australia.	1898	15,895	2.57	8	14,192	2.07	1914
Austria.	1875	18,984	1.36	29	20,072	0.75	1912
British Columbia.	1898	3,665	3.44	6	3,918	3.57	1914
France.	1853	7,876	1.72	51	27,477	2.90	1912
Germany.	1852	28,917	1.36	52	94,238	1.41	1912
Great Britain.	1873	58,402	1.69	33	27,376	1.35	1914
Greece.	1908	--	--	--	7,997	1.78	1912
Italy.	1907	--	--	--	51,992	1.65	1912
Japan ^a .	1899	65,993	2.60	5	80,889	1.48	1912
Portugal.	1908	--	--	--	7,311	1.31	1912
Spain.	1908	--	--	--	149,438	1.68	1912
Sweden.	1908	--	--	--	13,880	1.32	1910
Transvaal ^a .	1902	87,734	4.90	3	217,329	4.22	1913
United States.	1911	--	--	--	167,337	3.77	1915

^a Reports of earliest years of inspection not available.

Table 3—The first 5-year period of metal-mine inspection compared with the latest 5-year period available.

as thickness of seam, inclination, depth, etc. The thickness of coal beds that are being worked in the United States averages much greater than in many foreign countries, hence the ease with which a large tonnage may be produced.

Metal Mines: Table 2 shows data relating to fatalities at metal mines during the first five years of inspection as compared with the latest five years available. In this table is included data for the principal metal-mining countries as Australia, Austria, British Columbia, France, Germany, Great Britain, Spain, and the Transvaal. The earlier records of a number of the countries are not as complete as in the coal-mining industry, but the figures shown are representative and are the best that are available. The fatality rates in most cases have decreased slightly during the interval between the inauguration of inspection service and present-day conditions.

While these tables do not show as much decrease as one would expect after such long periods of inspection, they do not necessarily reflect upon the ability and efficiency of the mine inspectors. They do, however, show that the hazards are increasing, and that it will require constant efforts to keep pace with them. The records for the past five years show that we are gaining and that there has been a substantial reduction in fatalities.

The conservation of human life in industrial plants is a question of paramount importance and is being considered by legislative bodies, labor organizations, captains of industry, and individual employes. Today it is being realized that the public forms a party to the mining operations to such an extent that accident compensation laws are now enacted in more than thirty states. Every fatal accident leaves its impress upon the community in the loss of a useful citizen and the provider for a family, with the result that many widows and orphans are rendered public charges for which taxpayers must contribute support. The sufferings and privations borne by many of the dependents can not be measured by words nor compensated by a money equivalent. Here is an industry employing 1,000,000 men, of which three out of every 1,000 are killed each year. A reduction of 50 per cent in the number of fatalities would result in an annual saving of 1,500 human lives, to say nothing of the injuries and sufferings sustained by hundreds of thousands of unfortunates. From a humanitarian point of view, no greater good for the industry could be accomplished than to effect this reduction.

Period of year.	Total United States.			Portion of United States under inspection service.				Average tonnage per man, &		
	Production, short tons, &	Value per ton at mine.	Number employed, a	Total for States reporting accidents.		Number killed.		Days worked.	Per year.	Per day.
				Production. Short tons.	Per cent of total.	Employees. Number employed, c	Per cent of total.				Total, b	Per 1,000 employed.
1877-1869	410,395,133									
1870	33,689,580			15,644,275	47.42	35,600	90.85	211	5.93	440
1871	46,885,080			19,342,047	41.25	37,488	81.52	210	5.60	516
1872	51,433,369			24,233,166	47.10	44,745	83.54	223	4.98	542
1873	57,602,480			26,132,837	45.40	48,189	82.75	263	3.46	543
1874	52,605,920			28,086,375	53.39	67,152	92.74	260	3.87	418
1875	52,348,320			27,330,025	52.25	85,005	95.33	260	3.06	322
1876	53,280,000			26,283,245	49.35	85,474	98.33	242	2.83	308
1877	60,501,700			30,910,316	51.09	81,142	96.73	225	2.77	381
1878	57,935,600			36,809,682	63.54	89,751	97.71	235	2.62	410
1879	68,105,790			46,447,793	68.20	96,133	98.43	317	3.30	493
1880	71,481,570			53,083,570	74.26	123,736	99.16	317	3.21	429
1881	85,881,030			56,304,138	65.56	116,128	99.66	340	2.93	485
1882	103,551,180			78,326,909	75.64	162,883	99.88	448	2.75	481
1883	115,707,525			82,356,134	71.18	162,248	99.88	542	3.34	508
1884	120,155,551			87,284,984	72.63	192,369	99.88	538	2.80	454
1885	111,160,295			92,922,981	83.59	213,178	99.88	549	2.58	436
1886	113,680,427			94,538,058	83.16	219,699	99.88	494	2.29	430
1887	130,630,511			103,774,783	79.43	238,777	99.88	504	2.55	454
1888	145,689,637			129,703,086	87.29	285,517	99.88	723	2.36	451
1889	141,229,513			127,875,451	90.54	283,198	99.88	668	2.32	432
1890	157,770,963			146,192,491	92.06	291,217	99.88	608	2.52	503
1891	168,566,669			157,684,975	93.53	310,683	99.88	956	3.08	507
1892	179,329,071			165,708,630	92.40	317,140	99.88	991	3.12	523
1893	182,352,774			177,616,520	97.40	335,091	99.88	958	2.70	500
1894	170,741,526			162,139,619	94.96	338,642	98.33	948	2.67	452
1895	193,117,526			190,104,270	98.44	376,024	98.33	1,742	3.04	505
1896	191,996,357			185,122,823	96.43	380,477	96.73	1,083	2.85	487
1897	200,229,199			194,731,887	97.25	388,585	99.88	1,980	2.55	501
1898	219,976,267			213,734,037	97.16	391,841	99.88	1,961	2.71	501
1899	253,741,192			243,993,172	96.16	395,607	96.34	1,241	3.14	545
1900	269,684,027			260,164,397	96.47	432,448	96.40	1,489	5.72	602

1901.....	293,299,816	1.10	455,544	291,449,047	99.37	490,807	99.02	1,574	3.27	7.40	185,765	216	606	2.81
1902.....	301,590,430	1.22	518,197	296,087,066	98.37	510,217	98.46	1,724	3.38	5.81	172,092	197	581	2.98
1903.....	357,856,416	1.41	566,260	352,064,631	98.52	556,581	98.29	1,926	3.46	5.47	182,796	220	633	2.88
1904.....	351,816,398	1.26	568,083	339,164,812	96.40	573,373	96.58	1,965	3.48	5.88	170,707	202	592	2.93
1905.....	392,722,635	1.21	626,045	386,379,243	98.38	615,368	98.29	2,232	3.63	5.78	171,109	212	628	2.96
1906.....	414,157,278	1.24	640,780	405,955,888	98.02	630,293	98.36	2,138	3.39	5.27	189,376	209	644	3.08
1907.....	480,363,424	1.28	680,492	477,892,535	99.49	674,613	99.14	3,242	4.81	6.78	147,407	231	708	3.06
1908.....	415,842,698	1.28	690,468	409,309,857	98.43	678,873	98.32	2,445	3.60	5.97	167,416	195	603	3.09
1909.....	490,814,616	1.20	686,552	460,807,263	99.99	666,535	99.99	2,642	3.96	5.73	174,416	.....	691	.....
1910.....	501,596,378	1.25	735,030	501,596,378	100.00	725,030	100.00	2,821	3.89	5.02	177,808	220	682	3.15
1911.....	496,371,126	1.26	738,348	496,371,126	100.00	728,348	100.00	2,656	3.65	5.35	186,887	220	682	3.10
1912.....	534,466,580	1.30	732,662	534,466,580	100.00	722,662	100.00	2,419	3.35	4.53	220,945	225	740	3.29
1913.....	570,048,125	1.33	747,644	570,048,125	100.00	747,644	100.00	2,785	3.73	4.89	204,685	238	702	3.20
Total.....	9,844,247,843	.....	.....	8,806,855,193	89.46	14,906,511	.....	49,733	3.32	5.05	177,083	.....	588	.....
1914.....	513,525,477	1.33	763,185	513,525,477	100.00	763,185	100.00	2,454	3.22	4.78	209,361	297	673	3.27

Table 4—Production, employees, and fatalities, showing percentage of coal-mining industry for which complete returns are available, 1870 to 1914.

(See Fig. 1.) (Bureau of Mines Bull. 115.)

Year.	Falls of roof and pillar coal. 1, 2			Mine cars and locomotives. 3			Gas and dust explosions. 4, 5			Explosives. 6			Miscellaneous underground. 7 to 13			Total shaft fatalities. 13 to 16			Total surface fatalities. 17 to 23			Grand total.		Number of men employed. (See also Table 23.)		
	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.		Number killed per 1,000 employed.	
1870.....	57	27.01	1.601	15	7.11	0.421	10	4.74	0.231	8	3.79	0.225	73	34.60	2.051	27	12.80	0.753	21	9.95	0.590	211	5.277	211	5.277	35,400
1871.....	62	29.52	1.654	28	13.33	.747	31	14.76	.827	16	7.62	.427	45	21.43	1.200	6	2.86	1.00	22	10.48	.587	210	5.602	210	5.602	37,488
1872.....	97	43.50	2.168	24	10.76	.536	29	13.00	.648	16	7.18	.358	13	5.83	.291	20	8.97	.447	24	10.76	.536	223	4.984	223	4.984	44,745
1873.....	111	42.21	2.303	36	13.69	.747	32	12.17	.664	16	6.08	.332	19	7.22	.394	16	6.08	.332	33	12.55	.685	283	5.457	283	5.457	48,199
1874.....	102	39.23	1.519	37	14.23	.551	28	10.77	.417	16	6.15	.238	33	12.69	.492	19	7.31	.283	25	9.62	.372	260	3.872	260	3.872	67,152
1875.....	89	34.23	1.047	28	10.77	.329	17	6.54	.200	33	12.69	.388	34	13.08	.400	26	10.00	.306	33	12.69	.388	260	3.058	260	3.058	83,005
1875-1875.....	461	37.91	1.631	153	12.58	.541	137	11.27	.485	97	7.98	.343	144	11.84	.510	87	7.15	.308	137	11.27	.485	1,216	4.303	1,216	4.303	282,889
1876.....	97	40.08	1.135	36	14.88	.421	27	11.16	.316	35	14.46	.410	17	7.02	.198	15	6.20	.175	15	6.20	.175	242	2.631	242	2.631	85,474
1877.....	137	60.89	1.688	27	12.00	.333	16	7.11	.197	13	5.78	.160	10	4.44	.123	8	3.56	.094	14	6.22	.173	229	2.773	229	2.773	81,142
1878.....	117	49.79	1.304	30	12.77	.334	22	9.36	.245	18	7.66	.201	17	7.23	.186	2	.85	.022	29	12.34	.323	235	2.618	235	2.618	89,751
1879.....	170	53.63	1.768	47	14.83	.489	38	10.41	.343	17	5.36	.177	7	2.21	.073	7	2.21	.073	26	8.20	.271	317	3.298	317	3.298	96,133
1880.....	138	50.37	1.115	47	17.15	.380	22	8.03	.178	15	5.47	.121	25	9.13	.202	7	2.55	.056	20	7.30	.162	274	2.214	274	2.214	123,736
1876-1880.....	689	50.97	1.384	187	14.46	.393	120	9.28	.252	98	7.58	.206	86	6.65	.180	39	3.02	.082	104	8.04	.218	1,293	2.715	1,293	2.715	476,236
1881.....	144	42.35	1.240	66	19.41	.568	28	8.23	.241	19	5.99	.164	38	11.18	.327	9	2.65	.078	36	10.59	.310	340	2.628	340	2.628	116,128
1882.....	205	45.76	1.258	61	13.62	.374	34	7.59	.209	28	6.25	.172	41	9.15	.252	28	6.25	.172	51	11.38	.313	448	2.750	448	2.750	162,883
1883.....	213	39.30	1.313	59	10.89	.364	37	6.83	.228	40	7.38	.247	118	21.77	.727	25	4.61	.154	50	9.22	.268	552	3.341	552	3.341	162,248
1884.....	243	45.17	1.263	82	15.24	.423	44	8.18	.229	43	7.99	.224	53	9.85	.275	24	4.46	.125	49	9.11	.255	638	2.797	638	2.797	192,269
1885.....	263	47.91	1.234	44	8.01	.206	30	5.46	.141	47	8.56	.220	73	13.30	.343	38	6.92	.178	54	9.84	.253	549	2.875	549	2.875	213,178
1881-1885.....	1,998	44.19	1.261	312	12.91	.369	173	7.16	.204	177	7.32	.209	323	13.36	.382	124	5.13	.146	240	9.93	.283	2,417	2.654	2,417	2.654	846,806

1886.	47.57	1.070	54	10.83	246	7.06	173	34	6.88	158	24	4.86	108	49	9.02	223	494	2,249	719,609	
1887	54.76	1.207	79	15.67	845	5.56	123	57	6.55	144	28	5.56	122	38	7.54	154	594	2,203	727,777	
1888	44.16	1.177	82	11.26	287	6.06	371	53	7.83	200	38	5.22	133	44	6.04	166	758	2,150	728,517	
1889	52.69	1.243	90	13.47	818	6.80	162	47	7.04	166	41	6.14	145	59	8.83	208	688	2,359	735,198	
1890.	46.38	1.168	84	11.46	688	6.55	165	48	10.37	261	45	6.14	154	64	8.73	223	733	2,817	791,217	
1886-1890.	1,539	49.23	1,176	389	12.44	2,977	225	7.19	1,172	747	176	5.83	135	284	8.12	194	3,127	2,390	1,306,408	
1891.	49.92	1.413	98	10.26	315	163	232	76	7.90	189	176	5.67	135	284	7.43	228	966	3,077	310,683	
1892.	47.46	1.411	110	11.10	347	183	222	76	6.05	245	37	3.87	119	71	7.43	228	966	3,077	310,683	
1893.	51.8	1.456	118	12.32	332	85	8.87	239	6.47	175	35	3.53	111	54	5.45	170	991	3,125	317,144	
1894.	47.4	1.322	109	11.38	304	8.74	153	36	5.74	153	52	6.05	162	68	8.66	231	958	2,608	355,091	
1895.	50.3	1.338	123	10.77	327	225	19.70	599	9.87	263	49	4.29	130	79	6.92	210	1,142	3,037	376,024	
1891-1895.	2,391	47.77	1,393	558	11.15	3,225	743	14.85	432	379	7.57	2,221	348	6.95	2,022	355	7,009	5,005	2,914,171,580	
1896.	53.83	1.532	119	10.96	313	128	11.82	336	6.65	186	41	3.78	108	80	7.39	210	1,063	2,846	380,477	
1897.	56.47	1.436	96	9.70	247	82	8.28	211	6.36	162	39	3.04	100	63	6.36	210	990	2,710	391,841	
1898.	50.1	1.534	132	12.43	337	69	6.50	176	7.06	171	41	3.86	105	77	7.25	196	1,062	2,710	391,841	
1899.	60.53	1.668	141	11.36	357	131	10.56	331	8.2	207	44	3.55	111	90	7.25	228	1,241	3,137	395,607	
1900.	62.44	1.531	157	10.54	363	320	21.49	740	121	8.13	73	4.90	169	95	6.38	219	1,488	3,443	432,448	
1896-1900.	3,065	52.26	1,541	645	11.00	3,24	730	12.45	367	449	7.66	2,226	345	5.88	1,173	405	5,865	2,949	1,988,958	
1901.	47.59	1.568	194	12.32	404	183	9.72	318	8.70	285	169	10.74	352	67	6.67	218	1,574	3,274	480,807	
1902.	52.11	1.423	188	10.91	368	433	25.12	849	130	7.94	253	98	5.08	192	89	5.16	1,74	3,379	510,217	
1903.	47.77	1.392	221	11.47	392	287	14.90	516	196	10.18	352	88	4.57	158	160	7.79	209	1,928	3,460	556,581
1904.	53.5	1.631	215	10.78	375	301	15.08	525	190	9.52	331	108	5.41	188	147	7.37	259	1,995	3,679	573,373
1905.	49.06	1.779	247	11.07	401	350	15.68	569	181	8.11	294	117	3.49	127	164	7.35	267	2,232	3,627	615,368
1901-1905.	4,425	46.82	1,617	1,065	11.27	3,889	1,524	16.13	557	834	8.82	3,305	560	6.14	2,212	655	9,451	3,454	736,346	
1906.	46.64	1.650	256	11.97	406	265	12.39	420	197	9.22	313	110	5.15	175	8.33	282	2,138	3,392	630,283	
1907.	56.71	1.764	344	10.61	510	956	29.49	1,417	221	6.82	328	77	3.15	127	218	6.72	323	3,242	4,806	674,613
1908.	45.52	1.640	312	12.76	460	375	15.34	552	203	8.30	298	206	8.43	304	113	6.50	234	2,448	3,602	678,873
1909.	46.52	1.844	461	12.62	443	491	11.16	443	181	7.23	286	123	6.01	635	147	7.37	259	2,642	3,964	666,535
1910.	46.58	1.812	380	13.47	524	497	17.62	686	195	6.91	269	80	2.84	110	184	6.52	254	2,821	3,881	725,030
1906-1910.	5,886	44.30	1,744	1,599	12.03	4,74	2,388	17.97	708	1,007	7.58	2,998	1,137	8.56	3,37	382	2,87	113	3,937	5,373,334
1911.	47.40	1.726	382	14.38	525	365	13.74	501	160	6.03	220	268	10.06	368	70	6.40	233	2,656	3,647	728,348
1912.	49.03	1.641	371	15.33	513	290	11.99	401	147	6.08	204	165	6.82	228	61	2.52	208	2,419	3,347	728,662
1913.	45.39	1.691	424	13.22	667	138	14.46	687	188	4.95	185	222	7.97	297	62	2.23	163	2,783	3,725	747,644
1914.	46.10	1.482	580	13.46	498	349	14.22	457	166	6.76	194	254	8.58	166	6.76	218	2,15	2,454	3,215	765,185
1915.	47.77	1.977	347	12.03	474	304	17.62	457	153	7.58	183	40	2.268	160	6.40	233	2,656	3,647	728,348	
1911-1915.	5,917	47.40	1,904	1,822	12.03	4,74	2,388	17.97	708	1,007	7.58	2,998	1,137	8.56	3,37	382	2,87	113	3,937	5,373,334

Table 5—Coal-mine fatalities in the United States, by principal causes, 1870-1915.

a Subject to revision.

Group.	Falls of roof and pillar coal. (1 and 2)			Mine cars and locomotives. (3)			Gas and dust explosions. (4 and 5)			Explosives. (6)			Miscellaneous underground. (7 to 12)			Total shaft fatalities. (13 to 16)			Total surface fatalities. (17 to 22)			Grand total.			
	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Percentage of total killed.	Number killed per 1,000 employed.	Number killed.	Number killed per 1,000 employed.		
I.....	3,788	41.66	1.70	783	8.59	0.35	2,690	29.40	1.20	739	8.11	0.33	616	6.76	0.28	231	2.53	269	2.95	0.12	269	2.95	0.12	9,116	4.09
II.....	3,723	48.51	1.73	874	11.39	.41	1,423	18.54	.66	486	6.33	.23	578	7.53	.27	271	3.53	320	4.17	.15	320	4.17	.15	7,675	3.57
III.....	4,551	54.22	1.79	1,387	16.52	.55	1,974	11.60	.39	308	3.67	.12	536	6.39	.21	207	2.47	431	5.13	.17	431	5.13	.17	8,394	3.31
IV.....	4,897	60.90	1.72	1,177	12.02	.34	102	6.92	.19	80	5.43	.15	114	7.74	.22	32	2.17	71	4.82	.14	71	4.82	.14	1,473	2.82

Table 6—Summary of production, men employed, and number killed in and about the bituminous coal mines, by groups, based on percentage of coal mined by machines, 1896 to 1913, inclusive.
(Bureau of Mines Bull. 115.)

Group.	Grand total for group.			Total for States having accident statistics.			Grand total for group.			Total for States having accident statistics.			Tons mined per man.					
	Percentage mined by machine.	Production (short tons).	Men employed.	Percentage mined by machine.	Production (short tons).	Men employed.	Percentage mined by machine.	Production (short tons).	Men employed.	Percentage mined by machine.	Production (short tons).	Men employed.	Days active.	Number killed per 1,000 employed.	Number killed.	Number killed per million tons mined.	Per year.	Per day.
I.....	0 to 19	1,352,677,130	2,340,459	9.40	1,323,700,958	2,230,797	218	9,116	2,476	6,640	4.09	1.11	2.86	6.89	563	2.72	563	2.72
II.....	20 to 39	1,584,880,534	2,180,510	31.45	1,559,883,477	2,149,868	212	7,675	1,967	6,042	2.81	.76	2.81	4.92	726	3.42	726	3.42
III.....	40 to 59	2,100,257,254	2,542,833	46.06	2,086,310,230	2,539,165	227	8,394	1,967	7,427	3.31	.38	2.92	4.00	826	3.64	826	3.64
IV.....	60+	353,791,180	522,444	77.48	353,707,285	522,263	192	1,473	107	1,366	2.82	.20	2.02	4.16	677	2.83	677	2.83

TABLE 7 —PERCENTAGE OF FATALITIES AND RATE PER 1,000 MEN EMPLOYED, BY PRINCIPAL CAUSES, IN AND ABOUT THE BITUMINOUS COAL MINES, BY GROUPS, BASED ON PERCENTAGE OF COAL MINED BY MACHINES, 1896 TO 1913, INCLUSIVE.

DUTIES OF MINE INSPECTORS.

James W. Paul, Pittsburgh, Pa.

When a candidate for the office of mine inspector is asked the question: "What are the duties of the mine inspector?" he answers by quoting that section of his state's law which prescribes the duty of the inspector.

In some state laws these duties are set out at some length while in others they are not, but in all state laws it is made clear that the principal duty of the inspector is to see that the law is enforced and wherein the law is not being complied with, to resort to such remedies as are provided by law.

Three things have acted as a hindrance to the realization of the highest efficiency in the mine inspection service; namely, inadequate compensation to insure keeping good men, uncertainty of tenure of office and assigning too many mines to the inspector.

In states where the above handicap does not exist it is possible to build an organization which will insure the most efficient inspection service.

Unfortunately, many inspectors occupy their office for a term which is measured by the length of a political administration. Some attempts have been made in several of the states to adopt a civil service which would aid in holding together the inspection service but the plan has for some reason failed in these states, probably for the reason that a political civil service had been adopted instead of a true non-partisan civil service.

A condition of uncertainty in tenure of office, a meager salary and an expense allowance which necessitates the greatest of economy and much personal discomfort are not conducive to holding the most capable men and those who do hold on are open for a better job, and they may use their good offices to that end.

Wherein it may be claimed that some unscrupulous inspectors abuse the privileges which their office affords them in looking for a good place to land, it cannot be made the basis for an indictment against mine inspectors in general.

The inspector who for reason of personal friendship will be lax or indifferent in the enforcement of the laws which cover safety

measures is a discredit to the inspection system which admits of his continued employment. The conscientious inspector is one who does not allow his judgment or acts to be influenced by courteous favors which may be bestowed upon him by officials or employes with ulterior motives.

The duty of an inspector should be confined to making an honest effort to have all the mine laws complied with and wherein he finds the law inadequate he should endeavor to have it amended or revised in such manner that it will afford the greatest protection against dangerous conditions.

In his conduct with the miners, operators and mine officials he should exercise a spirit of justice and fairness and in points of controversy between the operator and the employe, other than those pertaining to his duties, he should be neutral.

An inspector's duty to the state has been fulfilled when he has succeeded in having the law complied with and has used the remedies provided in the law against those who fail to obey the law.

Many inspectors feel that their duties are only fulfilled when they have gone beyond the requirements of the law and, for the sake of humanity and to meet their conception of a duty they owe society, have brought about the adoption of additional safeguards.

If the aforesaid is instrumental in bringing forward some constructive criticism which will be beneficial to the mine inspection service of our states, the author will feel that his brief remarks have not been in vain.

THE FUTURE OF THE GOLD PRODUCTION OF THE WORLD.

Waldemar Lindgren, Cambridge, Mass.

Introduction.

Previous experiences are not encouraging for those who would attempt a prediction of the course of the world's production of metals. Even where estimates of available resources can be made the industry refuses to follow the prophets, for unexpected reserves appear and the definition of available ore must be revised downward. Still more hazardous is the forecast of the production of the precious metals for here the available ore is generally beyond exact estimation.

We all remember how roughly the early views of the future of gold and silver were treated by the actualities of development; how ores previously despised became assets of tremendous value; how the costs of treatment were lowered; and how fast the new discoveries appeared on the scene.

I write on the subject with some personal feelings for in 1902 I ventured to suggest¹ a probability of a moderate decrease in the gold production of the United States, though recognizing the likelihood of an increase in the world's production. The relentless statistics supported this view for a brief period but in 1905 began a rapid upward swing. The output in that year increasing to about \$88,000,000. The increase continued with unimportant interruptions to 1909 when a maximum of nearly one hundred million dollars was reported. The new discoveries in Nevada and Alaska nullified the predictions. Another feature, the wonderful increase in the production of copper, which brought much gold as a by-product was not taken into consideration.

The future course of the gold production of the world is, of course, a much more complex problem and may well be approached with much trepidation. I do not intend to take up your time with recital of the well known facts: How the output has been steadily and rapidly increasing since the eighties during which a level production was maintained of a little over one hundred million dollars,

¹Trans. Am. Inst. Min. Eng., Vol. 33, 1903, p. 811.

to nearly \$307,000,000 in 1899; \$454,000,000 in 1909 and \$471,000,000 in 1915.¹ Twice, from 1900 to 1902, and from 1913 to 1914, there was a slight backset, due to local and well recognized causes, but on the whole we still seem to be on the upward grade. Is this likely to continue and if so, for how long?

Statistics.

For many years the Director of the U. S. Mint has undertaken the important work of collecting the statistics of the world's production of gold and silver and we may well be proud of the universal recognition of this as the most authoritative statement. Nevertheless the careful observer will note that even in this compilation there is much room for improvement. It would be well worth while for the Bureau of the Mint to employ for this work a specialist with thorough technical knowledge of the geology, mining and smelting of the precious metals.

Criteria.

There are many factors to be considered in judging the probabilities of increase or decrease in the gold production of a country. First, the nature of the principal deposits: They may be shallow placers exhausted in a few years, but on the other hand there are countries like Alaska and California which boast of gravel beds so extensive that they last for many decades. The lode mines may be of the type of deep-seated origin like those of Brazil, California, or South Dakota; in these the ore may be of lower grade but there is a marked stability of yield. Or again the lode deposits may be of the type formed near the surface like those of the Comstock, or the Goldfield district in which case the ore is often of high tenor and the production dazzling but not lasting.

In the second place there are the discoveries most likely, of course, in new countries. These possibilities are difficult to appraise but always to be considered. Who would have thought that Mexico should become an important producer of gold? And yet, there is the El Oro district in a well prospected part of the country, in which the riches simply happened to be covered up by a sheet of lava until adventurous souls had the nerve to drive a few tunnels.

In the third place there is the cost of treatment. Thousands of ingenious men are ever striving to decrease this item or to increase the recovery. In a certain district this cost may be \$10 per ton.

¹Estimated by Eng. & Min. Journal, Jan. 8, 1916.

This ore is worked out and the vicinity lapses into somnolent repose. A few dollars' decrease and presto, there are now ore bodies waiting for the drill and the powder. When we see serious attempts made to mine ores containing less than \$2 worth of gold per ton, each one of us begins to think of this or that locality where there are masses of material which may be drawn within the definition of ore. So except in a few districts the calculation of gold reserves becomes an operation of very uncertain value. Do you realize what it would mean to the gold production of the world to have the working costs on the Rand reduced to \$2.50 per ton? With all this in view the prophet after a while is likely to acquire a wholesome conservatism.

Of course all things have a limit: Every deposit will be worked out sooner or later, the inexorable depth and the internal heat of our globe increase the cost in spite of the engineer. The treatment costs cannot be depressed indefinitely. We might feel inclined to predict an ultimate exhaustion of our gold bearing deposits in the distant future, were it not for the hopelessness of anticipating just what the human race will do in the next hundred years.

The Component Parts.

A casual survey of the present conditions shows that the Transvaal supplies 40 per cent of the world's production and that in the main this output (\$188,400,000 in 1915) comes from a small district comprising a few hundred square miles. Only about \$7,000,000 is derived from "outside" districts in the Transvaal. This predominance of the Transvaal is the outstanding and striking feature in the story of the gold production of the world. Its spectacular advance is very largely Transvaal history. The fluctuations elsewhere are of less importance. Therefore, any prediction for the future must necessarily be based upon a close study of that district. No exact parallel to these South African deposits is found elsewhere in the world and geologists and mining engineers have advanced many conflicting theories as to their origin. At the present time the most prominent students of these deposits tend to regard these pre-Cambrian or Cambrian beds of conglomerate as alluvial deposits rapidly accumulated under especially favorable circumstances in the deltas of large rivers which probably had their source in the old, pre-Cambrian granitic and schistose rocks of the north. These old rocks contained the upper parts of rich gold quartz vein, now largely eroded. A protracted period of slow erosion weathering and decomposition set the gold free and ground

it into fine particles. Though it is difficult or impossible to transport heavy gold in the water courses, the fine gold is easily carried along and a sudden increase in the transporting power of the river coming at the right time might suffice to sweep large masses of this fine gold down into the deltas of the streams. The development of pyrite and the silicification of these beds are regarded as secondary metamorphic processes. The whole topography of the area of the crystalline schists is naturally wholly changed at the present time and the superficial placers once existing are swept away. Nevertheless the richness of the region is borne out by the rapidly increasing production of Rhodesia which has doubled in few years and now for 1915 stands at about \$19,000,000.

The predictions in regard to the permanence of the gold deposits of the Transvaal have not been fortunate; in all cases their possibilities have been underestimated. Owing to favorable geologic position and underground temperatures a much greater tonnage is available than was thought possible at first and just now the possibilities of the "East Rand" are looming up large. Whether all expectations be fulfilled or not it appears certain that there is much available ground to be opened up and there is always the probability that ore carrying \$4 to \$5 per ton may be ultimately worked at a profit.

As pointed out before the industry has shown a remarkable strength and resiliency; not only has the output of the Rand exerted a dominating influence on the world's production for the last seventy-five years, but unfavorable influences have affected it surprisingly little. There was a temporary backset two or three years ago owing to labor troubles and rebellion; but the year 1915 closed in spite of difficulties of obtaining capital for new enterprises with a greater production than ever and more favorable prospects.

There is no doubt that the present big mines of the Rand proper will be exhausted. One often finds statements like this: "It is estimated that in 1929 fully one-half of the mines now productive will have depleted their supplies of ore; in thirty years the output will have fallen from \$190,000,000 to \$40,000,000 per annum."¹ With the prospective opening of the new mines of the East Rand it begins to look as if the production of the region could be maintained in its present volume for many years to come. It seems hard to believe that there can be great advance over the present figures.

¹Mining & Scientific Press, Oct. 7, 1916. Editorial.

Rhodesia and the West Coast producing respectively \$18,900,000 and \$8,600,000 also look promising and in Rhodesia particularly the advance has been rapid.

It is well known that the gold output of Australasia has receded persistently during the last decade. At present it forms only about 9 per cent of the world's production. The decrease, chiefly apparent in Western Australia and New Zealand, is mainly caused by the beginning exhaustion of the rich ore bodies. It is probable that the decrease if maintained will proceed at a much slower rate and there are still possibilities of new discoveries.

In British India the production of \$12,000,000 which has been maintained at the present high water mark for several years is largely derived from some mines, exceeding 4,000 feet in depth, and difficulties owing to this depth will probably appear in the near future.

Asiatic Russia is often mentioned as a coming country in the way of gold production. At present the Empire yields about \$27,000,000 annually, of which a smaller part is derived from the diminishing production of the Urals, while much the larger part comes from Eastern Siberia. Some of the placer mines like the Bodaibo of the Lena gold fields are yielding very heavily at present. The lode mines contribute as yet but little. We have no data to gauge the productive capacity of Eastern Siberia, but there are no doubt large amounts of gold bearing gravels yet to be worked. Except for temporary war conditions there is little probability of serious diminution of the supply from this source.

The South American production has practically remained constant for many years, and bids fair to change very slowly; an increase may be expected from the placers of Colombia, while some of the producing mines of Brazil are beginning to reach a depth at which further operations become difficult. Increasing activities in Chile and Peru may add slightly to their production of gold. For the world's production South America counts but little, contributing about 3 per cent to it.

We are naturally interested in the position of the United States of America. In spite of a steady increase from about \$33,000,000 in 1892 to treble that amount in 1915, the importance of the United States in relation to the output of the world has steadily diminished from one-third in the first mentioned year to nearly a fifth in 1915.

The advance apparently culminated in 1909 with a production of nearly one hundred million dollars. Then followed four years of recession to \$88,000,000 (in 1913), but in the last two years the lost ground has been almost recovered. The output of such an enormous territory involving all kinds of deposits is particularly subject to the delicate balance between character of deposits, new discoveries and cost of treatment.

There are strong elements of stability like the lode production of California, the deep mines of Alaska and South Dakota, the new dredge fields becoming available and the gold as byproduct of copper ores.

There are also features working towards a reduction in the output. Among these may be counted the more or less rapid exhaustion of placers, the ephemeral yield of tailing piles and the prospective decline of certain lode mines, as often exemplified in Nevada. Dredge fields will not last for ever; the exhaustion of some in California is probable. While recovery in concentrating tends to increase, and the metallurgical processes are improved, the wages, particularly those of miners, are also decidedly increasing. Few new discoveries have been reported during the last few years.

It requires more than ordinary acumen to sort and weigh all these factors. It seems difficult to believe that any rapid increase above the \$100,000 can take place; there seems to be as many factors working for a reduction as for an increase. There are others, however, that do not look at the matter in this light and to whom it appears that enough of low grade ore bodies will be developed in the near future to offset the unfavorable aspects.

The gold production of our northern neighbor, amounting to about \$18,000,000, has advanced slowly for several years. At present it is made of three roughly equal components: Yukon placers, British Columbia lode mines, and Ontario lode mines. The rapid development in the production of the latter has, however, more than counterbalanced a decrease from the Yukon and British Columbia and the possibility of still further reduction from the Yukon must be considered. The rich gold mines of Ontario are new discoveries. And who shall say that another field like that of Porcupine will not be found in the wilds of the north?

A score of years ago nobody would have classed Mexico as a gold producing country of any importance. The discovery of the rich and extensive ores of El Oro rapidly brought the output of the country to \$25,000,000. In the last few years there has been a great drop and the figures for 1915 are estimated to \$17,000,000.

In great part this is caused by conditions of civil war, but previously to that the end of some of the great ore bodies seemed to be in sight.

Conclusions.

The dominant position which the Rand districts of South Africa now occupy in regard to the gold production of the world have been sufficiently emphasized in the preceding paragraphs. The prospects in that region seem to favor a maintenance and possibly an increase in the output during the next decade.

With this in view we may say that what happens in the rest of the world is really of smaller importance. Locally, favorable or unfavorable factors may dominate but they appear to be fairly well balanced and nothing short of new sensational discoveries is likely to influence the world's production greatly.

A progressive increase of the total yield of gold on the same scale as that which has taken place since 1900 would seem to be extremely improbable. Possibly on the other hand a decrease of importance is at least as unlikely. For a number of years to come a slow increase or stationary world's production would seem to be favored by the probabilities and the change of rate of increase must necessarily have a marked economic effect.

THE FEDERAL TRADE COMMISSION AND THE MINING INDUSTRY.

Hon. Edward N. Hurley, Washington, D. C.

It is a pleasure to address this meeting of the American Mining Congress. A body such as this, whose methods make for fair and open discussion of those great problems which confront not only the mining industry but the nation as a whole, must inevitably accomplish a great work. This work will not only bear fruit among yourselves, but it will focus public attention upon these great economic problems as they apply to your industry. Those problems involving the safety of human life, the relations between employer and employe, the efficiency of production in a basic industry and the conservation of irreplaceable resources are of tremendous significance to the people of the whole country. I congratulate you as members of the American Mining Congress on the broadminded and fair attitude you have taken in the discussion of these fundamental problems.

If your organization had done nothing more than secure the creation of the United States Bureau of Mines, it would have deserved well. But I am sure that your efforts in the direction of fair and practical workmen's compensation laws, arbitration of industrial disputes, conservation, and other important matters will give your Congress a growing and wholesome influence throughout the nation.

A Common Platform.

At your meeting two years ago at Phoenix, Arizona, Secretary Callbreath made a statement that embodies the mental attitude of your organization as I understand it. With your permission I will quote the substance of that statement, which seems to me a platform on which all fair-minded men can stand—whether operators, employes, or Government officials. This in brief was what your secretary said:

“Safety, efficiency, conservation are the three watchwords of the American Mining Congress, and it is hoped that by co-operative effort on the part of the mining men of the United States these things may be accomplished. I hope the day may come when this

conflict between employer and employe will cease, because the highest development of the mining industry can never be secured until the mine worker and the mine operator work squarely together for the best safety, the best working conditions, the best living conditions and the highest wages that are possible to be paid taking other interests into consideration. The mine operator is entitled to his profit. That profit must be enough not only to pay current expenses and to cover his risk, but to cover the value of his mine, which sooner or later will be depleted. Having met those two conditions, the third thing is that the consumer is entitled to the product of the mine at the lowest price which it is possible to furnish it to him for, having cared first for the miner and the operator."

That, gentlemen, is an enunciation of principles, clear and simple, that we can all subscribe to, and we should all do our part to bring about the day when these fair and just conditions shall prevail throughout the mining industry of the United States.

Efficiency Needed in the Bituminous Coal Industry.

In the bituminous coal mining industry, especially, it is important that the attention of the public should be drawn to this statement of principles. The country should understand the stake it has in this industry and consider its problems fairly and seriously from all points of view.

Where physical and economic conditions tend to the keenest competition, as they appear to in this industry, it follows that Safety and Conservation really depend upon *Efficiency*. By efficiency I mean not simply efficiency of individual mines and individual companies, but efficiency in the industry as a whole. First, efficiency in production and distribution at the lowest cost consistent with conservation of life and of coal; and second, efficiency in selling at the lowest price consistent with a fair profit and the perpetuation of the industry. To attain this efficiency of production and of price we need a third efficiency—efficiency in cost accounting. Efficiency in cost accounting spells knowledge, light, sanity. It means the industry's understanding of itself, which is the first essential to every step in its progress toward wholesome conditions.

Effect of Ignorance of Costs.

Let us take a look at this matter concretely. There are many operators who have no cost systems. They are the men who go

it blind. There are others who have cost systems, but some of them give accurate costs and some give costs that are not accurate. One operator's cost sheet is a true guide to him; another's is a will-o'-the-wisp that leads him into the mire of business ruin. He *thinks* he knows, but he may be charging to capital account what ought to go to operating cost; he may be forgetting his overhead expense; and, most important of all, he may fail to count on depreciation of his equipment and depletion of his mine. What is the result? Prices that look good to him are really suicidal. What he thinks are annual profits are really annual eatings up of his capital and even when the inevitable crash comes he may not know what it was that killed him. On the tombstone of many operations might truly be written the words, "This enterprise died of ignorant competition."

But ignorance of true costs does not affect only the operator who "guesses" his costs, or whose faulty cost sheets mislead him. They affect, often disastrously, the efficient operator, who knows his costs but is helpless against conditions induced in the industry by the ignorant price maker.

Too often the operator who sets the competitive price may be the very man who disregards safety of life for cheapness of production, the man who wastes his coal rather than increase his costs to save it, and who in addition is ignorant of what his true costs are. Not till every operator in the industry is educated to an understanding of what this means, will you be on the high road to a solution of the problems of bituminous coal.

The Banker's Part.

Bankers are realizing this. The Pennsylvania Railroad advertises that, of all the people carried over its lines last year, not one single life was lost. The bankers of the country before very long will be referring with pride to the minimum business death rate among their clients. Suppose Jones is operating a coal mine here in Illinois on the "guess" plan; Smith is operating one on the "no depreciation" plan, or on the plan of "depreciation charged off when an extra good year comes along"; and Brown has an efficient cost system. Suppose all three come to a banker for loans for their mining business. What is the banker to do? He knows that Jones and Smith are likely to be waging a price war in the industry that will really net them losses where they think they are making gains; and he knows that this price war may impair the market of

the efficient operator, Brown—and send him down to failure with the rest.

Low price making based on guesswork or on partial costs is a menace to sound business. The menace is not in underselling, for competitors must expect to face the low prices due to efficiency. But even the most efficient cannot continually meet cut-throat prices based on ignorance. I believe that bankers owe a duty, to insist on careful cost accounting systems and sound financial statements before extending further credit to concerns whose unbusinesslike methods endanger the whole structure of business. Bankers will *doubly aid* business by insuring that business shall know its true costs before extending its operations.

I do not propose to shut off the credit of a small operator full of pluck and energy. I simply propose that the borrower's energy and pluck shall be intelligently directed. Individual force plus a true knowledge of costs means success—without such knowledge it too often drives a man to business disaster. It would be much better for him if the banker would require an adequate cost analysis before making the loan and so protect his client against a mistake that may mean a loss to the client, a loss to the banker, and an impairment of sound conditions in the industry.

A Plan to Secure Better Accounting.

I hope that in the not very distant future each industry in this country will have developed a basic cost system that will fit its particular needs; that the question of a reasonable and adequate basis for depreciation will be worked out for each industry; and that these basic systems will be approved by the Federal Trade Commission.

I am now working on a plan that I hope will make it possible for manufacturers, merchants and business men generally to know whether their businesses are on a sound cost basis, and to go to the banker with confidence in the justice of their requests for loans. My thought is to give public accountants the opportunity of becoming registered United States accountants under the general supervision of the Federal Reserve Board and to permit such accountants to certify under a United States seal the cost records and financial soundness of the concerns whose books they examine.

It is a well known fact that the public accountants are willing and ready to do their part in seeing that the banker is presented with a statement or balance sheet that will show the real facts.

The trouble is that many manufacturers are unwilling to agree with their accountants as to what amount shall be charged off to depreciation. When a public accountant attempts to make a proper charge for this, he is confronted by the manufacturer with a statement like this: "My machinery and buildings are as good as they were ten years ago, and your charge for depreciation is too high." The accountant, although anxious to do what is right, realizes that unless he is willing to agree with his client he is likely to lose him, and compromises by charging off an insufficient amount for depreciation. The next year similar conditions arise; and after this has continued for two or three years, it is a very hard matter to treat this item in such a way that the balance sheets will be on a correct and sound basis. But when we have an officially approved basis for depreciation in that manufacturer's industry, the accountant and the banker working together will be able to bring the manufacturer into line.

I do not want you to get the impression from this that I am advocating that all books should be kept under governmental supervision, nor that public accountants should not be allowed to certify business accounts without a United States registry. But if a public accountant has his registry number, and if the manufacturer complies with the fundamental system, then let the accountant make and seal his certification in his capacity as a United States registered accountant.

You can readily see how such a plan would steady the bituminous coal industry as well—how it would automatically induce safer and more conservative methods, with unquestionable benefit to the entire industry.

Uniform Cost Accounting Methods.

The subject of more uniformity in cost finding is at present receiving the earnest attention of many operators and associations in the bituminous field. By a uniform practice I mean a common classification of costs of production both inside and outside the mine, and of costs of selling; a uniform method of distributing overhead expense; a uniform method of providing for depreciation of plant and equipment with rates more or less standardized; and a uniform method of taking care of depletion of the coal. Please understand me, I am not advocating uniform *costs*, uniform depletion charges—that is palpably impossible—but uniform *methods* of getting at what the real costs are. Where uniformity

of method is adopted you can get production statistics and cost statistics that are comparable, one company with another; you will be talking the same language; you can profit by each other's experience, conduct your operations more efficiently and price your output intelligently. When the industry is on an efficient cost accounting basis, ignorant competition, which is your most insidious danger, will be a thing of the past.

Results of Uniform Accounting in Iron and Steel Industry.

The excellent financial condition of the iron and steel industry in recent years is due in a marked degree to the attention iron and steel manufacturers have given to the important questions of business policy. Perhaps most important of these is the knowledge of true costs of production and distribution. I doubt if there is another industry in the United States where conditions in this respect are as satisfactory; where the destinies of the industry have been as wisely safeguarded by adequate provisions for exhaustion of capital, both of plant and natural resources; where there is as careful a study of methods of lowering costs and increasing efficiency. It is a gratifying fact that practically all iron and steel manufacturers are recording and classifying their costs on a substantially uniform basis, are distributing their overhead expense by the same methods, and are adequately providing for depreciation and exhaustion. It will be a proud day for the bituminous coal mining industry when as much can be said for it!

The Contrast in Bituminous Coal Mining.

But what is the picture in your bituminous coal fields? It is said that the mines could readily produce 100,000,000 tons in excess of what can now be marketed at a profit. It is estimated by reputable authorities that for every ton sold half a ton is left in the ground. This means that for the 600,000,000 tons of bituminous that will be mined this year approximately 300,000,000 tons will be lost, of which possibly 200,000,000 tons could be saved under thoroughly efficient conditions in the industry. Moreover, it is the cream of our coal resources that we are wasting so prodigally. We are now mining in the best and most accessible seams, and the greater the present waste, the sooner we shall be forced back upon the poorer and less accessible coals that will constitute the supply for the future. More serious for today than waste of coal is the surprising waste of labor. Of our 600,000 bituminous

miners, approximately 500,000 are idle from 60 to 100 working days per year. In Illinois the mines ordinarily run only 180 days a year and over 70,000 men must be maintained in idleness three to four months out of every twelve.

Such inefficiencies as these should not be tolerated in any well-ordered business or nation. Is it any wonder that financial writers strongly criticise the conditions in an industry where inefficiencies like these are found? They say that for years the credit of bituminous coal operators has been far from good; that bankers have hesitated to advance adequate loans; and that the list of dividend payers is chiefly remarkable for its brevity.

What the Operators Can Do for Themselves.

In some degree the difficulties of the bituminous coal mining industry are due to the faulty business methods of the operators. Many, as I have said, do not have accurate cost accounting systems and the greater number do not make proper charges for the depreciation of mining equipment or for the depletion of coal lands. Moreover, many companies fail to allow for the constant increase in the cost of mining coal which necessarily results from the extension of the mine workings. When the mines are first opened and the coal is being taken from ground near the openings—haulage, drainage, ventilation, and upkeep costs are all at a minimum. But as the workings are pushed out farther from the openings, the coal must be hauled farther underground, more water must be pumped, more power must be used for ventilation, and more men must be employed in caring for this work. If the mining companies do not make proper allowance for this natural increase in their costs, and from the beginning of their business make their prices with this fact in mind, they must expect to suffer the financial hardships that usually overtake the short-sighted man in any business.

The presence of inefficiencies on a large scale in an industry is an indication of serious trouble. But the first question in seeking a remedy is, What can the patient do for himself? Undoubtedly, better business methods on the part of individual operators, accurate cost accounting systems, and price-making policies that have a sensible regard for the inevitable rise in the costs as the mines develop, can effect much improvement.

One of the most helpful ways in which improvement in cost accounting can be effected is through the study and establishment

of uniform methods of cost accounting by associations of operators in different districts, or even in the industry as a whole. Such uniform, systematic, and scientific methods of cost accounting have been adopted with marked success by cartels in various industries in Germany. Frequently special comptrollers, or "revision officials," visit the plants of the members and make sure that all co-operate on the same basis, so that the entire cartel operates as a unit.

Where the Pinch Comes.

But many of the bituminous coal mine operators of the United States hold that their experience has taught them that when all has been done that they can do to improve business methods, a fundamental difficulty will remain. They believe that the primary cause of the wastes and inefficiencies of the industry is unrestricted competition. With a vast area of undeveloped coal lands on which mines can at any time be opened, and an ever-present potential overproduction from mines already in operation, competition tends to force the price of bituminous at the mines to the level of the lowest cost of production.

This lowest cost of production, though sometimes obtained by highly efficient methods of mining, is too often obtained by mining only coal which can be taken out most cheaply and abandoning all the rest; by skimping on the installation of safety devices and risking accidents and explosions; by cutting depreciation and depletion charges to the minimum or wholly disregarding them; by considering only the low initial cost of mining, and not the later higher costs—in short by all the objectionable tactics which lead to inefficiency and waste of coal and human life.

That is where the pinch comes. The operators believe that unrestricted competition places a premium on inefficiency, on waste of the natural resources, and on disregard of life. They believe it puts it beyond the power of the operators themselves to effect their own cure. They believe collective action with constructive aid and regulation by the Government is necessary for any effective remedy. With this analysis and view labor organizations in the industry agree.

The Problem Put Up to the Federal Trade Commission.

This is a significant situation. The people in a basic industry—operators and miners together—tell us that their industry has for years been tending increasingly to demoralization as its normal

condition, and that periods of prosperity are notable exceptions to the rule. They lay their cards on the table and ask the Government for searching study of the facts and such relief in the common interest as the facts warrant. That is the problem put up to the Federal Trade Commission. At the direction of Congress it is organizing a thorough-going inquiry, and when it has all the facts before it, it will make constructive recommendations to Congress, which it hopes will reach to the roots of the trouble.

Intelligent competition is an adequate regulator for most of our industries. Government regulation is not necessary or desirable as a general policy in this country. We do not need it. Competition, intelligently directed, may be relied on in nearly all cases to take care of both public and private interests.

7 But exceptional cases may arise when competition fails to regulate. If such a case does arise, Government should step in and regulate; it should use its power in behalf of the common interest to do what competition failed to do.

If the Federal Trade Commission's study establishes beyond dispute that bituminous coal mining is an industry that can cure its troubles simply by greater efficiency, more intelligent competition, and such co-operation as the law now permits for improving conditions, then the matter is up to the operators themselves. The Commission will gladly give such help and suggestion as it can, but the industry must take itself in hand and work out its own salvation.

On the other hand, if the facts show that in this industry unrestricted competition is the primary cause of business ills, rather than a cure for them, then the matter is up to Congress and to the public. I personally would favor any measure of Government regulation that may be found necessary and suitable in order to effect a real remedy. In my judgment, if ruinous and destructive competition exists in a great industry like this, it cannot be allowed to go on. The waste of human life, the waste of coal, the waste of labor and the resultant loss of wages, the financial instability of the large investments in this industry vitally concern the national welfare. When we have diagnosed the disease, when we have found the cause, we must not hesitate to apply the remedy. Our vision must not be narrow; we must look, not to the past, but to the future. If the well-being of a great industry demands a forward step in national policy, let us not be afraid to take it.

But whatever the outcome of the Federal Trade Commission's

inquiry, one great practical benefit ought to result. It is my hope that the Commission's careful analysis of the costs of bituminous coal companies in all the different fields will develop a broad and sound basis for uniform accounting methods, either in the separate fields or possibly in the industry as a whole. If this can be brought about, you will have taken a long step toward the realization of your inspiring watchwords—safety, Efficiency, and Conservation—and you will be ready to face the difficulties in your path with new courage and intelligence.

THE COST OF COAL.

By Geo. Otis Smith and C. E. Leshner, Washington, D. C.

The price of coal is a matter of vital concern to the average citizen. No less important, however, is the question what our coal actually costs to produce and the interest in this subject is typical of the popular interest in the large productive enterprises of the country. As citizens we recognize the consumer's dependence upon the producer and are taking advanced ground as to their relative rights. In few industries does this dependence seem more vital or the consumer's equity appear larger than in that of producing and selling coal. The per capita annual expenditure for the useful metals is roughly equivalent to that for coal, but few citizens purchase pig iron or bar copper, whereas of the urban population only the dwellers in apartments, boarding houses, and hotels are spared the necessity of buying coal. The consumption of coal in the United States for heating and cooking is between 1 and 1½ tons per capita. A careful estimate for 1915 is 1.1 tons, which happens to be identical with the figure determined for similar consumption in Great Britain in 1898. This nonindustrial consumption is greatest in cities and in this city of Chicago in 1912 it was nearly 2 tons. Of course every citizen indirectly pays for his share of the total consumption which last year amounted to 4.6 tons per capita.

Again it may be that because to a larger degree the cost of metals is charged to capital outlay rather than to the operating expense of life, we appreciate less keenly the unit price of these materials that are not immediately consumed with the using. At any rate, public opinion is more easily brought to a high temperature by considering the price of coal than by considering the price of any other product unless we except gasoline, recent discussion of which has been almost explosive.

Looking backward as well as forward, one need not be an alarmist to suggest that in the whole field of productive business the coal industry seems the one most likely to be threatened with Government operation. The foodstuffs are produced on land owned and operated by the millions, and so far as the production of the raw material for them is concerned, "monopoly" is an unknown

word, but when we think of coal, terms like "barons" and "trusts" instinctively come to mind. For these reasons the determination of certain facts connected with coal production and the analysis of the cost elements that enter into the price of coal constitute a timely subject for discussion.

In discussing costs, however, we do not overlook the too evident fact that at times price may far outstrip cost. The price of coal depends upon the balance between necessity for fuel on the one hand and ability to produce and to deliver on the other; the ability to produce is in turn controlled by the labor available and the ability to deliver is dependent upon car supply. Increased foreign demand for American coal, large industrial consumption, unusual weather—all may have great influence on the current price of coal, but none of these is to be considered a factor in the actual cost of production except so far as it causes irregularity in operating expenses and promotes a decrease in efficiency of mine labor. Today high prices are being received for coal by those who are able to produce and deliver more than their outstanding contracts require. In other words, a few operators may be able and willing to capitalize the urgent necessity of the consumer and their own ability to deliver. The premium for fuel now being paid generally by the consumers of the country and by such trades as have been caught short in their contracts is in reality not properly chargeable to cost of coal but to cost of car and labor shortage, just as in the times of stress accompanying labor troubles the premium paid by their consumers is a part of the price the country pays for strikes.

Four general items of cost must be considered as normally controlling the price of coal to the consumer—resource cost, mining cost, transportation cost, and marketing cost. Under usual conditions each of these items includes a margin of profit which may seem either excessive or inadequate, according to your point of view. Yet an unbiased consideration of these cost items is absolutely essential as a preliminary to the decision by the public whether we are buying coal at a fair price, and if not why not. As long as it is the popular view that the price of coal is made up of one part each of mining costs and freight costs to two parts each of operator's profits and railroad dividends, with the cost of a certain amount of needless waste on the side, the demand for investigation will continue, and in so far as there is any element of truth in this view, legislative action is justified, even though the pre-

scribed reform may approach the extreme of public ownership and operation of mines and railroads.

As the initial item of cost, the amount charged against the marketed product as the value of the coal in the ground, which for brevity may be termed the resource cost, is perhaps the item most often overlooked by the coal consumer, and for this reason that phase of the subject will be fully considered after the other items are treated. These other items need less discussion in this paper for several reasons: the item of marketing cost is one that can be brought directly under observation by the consumer if he will but study the matter intelligently, the transportation cost can be learned by simple inquiry and its control lies within the province of the Interstate Commerce Commission, and the details of mining cost can best be set forth by the mine operators themselves, for they have now adopted the policy of free discussion of these matters, which they once regarded as sacred from public view. The purpose of this paper, then, is simply to give a summary statement of all these elements in the cost of coal, and some special discussion of the resource cost. In presenting the subject, the senior author assumes responsibility for whatever may be regarded as mere expressions of opinion and the junior author stands behind the statements of fact.

The item of cost first to be considered represents that part of the value given to the ton of coal by the mine operator and the mine worker. This may be termed mining cost, but it must include the operator's selling costs and other overhead expenses as well as the mining costs proper which include the larger expenditures for wages, supplies, and power. This cost plus the resource cost—the royalty or depletion charge—and the profit or loss on the sale make up the value at the mine mouth. The mining cost varies not only between mines of different companies in separated fields but even between adjacent mines of the same company in the same field. Both nature and man contribute to such variation.

It is not practicable to assign a very exact figure to the mining cost—the census of 1909 indicated an average of \$1 a ton for bituminous coal and \$1.86 for anthracite, but these figures are believed by some operators to be too low. It is possible, however, to show in a general way the distribution of this item; the cost of mining is divided between labor, 70 to 75 per cent; materials, 16 to 20 per cent; general expense at mine and office and insurance, 2 to 4 per cent; taxes, less than 1 per cent to 3 per cent for bitumin-

ous coal, and 3 to 7 per cent for anthracite; selling expenses, nothing to 5 per cent, and recently to these items has been added the direct and indirect cost of workman's compensation which may reach 5 per cent for bituminous coal. The charges for labor, material, and general office expenses are easily understood, as is also a charge for depreciation of plant and machinery; but taxes and selling expenses are important items that may be overlooked by the casual observer. Some figures recently published show that the taxes levied in West Virginia last year on coal lands and coal-mine improvements—that is, on the industry as a whole—were equivalent to nearly 3 cents per net ton of coal produced, which is doubtless fully as much as the profit made by many of the operators in that state.

The cost of selling coal is nothing for the companies that use their own product, including the Steel Corporation and a large number of others, and is little or nothing for the producers who sell nearly all their coal to such large consumers as the railroads. Companies that produce coal for domestic use and the general run of steam trade must figure on a selling cost as high as 10 cents or more per ton, the cost depending on the extent of their business. The average selling cost for bituminous coal is probably 5 to 10 cents a ton, and for anthracite the usual charge of sales agencies is reported as 10 cents a ton for steam sizes and 15 cents for the prepared sizes.

The producers of coal and the transportation companies are concerned not so much with the actual rates charged for carrying coal as with the adjustment of rates between different coal fields and between different markets. In the many years in which our coal industry has been developing, rate structures have been built up that give to this and that producing district differentials over other districts—"handicaps," as it were—that may be based on comparative lengths of haul or on the ability of the coals to compete by reason of difference in quality or in cost of mining or perhaps may be merely the survival of past practice, for which no reason now exists. The consumer of coal, however, is interested in the actual rather than the relative freight rate.

To help toward a realization of the magnitude of this transportation item, it may be pointed out, first, that all but 14 per cent of the output of the country's coal mines, aggregating 532 million tons, is moved to market by rail or water, and second, that nearly half of the bituminous coal (47 per cent in 1915) and more than

two-thirds of the anthracite (71 per cent in 1915) is shipped outside of the states in which it is produced.

Add to this statement of the extent to which coal enters interstate commerce a glance at the distribution of centers of maximum production and maximum consumption—the New York-Baltimore industrial zone, which has a total per capita consumption of nearly 10 tons and lies 100 to 400 miles from the tributary coal fields; New England, consuming about 7 tons to the unit of population and lying 400 to 800 miles from its coal supply; or the populous industrial district of which Chicago is the commercial center, consuming 8 to 9 tons per capita of coal in part hauled more than 400 miles from the fields of West Virginia and eastern Kentucky and in part 200 miles or less from the Illinois mines. With these facts in mind we must realize that the transportation cost is necessarily a large part of the country's fuel bill.

As has already been suggested, the transportation rate in force from any coal fields to any market can readily be learned by the consumer who wishes to figure this item in the cost of the coal he buys. Therefore in the present general consideration of the subject it is sufficient to state the average value of this item. In the interstate traffic, both rail and water, bituminous coal probably pays an average freight of nearly \$2 per ton. In other words, the transportation costs more than the product and, as some parts of the country are just now learning, is sometimes more difficult to obtain. The value of coal like the value of so many other commodities, is a place value.

The average freight charge on anthracite is higher than that on bituminous coal, first because the rates are higher and second because according to the reports of the Interstate Commerce Commission, *all* movement considered, the coal is carried a greater distance.

The cost of handling the coal, exclusive of freight, from the time it leaves the producer until it is in the consumer's fuel bin, may be termed the marketing cost. It can readily be seen that a large part of the coal produced is not subject to this cost for most large users of steam coal, such as the railroads and the coke manufacturers, place contracts directly with the producing companies or their selling agencies and buy in the open market only when their needs exceed the deliveries under their contracts. Much of the coal, however, both anthracite and bituminous, passes through the hands of a wholesale dealer or jobber before it is received by

the retail dealer who puts it in our cellars or in the bins of a power plant. Coal that gets a long way from the mine may pass through many hands before it reaches the consumer, and it not only pays commissions all along the line but is subject to shrinkage and deterioration, both of which enter into the final selling price to the consumer. Brokers are usually satisfied to make a gross profit of perhaps 10 cents a ton, but as several brokers may make a "turn over" on the same car before it is unloaded this element of cost may be several times that amount.

About half of the anthracite and around 15 per cent of the bituminous coal is retailed in less than carload lots, and the greatest number of individuals are directly concerned in the marketing of this portion, regarding the profits on which there is the widest divergence of opinion. The margin in the retail business between cost on cars and price delivered is between \$1.25 and \$2 a ton and is not more than enough to give on the average a fair profit. The shrinkage and, in part, the deterioration are together seldom less than 1 per cent of the weight and may exceed 4 per cent, and the retail dealer also must provide in his selling price for uncollectable accounts.

Advertising is a large expense—in part carried by the retailer directly but all borne by the industry. The largest single item in the cost of retailing is of course that representing the labor of handling and the local cartage, which together make up about half the marketing cost.

There now remains to be considered the first major item, or the resource cost, which is what the operator has to pay for the coal in the ground—the idle resource, which he starts on its career of usefulness. This cost is expressed as a royalty or a depletion charge.

One of the latest leases by a large coal-land owner provides for the payment of 27 per cent of the selling price of the coal at the breaker. This percentage is therefore not only a royalty figured on the mineral resource but also a commission based on the miner's wage. To bring this right home to you and to me, it may be said that the practical result is that if the anthracite we burn in our range this winter happens to come from that particular property, we will pay fully \$1 a ton into the treasury of the city trust that owes its existence to the far-seeing business sense of a hard-headed citizen of Philadelphia. Whether such a royalty is excessive or

not the fact remains that this is the tribute paid to private ownership.

The present average rate of royalty on anthracite is probably between 32 and 35 cents a ton on all sizes, which is from 12 to 14 per cent of the selling value at the mine. The minimum rate (about 10 per cent) is found in some old leases, and the maximum (20 to 27 per cent) in leases made in the last five years. R. V. Norris states that in the late sixties, when the annual output of anthracite was around 15,000,000 tons, royalties were 8 to 10 cents a ton on prepared sizes, but that no charge was made on the smaller sizes. In the seventies the rate rose to 25 cents on prepared, one-half that on pea, and one-fourth on smaller sizes. By the middle eighties, when the output was a third what it is now, the rate was about double that of the seventies—that is, 40 to 50 cents on the larger sizes and 5 to 10 cents on the smaller sizes. The tendency is still upward by reason of increases in the rates for intermediate sizes and the operation of royalty rates based on a percentage of the selling value, an increasing quantity. Figured on the output from the Girard lands, which is nearly 3 per cent of the total production, the gross return to the estate from its coal lands is over 50 cents a ton.

Nor is the increase in value of anthracite lands any less striking. At the beginning of the last century, as stated by Mr. Norris, the great bulk of these lands were patented by the State of Pennsylvania for \$2 to \$4 an acre; in the middle of the century the price of the best land rose to \$50, and in 1875 even to \$500. Now \$3,000 an acre has been paid for virgin coal land, and little is on the market at that. In considering these increases in land values, the effect of interest and taxes must not be overlooked.

The bituminous coal industry is a modern institution compared with the mining of anthracite, and much of the bituminous coal land was acquired by the operating companies during the last 20 years for little if anything more than its surface value. Today there are large areas of bituminous coal-bearing lands that, because they are undeveloped and without railroads, can be purchased at a low price, but little or no anthracite land is on the market, and little has changed hands for years. The present average resource cost of bituminous coal is not much over 5 cents a ton, or about 4 per cent of the average selling value at the mine. In the Pocahontas region and the Pittsburgh district the royalties are much higher, but these like others that might be cited, are exceptions—

one due to coal of special quality, and the other to location—factors which, incidentally, are exactly those that have assisted in making the resource cost of anthracite what it is.

Should you be interested in summing up all these various costs and striking a balance between labor's share and capital's return, you would find that the mine worker, the trainman, and the wagon driver together receive fully half of the price of the anthracite delivered at your house, and the same three classes of labor receive not less than half the price paid by the average consumer for the cheaper soft coal. In a similar manner the average return on the capital invested in land, mining plant, railroads, and coal yard may be roughly calculated, with the result that landlord, bondholder and stockholder of coal company and railroad together receive about \$1.15 from the ton of anthracite and only 50 to 75 cents from the ton of bituminous coal, and of either of these amounts the mine operator's share is only a small fraction.

It is not the purpose of this analysis of costs to offer any cure-all for the high price of coal, yet some comment on the facts presented may possess values. At least certain lines of approach can be pointed out as not very promising. For example, anyone who is at all cognizant of the trend in price of labor and material can see little hope of relief in lower costs for these items. Furthermore, observation of the advances made in mining methods in the last decade or two affords slight warrant for belief in any charge of wasteful operation. As consumers of coal we might do well to imitate the economy now enforced by the producers in their engineering practice. In the northern anthracite field machine mining is extracting coal from 22 and 24 inch beds, and throughout the anthracite region the average recovery of coal in mining is 65 per cent, as against 40 per cent only 20 years ago. Nor are the bituminous operators any less progressive in their conservation of the coal they mine.

Yet it must be remembered that conservation of a natural resource though it will undoubtedly be of direct economic benefit in the future, is not essentially a cheapening process; in fact, these increased recoveries of coal have in large part become possible only because of a higher market price. And, following further this line of thought, we may say that the increased safety in the coal mines that has come through the combined efforts of the coal companies, the state inspectors, and the Federal Bureau of Mines necessarily involves some increase in cost of operation, but the few

cents per ton thus added to the cost is a small price to pay for the satisfaction of having the stain of blood removed from the coal we buy. That form of social insurance which is now enforced through the workman's compensation laws alone adds from 2 to 5 cents a ton to the cost of coal.

In the item of transportation perhaps the most promising means of relief is that of reducing the length of haul. Though many a consumer's preference for coal from a distant field over that from a field nearer home is based on special requirements, the deciding element in the preference of other consumers is simply the price, and this in turn may be largely due to a differential freight scale, which is thus not in the public interest if we admit the premise that it is wasteful to burn such coal in hauling coal into coal districts or past such districts, except in so far as quality requirements absolutely demand the long-haul coal. The recent eastward movement of the higher-grade coals, in part caused by the export demand, may involve some increase in the average length of haul and thus in the transportation cost of coal not exported, but on the other hand this enforced adjustment may lead some consumers to discover nearer home sources of coal equally well suited to their purposes.

Reduction in marketing costs is a reform so close to the consumer that he should be able to find for himself whatever relief is possible. Professor Mead, of the University of Pennsylvania, is authority for the statement that the delivery of coal is costing the dealers 50 cents a ton more than is necessary.

There only remains, therefore, the first item of all—the value of the coal in the ground, or rather the return which the land-owner is asking for this natural resource. The fortunate holder of coal land, whether a very human individual or a soulless corporation or a large trust estate administered for benevolence only, is likely to endeavor to get all that the traffic will bear. Especially in the possession of a limited resource like anthracite, the tendency has been and will continue to be to increase royalties as the years pass, and the only penalty imposed by the state for high royalties seems to be high taxes, which too often, indeed, serve to justify the high resource cost put upon coal in the ground. Finally, in considering royalty rates or depletion charge we must not overlook the interest that accumulates throughout the period between the purchase of the coal land and the removal of the last ton of coal.

In placing a value upon the Choctaw lands some years ago the Geological Survey figured the aggregate royalties at current rates as 160 million dollars but if that amount of royalty were to be collected through the six or seven centuries required for mining the two thousand million tons under this land, the present value of the land would be only $6\frac{1}{2}$ million dollars if purchased by the Federal Government or only 4 million if purchased by the State of Oklahoma, and even less if the project were financed by a corporation that would need to issue 6 per cent bonds. Such is an illustration from actual experience in coal-land valuation—the 4 or 6 million dollars invested in these Oklahoma coal lands now would require a final return of 160 million dollars in royalties to balance the account.

More recently Mr. Cushing, the editor of *Black Diamond*, has figured the cost of a monopolistic control of the available coal resources east of the Rocky Mountains on the basis of the United States Geological Survey estimate of two million million tons. At a valuation of coal in the ground of only 1 cent a ton, which as he stated is less than has been paid for large holdings, this deal would require a capitalization of 20 billion dollars, and the fixed charges on the bonds of this United States Coal Corporation would require an interest charge alone of \$2 a ton against a production of 600 million tons a year. Mr. Cushing characterizes such a financial undertaking in mild terms as hopelessly impossible, and yet his figures, which do not include taxes, are most enlightening as affording some measure of the cost of possessing an undeveloped resource. Incidentally, these startling figures furnish a strong argument for the present policy of the National Government in retaining ownership of the public coal lands, at least up to the time when the market conditions justify the opening of a mine and then either leasing or selling a tract only large enough for that operation. The consumer of the next century simply cannot afford to have private capitalists invest today in coal land for their great grandchildren to lease.

The burden that seems inevitable under unregulated private ownership of a natural resource like coal is that because the lands containing these national reserves of heat and power are taxed and because the individual or corporation properly charges up interest at current rates on his large holding, the consumer must pay a resource cost which takes into account the long period of undevelopment. Even the high rates of royalty on the lands of the Girard Estate may be found less excessive than they seem if a cen-

ture's taxes and interest charges are figured. Yet the fact remains that the royalty for anthracite represents a much large proportion of the cost of the mined coal than any bituminous royalties. Moreover, we believe the highest royalty prevailing in the anthracite region has far more influence in fixing the selling price than the lower rates of the older leases.

Any study of costs in the coal industry finds its point in the question not who but what fixes the price of coal. The cost of mining coal, like the cost of living, is increasing. Exact mining costs, however, cannot be determined until the operators have accomplished their reform of standardizing accounting. Too often the bituminous operator includes in his account only the two largest and most obvious items, labor and material. Thus, when the market for bituminous coal is dull, the company whose land costs little or nothing is able to set a lower limit of price than the company whose coal must stand a charge of 5 to 10 cents per ton or even more, be that charge called royalty, depletion, or amortization. At such times the operator with the larger resource cost must sell at a real though not always recognized loss, but of course with the hope of recouping himself at times of high prices like the present, if fortunately he has any coal to sell not already contracted for.

Even with the average low resource cost of bituminous coal, the state of competition that is tied up with idle and half-worked mines results in an average total cost that is little below the average selling price. Of course in this business there are those, both large operators and small, who make a profit in lean as well as in fat years, just as there are those for whom the prosperous years are too infrequent to keep them out of the hands of receivers.

In the anthracite fields the mining costs and especially the resource costs are higher. But here, with an average market demand that normally exceeds or at least equals the available supply (and with the passing years this disparity must be expected to increase), there results naturally a lack of competition for the market. Even gentlemen's agreements are unnecessary as long as every operator can reasonably expect to sell his product, and the market price of anthracite at the mine must therefore tend to be fixed by the operator who has the largest mining and resource cost rather than by his neighbor who may be doubly favored with a mine less expensive to work and a lease less exacting in terms.

Confessedly, this analysis of the cost elements that enter into the price of coal emphasizes our lack of specific facts, which can

be supplied in the future only through "installation of uniform cost-keeping methods and uniform and improved accounting systems" to quote from the declaration of purposes of the Pittsburgh coal producers. With the results of such bookkeeping in hand, more definite reply can be made to the public's appeal for relief from high prices. Yet even now it may be possible to suggest how that relief will eventually be obtained. Study of present conditions in the coal mining districts fails to encourage the idea of governmental operation of the seven thousand coal mines in this country. More in line with the trend of public sentiment in the last decade, however, is governmental control in the interest of the consumer by regulation of prices, and to judge from the facts of experience in the regulation of transportation of other public utilities, the public coal commissions will be given sufficient discretionary powers to safeguard the interests of producer and consumer alike, and even mandatory requirements, either legislative or executive, will be subject to judicial review.

Competition seems to have failed of late years to benefit the consumer of coal. In the bituminous fields the competition whenever present has been wasteful and in the anthracite fields there has been practical absence of healthy competition; and whether too great or too little competition, the result is the same—to increase the actual cost of bituminous coal by saddling the industry and its product with the fixed charges on idle or semi-idle mines and to raise the price of anthracite coal by favoring the burdens of high resource costs.

In estimating the aggregate losses incurred by society by reason of the large number of mines not working at full capacity, the facts to be considered are that the capital invested in mine equipment asks a wage based on a year of 365 days of 24 hours, while labor's year averaged last year only 230 days in the anthracite mines and only 203 days in the bituminous mines with only 5 to 8 hours to the day.

As coal is more an interstate than an intrastate commodity, any regulation of prices needs to be under Federal control, and to benefit both consumer and producer such control cannot stop with transportation and mining costs but must stand ready to exercise full rights as a trustee of the people over the coal in the ground. The private owner of coal land, which derives its real value from society's needs has no more sacred right to decide whether or not that coal shall be mined when it is needed by society or to fix an

exorbitant price on this indispensable national resource than the coal operators have to combine for the purpose of exacting an excessive profit from the consumer, or the railroads to charge all that the traffic may bear. The proposal to bring landowner under the same rule as mine operator and coal carrier may seem radical, but where is the point at which coal becomes the resource upon which industrial society depends for its very life?

Public regulation, however, will be fair and indeed in the long run will prove beneficial to the landowner as well as to the consumer, to the mine worker as well as to the operator, because any such agency as the Federal Trade Commission, in its control of prices, must determine costs, and as we interpret the present attitude of the whole coal-mining industry the operators are willing to rest their case on a fair determination of actual costs on which their profits may then be figured.

WHAT BECOMES OF THE BENEFITS OF PRODUCTION EFFICIENCY?

George H. Cushing, Chicago, Ill.

Every industry in passing from the manual labor to the mechanical stage must necessarily effect certain economies. The cost of production decreases as the use of machines increases or, to put it another way, the volume of output increases per unit of cost.

The coal industry has in about twenty-five years, made the transfer so completely that there remains no mine without some mechanically equipped departments. In the truly modern mine, only one act in the entire production program remains to be fitted with machinery.

Between the time when in the memory of some coal operators everything was done by men and the present when everything is done by machines, a great reduction in the cost must have and has taken place. Yet a statement, about the financial results of coal mining today is almost identical with the same sort of a statement made twenty-five years ago. The struggle between the miners and the operators is as pointed as it was then. It is, if anything, more so. The operators take refuge behind the same declaration now as they did then, namely, that they cannot afford to pay what the men demand.

The mortality statistics among coal companies have not been collected with care, but those who have watched the trade know that we have neither saved the infants nor prolonged the life of the aged.

The economies gained by the use of machines have not been used to relieve the condition of the coal trade. In some mysterious way they have been swallowed. Indeed, in going over the records of the industry, I find that following the introduction of every money saving machine, the return on capital invested in coal mines has shrunk.

Coal production consists after all is said, of only three simple acts—cutting, transporting, and preparing. Of course, many more things enter today, but they are not essentially parts of the act of getting the coal. Within those three simple things, the economies

have been effected because in those three places only can machinery be applied to cut the cost. All other machines put in for all other purposes can do nothing but increase the cost.

Since the greater efficiency is thus confined to three points which can be studied, it is easy to measure the economies secured.

In the rooms, the modern cutting machines can get down from 100 to 150 tons in a day of eight hours. I know of one mine where each machine gets 250 tons a day. That is exceptional. By contrast, in the old days, a miner and his helper could do no more than get five tons a day while working ten and twelve hours. Some records show that in difficult veins the men got two and one-half tons, but if they worked fourteen hours, as some did, and used skill, they could get three and one-half tons. Thus the mining machine is easily equal to fifteen or twenty men in the matter of getting down the coal. The economy is proportional.

The modern mine locomotive can make easily twenty miles an hour. If the mule makes three he is going some. The locomotive can haul easily—I am conservative—thirty, three and four-ton cars to the trip. The mule could haul but few cars and those were small. The economy there is also proportional. That is, the locomotive is at least six times as fast and ten times as strong as the mule.

I have seen a modern hoisting engine lift a cage from 300 to 600 feet with two large pit cars of coal and repeat the operation three times in a minute. Those who were operating mines twenty-five years ago tell me that the old hoisting engines would lift a cage to the surface only occasionally. In some cases it was never sure whether a car which started for the top would ever get there.

Also, in the modern main bottom, the cars are self caging; the load kicks the empty off the platform and takes its place. The empty cars automatically switch themselves. In the old mine this work had to be done by man power with much pulling, hauling, and swearing.

The contrast between the old and the new shaft practice suggests other economies proportional first to the greater speed, and second to the greater capacity of the pit cars hoisted.

If we say that in these three simple things alone is condensed the act of getting coal and if we base efficiency on the greater use of time, it must be evident that the cost of coal getting has shrunk tremendously. It is impossible to make exact comparisons between these two periods because of the vast change in all coal mining

methods in that period of time. Still, if we confine our thought to the mere matter of getting the coal, I believe the men of experience in both periods will agree with me that the cost of getting the coal today is not more than ten per cent of what it used to be.

What, then, has become of the studiously sought economy? Why is it that the cost of the coal to the operator at the tippie is as much as or more than it used to be? What has become of the saving which amounts to ninety per cent? By what magic has it disappeared so completely it is a stranger to the pockets of the operators?

It would prove entirely too tedious to attempt to trace the devious ways by which this assumed ninety per cent has wandered away from home. Instead, I am going to group the many avenues of departure under what I shall call the four absorbents of economy. Some of these are either legitimate or unavoidable. Others are mere refinements of waste which have standing only because of indifference.

The most oppressive and most useless of these absorbents I shall call the modern tendency toward centralized buying while the production remains decentralized. I might say that this is the predatory tendency in modern business but I shall not say it. I will merely think it. We all know that the central purchasing agent is a modern institution, the product of a system of combinations allowed in everything but coal. He buys an enormous tonnage each year. He gets bids on his coal supply from twenty-five to 250 different producers and wholesalers. He draws a salary solely because he can save money on coal purchases. To make his job good, he uses his power to the best advantage. Having no competitor in buying, he studiously pits salesman against salesman until he gets all of them into a quarrelsome mood towards each other but in a too friendly mood towards him. They thus arrive at the point where each is willing to subject his company to a loss rather than allow a competitor to make a profit on that business or to come out even. That mood is what the purchasing agent is hired to create.

We have one of those amiable buyers located here in Chicago. His concern uses upwards of 4,000 tons of coal per day. He has "welcome" written on his door mat and he lets it be known that this means "to coal salesmen especially." He says openly that if the time ever comes when he has to pay as much as cost of production for his coal, his company will open its own mines. He

boasted to me at one time that he had bought thirty-five cars of Illinois screenings at \$2 a car.

Just recently, I have spent a little time checking up on the cost of coal to a number of railroads who also have adopted centralized purchasing. One such purchasing agent bought two sizes of coal. He told me that his prices were most liberal to the operator. Perhaps they were from the railroad point of view. Yet the mine run price he pays is four cents a ton less than the cost of production.

All the other railroads observed were found to be paying less than this one.

These centralized buyers have entrenched themselves in their privilege. The concerns they represent have acquired coal lands and, in some cases, coal mines. They thus can and do hang the sword above the operators' heads by saying:

"Sell us the coal we need for less than cost of production or we will mine our own. What then will become of your productive capacity?"

Part of the operator's economy has gone into that hole. The coal mine was equipped with money saving machines to hand the resultant economy over to the central purchasing agent.

The second absorbent of economy is unionism. In this I am not indulging in partisanship, I merely state facts. The direct tax upon the cost of coal, to support the union amounts to about half a cent a ton. This is only a small beginning of what the union means regardless of the fact it will average close to \$2,000,000 a year.

The increase in the cost of labor, traceable to unionism, varies with the different fields. But, a recent compilation shows that this on the average amounts to upwards of fifty cents a ton in the last twenty-five years. That, alone, would account for the disappearance of much of coal's economy.

This, while important, covers only the major superficial item of expense. Along with unionism came collective bargaining. With collective bargaining came the periodical strikes or threats of such strikes. This in turn brought a need for a reserve productive capacity to allow the coal mine to protect the public against possible eventualities. And, the resultant storage piles emphasized the period of summer dullness only to demand still larger capacity to meet the fall rush for coal. This expanded the investment, increased the overhead and complicated the machinery generally. Naturally it added to the cost of coal and hence subtracted from the money won by economy.

Then, too, the worker is secure in his position since unionism came. He is only human and hence he lost his efficiency when he no longer needed to display it to hold his working place. In one contract period alone and as a result of concessions made to the union, it is estimated that the reduction in personal efficiency among the miners has averaged more than ten per cent.

These things about unionism when added together, explain where other parts of the operator's studiously sought and dearly bought economy has gone. He has paid for economy and the union has taken the benefit of it away from him.

The third absorbent of economy, I call the social spirit of the time. I do not take any stand against these social inclinations, you understand. They are delightful things to think about. The only thing I am thinking about when I discuss them is that it's curious to find a pauper so strong on philanthropy when he has to do the giving.

One of these social expressions is the "mining camp beautiful." We may explain this in many ways but the thing which comes most readily to my mind is that it is a covert effort to wean the miner away from any too great fondness for the union by planting flower gardens, recreation parks, et cetera, under his nose. The assumption seems to be that if you can fix his mind on peonies and cabbages he will not lust after the convention hall and super-heated oratory.

Of a piece with these are the wash houses, the amusement halls, the more elaborate expenditures for mining villages, the sewerage systems, the staff of physicians, the hospital and their corps of trained and visiting nurses.

In the social class, also, I place the enactment of workman's compensation laws. The expense of this department alone amounts, in most states, to about eight to ten cents a ton on all coal mined. Coming swiftly down the same road is a scheme for old age pensions which will entail a still greater cost. When you complicate both of these things by the cost of mine insurance to cover them, and when you know that forty to sixty per cent of the latter fund is eaten up by the mere machinery of administration, the item of expense grows to be pretty big.

Also, in the social class belongs the safety first movement, with its underground telephones, its teams of men equipped with expensive apparatus and so drilled at the coal company's expense they are better doctors than the average physician in a large city.

In the same category may be placed the cost of the extra air and escapement shafts, a purely modern invention; rescue chambers below ground with their stocks of goods; and the electric lighting of mines and better air supply now provided.

If you make a total of the cost of these social items, and if you recall that the old time operator had nothing to do with any of them, you begin to understand where some more of the operator's economy has gone.

The fourth absorbent of economy I call the administrative expense. This covers a multitude of things with which the old time operator had nothing to do. To begin with, the state is costing its business concerns an enormous sum of money these days. Most of this is chargeable directly to administrative expense. It isn't always what the State actually does that costs the money. Often it is what the state threatens to do. For instance, the commonwealth is presided over generally speaking by a politician who harbors a deep seated and insatiable yearning to do something for his people. The cost of that something—no matter what it is—must be borne in part at least by a tax upon the mines. The operators set out to prove that the people do not want or need that thing and, even if they do, the mines cannot afford to give it. Thus they have to fight the executive and, often, even to fight off the blood-thirsty voter backed by the whole power of our political organization. This fight costs money, whether the battle is won or lost. If the operator tried to do battle alone, the cost of the single-handed conflict with the state would swamp him over night. Instead of doing such a foolish thing, operators band themselves together into association. Thus we have county associations, district associations, state associations, interstate associations, and national associations. All of these are supported by dues and the administrative expense of the coal mine has to pay all of them.

The state and the railroads have come to be about the same thing in these enlightened and advanced days. The railroad we will assume wants to whet its appetite for gold by advancing the rates on coal. The operator has either to pay the rates or to pay the cost of a fight that he may avoid paying them. Every time the railroads thinks it wants some of the coal man's money, it costs the coal man something whether the railroad gets what it wants or doesn't get it.

Then, too, the state itself has growing wants. Its list of essentials is expanding every year. To satisfy these essentials, taxes

must be collected. The coal man pays his taxes because his is a visible asset which cannot escape the eye of the assessor.

These various items are all chargeable to administrative expense and an executive these days is not considered as looking out for the interests of his company unless he has a liberal personal expense account chargeable to his activities in some of these lively disputes.

But, the administrative expense does not end there. We have journeyed a long way from the old days when there was warehousing in the coal business. Coal has fallen in line with the spirit of 1916 which is expressed in the slogan "direct from the mine to you." We even hear these days of "fresh mined coal." What we used to pay as warehousing charges we are now paying—and more—in long distance telephone calls, telegraph tolls, demurrage charges, reconsignment charges, special discounts to grasping buyers, and what not in order to keep the cost moving around the warehouse to the user.

Because of this mania for "fresh" things—even coal—we have a most elaborate organization for the sale of coal. This has become so complete and so splendid it might almost be called the general sales agent's retinue. It is costing the mines of the middle west from twelve to eighteen cents a ton to sell their domestic coal these days. On the sale of steam coal, it is a toss up between direct selling expense and a ten cent a ton commission to a jobber. A more simple and efficient organization and even a little more sensible method of distribution would reduce that cost to about three cents a ton.

Under administrative expense, I include also the cost of what I call the supernumeraries around the mines. These comprise men who are supposed to be administrative officers. In reality, they are but policemen and timekeepers because they have been robbed of their administrative functions by the rules of the union. However, they draw salaries for what they seem to be instead of for what they are and these are charged against the coal. Therefore, we must include these excess salaries in administrative expense, regardless of the fact that the title holders have lost or misplaced their functions.

If you add together all of these new and extraordinary administrative expenses, I believe you will be able to explain where a lot of the operator's result of economy has gone.

Now, if you add together the totals found under each of these four absorbents, you will find that the new outlay exceeds the new

economies by a considerable margin. This astounding result isn't so hard to understand when you realize that the economies have come, in pennies per ton, from three sources, while expenditures, in pennies per ton, have flown through four subdivided channels. Thus is explained why the coal industry which has saved literally hundreds of millions of dollars is yet worse off than it was before it started to save a cent.

The items of new and extraordinary outlay I have enumerated do not cover the list by any means. But, by indicating directions taken by the departing money, they do tell what has become of the operator's economies brought about by the use of cost cutting machines.

THE WORLD'S OIL SUPPLY.

By Ralph Arnold, New York.

Introduction.

It is the purpose of this paper to outline the status and possibilities of the oil industry throughout the world and to discuss briefly the reason why the world's supply is not inexhaustible, but, on the contrary, is very restricted, and for that reason should be conserved to the best advantage.

In preparing a paper of so wide a scope as the title of this one implies, it becomes necessary not only to seek information from first-hand sources, but to draw liberally from published data. In addition to the available literature, the writer has had the co-operation of many geologists, particularly of Mr. A. Beeby Thompson, the well known English petroleum geologist, whose recent visit to the United States was most timely in so far as the preparation of this paper is concerned.

Importance of Oil.

Petroleum has assumed such a position in the industrial world in the last few years as to place it among the first group of minerals essential to civilization. Food is cooked with it, houses heated by it, power for surface, marine and aerial transportation is furnished by it, machinery lubricated with it, and it enters into our everyday life in manifold other ways. As one man tersely put it, "We are dependent upon petroleum from the time it lubricates the wheels of our baby carriage until it performs the same service for our hearse."

The world's production of crude petroleum in 1915 was 427,695,347 barrels; the 281,104,104 barrels of this produced in the United States was worth an average of about 80 cents per barrel, or a total of \$224,883,283; the balance of the world's production was worth at least an average of \$1.00 per barrel, so that the total value of the entire world's production for that year was approximately \$371,474,526. The value of the derivatives of this oil could not have been less than a billion to two billion dollars.

World's Supply Limited.

Because petroleum is a natural product and is sometimes produced in prodigal quantities in certain fields, people commonly have the notion that there is an unlimited supply of oil in the earth's crust. It is true that petroleum or associated hydrocarbons occur almost universally, especially in regions of sedimentary rocks, but it is likewise true that petroleum in commercial quantities is confined to a limited number of restricted areas throughout the world. As indicative of the relatively small area yielding commercial quantities of petroleum, it might be mentioned that the total area of the United States is 3,025,640 square miles; the proven oil producing area 4,109 square miles, or 13 one-hundredths of one per cent of the entire area. When it is considered that the United States is the most intensely developed of the important oil producing countries, it can be readily understood that commercial deposits of oil are rare.

Why Petroleum Deposits Are Rare.

A study of the chemical and physical properties of petroleum, its origin, migration and accumulation, makes clear why its distribution is so wide, but its segregation in commercial deposits so restricted. In the first place it is a liquid at ordinary temperature, susceptible to evaporation when exposed to the air, and never a stable compound even when confined. Slow distillation is always taking place in crude petroleum, generating gas which tends to expand and cause migration of the oil. In most deposits the tendency to migrate because of the generation of gas is augmented by hydrostatic pressure. Oil is, therefore, not a stationary but a migratory substance.

Many theories have been advanced to account for the origin of oil, the one most commonly accepted being that it is derived through more or less tedious processes, from organic remains, either animal or vegetable or both, laid down under water, usually in intimate association with fine, shale-forming sediments. The alteration of this material to crude oil is accomplished through the agency of bacteria and types of distillation and filtration under moderate temperatures. Its occurrence, then, is confined to a particular group of rocks.

The migration and accumulation of the liquid hydrocarbons are largely influenced by water which is associated with the oil in the rock formations and by the structure of the containing beds. Without going into details it may be said that to have a commercial

deposit of oil, three things are essential; first, an adequate source of supply in the form of organic sediments such as shales or limestones; second, a suitable reservoir in the shape of porous-beds or zones covered by, or enclosed in, impervious formations; and, third, the occurrence of the reservoir near enough to the surface to permit of the recovery of the oil on a paying basis. In nature it is not at all unusual to have two of the conditions fulfilled, such, for instance, as the presence of organic shales near the surface—this is common throughout practically all of the areas of sedimentary rocks—but to find reservoir conditions in proper association with an adequate supply near the surface is a rare coincidence. Furthermore, a natural oil reservoir once emptied will never fill up again in many generations as we count them.

Factors Governing the Production of Oil.

Assuming the presence of commercial quantities of oil in any country, it becomes useful to mankind only after it is made available by development. The factors which enter into the production of oil are numerous and complicated. They may be divided roughly into four groups, viz., character of the deposit, location of the deposit, demand for the product, and the personnel of the operators, or by other criteria into two groups, the one including natural factors, the other artificial. The geologist has to deal largely with the first group, the financier with the second, the technologist with both.

Carrying the latter classification another step, the natural factors governing the occurrence of oil may be enumerated as source; rock pressure, or pressure under which the oil and gas exist in their underground reservoir; viscosity and other physical and chemical properties of the oil; and the thickness, extent, porosity and structure of the reservoir rock. In the group of artificial factors, or those having to do with its recovery and use, might be mentioned the price of oil and gas, which is the dominant factor, and such others as depth of wells; time required to complete wells; distance separating wells; physical condition of wells, pumps and other equipment; improvements in methods of development and recovery; water complications; discovery of new fields; distance of fields from markets; transportation facilities; relative cost of production as compared with other fields and with other commodities; relation of the government to the industry, etc.

It is, therefore, obvious from even the brief survey recorded above, that the question of world's supply is not one that can be even summed up comprehensively without a pretty thorough review of all phases of the oil industry.

Relative Importance of Countries.

In discussing the relative importance of the various countries of the world as producers of petroleum, the question as to past and present productiveness must often be considered separately from that of their probable future productiveness, for in some cases the country, like the United States, is at its zenith or past, while other countries, like Persia or Colombia, with little or no production at present, may offer evidence of later becoming most important.

The relative rank as oil producers of the countries of the world with respect to one another is shown by the following table compiled by the United States Geological Survey.

WORLD'S PRODUCTION OF CRUDE PETROLEUM IN 1915 AND TOTAL YIELD SINCE 1857.

Country.	Quantity, 1915, of 42 gals. barrels	Per cent of total.
United States	*281,104,104	65.72
Russia	68,548,062	16.03
Mexico	32,910,508	7.69
Dutch East Indies†.....	12,386,808	2.90
Roumania	12,029,913	2.81
India	8,202,674	1.92
Galicia	4,158,899	.98
Japan and Formosa.....	3,118,464	.73
Peru	2,487,251	.58
Germany	995,764	.23
Trinidad	‡750,000	.18
Argentina	516,120	.12
Egypt	221,768	.05
Canada	215,464	.05
Italy	39,548	.01
Other	‡10,000	
	427,695,347	100.00

*Marketed production. †Includes British Borneo. ‡Estimated.

According to this table, it is seen that nearly three-fourths of the world's supply is now coming from North America, including

Mexico, and that the bulk of the remainder comes from Russia. The United States has produced about 60 per cent of the total production to date, while Russia has produced only about half as much, or a little over 28 per cent. As regards future production, it is probably safe to say that Russia or even Mexico will outstrip the United States. This condition is true because of the early and intensive development of petroleum in the United States, due to the proximity of the fields to markets, the character of our citizens who went into the business, and the attitude of our government. The last two factors are always important ones, and ones that will be in the future, as they have been in the past, the determining ones in many instances. These same two factors are also the dominant ones, almost universally, when it comes to conservation of oil, and it is the balance between those engaged in exploitation and those favoring conservation that determines the efficiency with which the petroleum, as well as other natural resources, is produced and utilized.

In discussing the present and future sources of the world's supply of petroleum, the countries will be taken up in geographic order, beginning with North America. The future possibilities of the various countries, obviously the most interesting topic to this audience, will receive the most attention.

North America.

Canada.

The Canadian oil fields are among the oldest in the world, and although never of very great importance, have yielded a fairly constant production for many years. The production, or indications of oil, are found in Nova Scotia, New Brunswick, Quebec, Ontario, Saskatchewan, British Columbia, Northwest Territory and Alberta. The oil producing territory of Canada is confined at present to the province of Ontario, where an area of about twenty-five square miles of proved land yields the total annual output of a little over 200,000 barrels of oil. Extensive areas in western Canada, however, offer indications suggesting the presence of oil in commercial quantities, and it is believed that the future will see the Dominion take its place as an important producer of petroleum. The oil-yielding formations are of Ordovician to Carboniferous age in the east, and of Cambrian, Devonian and Cretaceous age in the west. The oil is usually found in sandstones, limestones or dolomites, associated with anticlines and domes. It ranges from the heavy oil of Asphaltic type in Athabasca to the

high-grade refining oils of 36 to 46 degrees Baumé (0.8434 to 0.7955 specific gravity) of the Ontario field. The initial production of individual wells has never gone above 7,500 barrels daily; the present average per well is only a few gallons. The product is used entirely within the country.

United States.

The oil fields of the United States are fairly well distributed geographically, occupying areas from the Appalachian Range on the east to California on the west, and from the Canadian boundary on the north to the Mexican line on the south. They are usually classified as Appalachian, Lima-Indiana, Illinois, Mid-Continent, Gulf, Rocky Mountain California, and Alaska fields. Their proved area includes over 4,100 square miles; the prospective territory nearly 1,000 square miles. The production for 1915 was 281,104,104 barrels; the total production to 1915 was 3,616,561,244 barrels; the estimated future supply is 5,482,000,000 barrels. The oil is found in formations ranging in age from the Ordovician to the latest Tertiary and Quaternary, usually in sandstones or limestones. Practically all types of structure are present in the productive areas, but anticlines and domes predominate. In quality the oil ranges from the asphalt-base oils of California and Texas, whose gravity is from 10 to 35 degrees Baumé (1.000 to 0.8485 specific gravity) to the lightest paraffin-base oils of the eastern states, whose gravity is from 25 degrees to 52 degrees Baumé (0.9032 to 0.7692 specific gravity). The maximum production of individual wells for most of the fields is less than 10,000 barrels daily, although there has been daily records of 58,000 barrels in California and 75,000 barrels in Texas. The wells range in depth from 200 to more than 6,000 feet. Old pipe-line transportation systems extend for hundreds of miles in certain parts of the country.

At the present rate of consumption of approximately 280,000,000 barrels per year, an estimated supply of 5,482,500,000 barrels would last only, approximately, 20 years. However, as the total production of the United States will gradually decrease from year to year, it is believed that the total available supply will spread out over a period of from 50 to 75 years. The price of oil, which now ranges from 50 cents to \$2.00 per barrel (average 95 cents), depending on the locality and grade of the product, probably will increase to figures approximately \$1.00 per barrel for fuel oil and possibly \$5.00 or more for the lighter grades. All other

factors being equal, a barrel of fuel oil as compared with coal on the Pacific Coast is worth today 93 cents. Even were oil to be used only as a fuel, the tendency would be for it to rise in price until it reached a point set by the value of coal in the same regions. As oil has so many points in its favor, as regards ease of handling, cleanliness, etc., it is quite evident that eventually it will be sold at a higher price than is warranted by its heat value as compared with that of coal.

Before the free natural petroleum of the United States is exhausted, the oil shales of Colorado, Utah, California, and other states will have begun to be utilized as a source of petroleum. Also artificial oil made from animal and vegetable waste probably will be available to take its place.

Mexico.

The known oil fields of Mexico are included within two great regions, both of which are segments of the Gulf Coastal Plain—the Tampico-Tuxpam and Tehuantepec-Tabasco regions. The two regions include about twenty fields, covering areas of over 20,000 square miles. A very rough estimate places the proved areas in the two regions at twenty-five square miles and the prospective area at 500 to 1,000 square miles. The principal oil-yielding rocks are the Cretaceous and immediately overlying Eocene, although some oil is obtained from the later Tertiaries, locally. Inasmuch as 700 wells have been drilled for oil in the entire republic up to the present time, and as almost two-thirds of the entire quantity of oil produced has come from two wells, neither of which is more than six years old, it would be rash indeed to give too much weight to estimates of unit areas. The quality of oil ranges from 10° to 29° Baumé (1.000 to 0.882 specific gravity), the lighter oils coming from the southern fields. The daily individual production ranges up to 268,000 barrels, and a total production of over 40,000,000 barrels has been yielded by one well in about five years. Wells range in depth from 800 to over 3,000 feet, the usual depth being between 2,000 and 3,000 feet. The production of the country has jumped from over 200,000 barrels in 1904 to over 34,000,000 barrels in 1915, and bids fair to far surpass this point when political conditions in Mexico shall have become more stable and the war in Europe permits of the utilization of more marine transportation facilities.

Central America.

Little is known of the oil possibilities of Central American countries, but from the information available it does not seem probable that any very commercially important fields will ever be developed in them. There are surface evidences of petroleum in Guatamala, Honduras, Costa Rica and Panama, so it is probable that small fields may be eventually opened up in one or all of these countries.

West India Islands.

In the West India Islands, which lie to the north and east of the Caribbean Sea, between North and South America, oil indications have been found in Cuba; Haiti, Porto Rico, Barbados and Trinidad. Drilling for oil has been done in all these islands except Porto Rico, but important commercial results have been obtained only in Trinidad,* where about 750,000 barrels were produced in 1915. Several wells have been drilled in Cuba and the oil is of remarkably high grade, ranging from 55° to 70° Baumé (0.7568 to 0.7000 specific gravity). As the production of the only one of these wells which has yielded much oil is measured in gallons, it can be seen that Cuba will probably never yield any considerable quantity of oil. The same can be said of the other islands mentioned.

South America.

Practically every country in South America yields certain evidences of the presence of petroleum. The countries in which commercial quantities of oil are now being produced, or which will probably yield oil in commercial quantities, are Colombia, Venezuela, Peru, Argentina and Bolivia.

Colombia.

Although development of oil resources has been carried on in Colombia for many years, no marked commercially successful results have yet been obtained. The oil ranges from the heavy oil of asphaltic type to a paraffin oil of 41° Baumé (0.8187 specific gravity) and is believed to be derived largely from Cretaceous and

*Owing to the writer's present connections in Trinidad he deems it inexpedient to discuss the oil resources or possibilities of that island.

lower Tertiary formations. The prospective territory may be divided into four general districts as follows:

District.	Area.	Possible oil territory.	Proved oil territory.
Caribbean	15,000	300	1
Pacific	1,800	18	..
Magdalena-Santander	10,000	200	1
Tolima	7,500	100	..
	<hr/>	<hr/>	<hr/>
	34,300	618	2

The possibilities of Colombia may be summed up from the above table, which shows a possible oil territory of 618 miles, and proven oil territory of probably less than two square miles. The country will yield commercial quantities of oil only after the expenditure of large sums of money for development of wells and transportation facilities, as operations in a country of this kind are very costly, on account of adverse natural conditions.

Dutch Guiana and French Guiana.

Indications of oil are known in both Dutch and French Guiana, but it is not likely that either of these countries will ever take a prominent part in the industry.

Ecuador.

Oil has been produced in small quantities in Ecuador for many years, and certain favorable indications are known at various points along the west coast of the country, especially at Santa Elena, west of Guayaquil. As the known deposits of Ecuador have not been thoroughly tested, any predictions as to their ultimate possibilities would obviously not be justified. However, as the surface evidences are rather meagre, it does not seem likely that this country will ever play a very prominent part in the oil industry of South America.

Peru.

Peru was the first country in South America in which oil was produced on a commercial scale, and is the most important producer at present. The petroliferous areas can be separated into two general provinces—that of the Andes, comprising at present the Titicaca field; and that of the coastal belt, in which are the more productive Zorritos, Lobitos and Negritos fields, lying just south of the Ecuadorian frontier. The total area included in the

oil belts is over 5,000 square miles, of which about 200 square miles can be said to be either proven or highly probable, while about 100 square miles more has oil possibilities. The oil-bearing rocks are largely sandstones of Eocene age. The structure is usually monoclinal. Wells range from 700 to 3,000 feet in depth, the average being about 1,500 feet. The initial productions are never very large, and soon settle down to an average of from 4 to 7 barrels a day. The oil is of excellent refinery grade, yielding over 15% gasoline and ranges in gravity from 32° to 43° Baumé (0.8642 to 0.8092 specific gravity). The production of Peru in 1915 was 2,487,251 barrels, the greatest in its history. It seems likely that this country will increase in production for several years to come, but that it will never yield more than double or treble its present output.

Bolivia.

The oil fields of Bolivia are found along the eastern base of the Andes, and are a continuation of those in western Argentina. The oil bearing rocks are largely Cretaceous and the oil ranges from 35° to 47° Baumé (0.850 to 0.790 specific gravity). The formation is very broken and sharply folded and faulted. Owing to the inaccessibility of the fields, there is little likelihood of development work being initiated until better transport facilities exist, but eventually these fields should yield commercial quantities of oil.

Argentina.

Argentina first attracted attention as a possible producer of petroleum in 1907, when oil was discovered, entirely by accident, in drilling for water at Comodoro Rivadavia, on the coast of Patagonia. Previous to that time test drilling had been done in the Andean portion of the republic, but no significant results were obtained. The area included in the petroliferous districts exceeds 8,000 square miles, and of this territory probably 400 square miles gives superficial evidence of petroleum. The proved area does not exceed two square miles. The petroleum occurs in rocks of Jurassic, Cretaceous and Eocene age, limestones, dolomites and sandstones predominating. Both anticlines and practically structureless areas yield commercial quantities. The oil is asphaltic and ranges in gravity from 11° to 24° Baumé (0.996 to 0.9091 specific gravity). The wells attain depths from 200 to more than 4,000 feet and are rather small producers, so far averaging less than 100 barrels daily each. The production, which was approximately 516,120 barrels

in 1915, comes entirely from the Comodoro Rivadavia district and is consumed in the country, principally for fuel.

The petroliferous area of Argentina is divisible into three principal districts—the Comodoro Rivadavia district, on the Atlantic coast, and the Salta-Jujuy and Mendoza-Neuquen districts in the Andean region. Although it is possible that commercial quantities of oil may be developed in all of these fields,* it does not seem likely that Argentina will ever take a very prominent place in the oil industry.

Europe and Adjacent Islands.

General Statement.

The principal deposits of Europe lie in its eastern portion, those of European Russia, Galicia, and Roumania being the most important at present and also offering the greatest future possibilities. These three countries produce nearly one-fifth of the world's supply, and bid fair to produce a much higher percentage when political and economic conditions become normal.

England and Scotland.

No oil in commercial quantities is produced in these countries direct from wells, although small quantities are yielded by distillation from the Scottish oil shales. There is no prospect of either country ever being important as producers of petroleum.

France.

Indications of oil are found in certain parts of France, but none is produced in commercial quantities and probably never will be.

Spain and Portugal.

Indications in portions of Spain and Portugal suggest the possibility of a small production being developed in certain restricted areas, but nothing of importance will probably ever come from either of these countries.

Germany.

Germany produces nearly a million barrels of oil annually, largely from lower Alsace and Hanover. The oil is principally of medium to heavy grade and is derived from Mesozoic and Tertiary rocks. Development began in 1889 and has been gradually increasing ever since. It is probable that abnormally intensive drilling has been carried on since the outbreak of the war to meet, as far as

possible, the unusual internal demand for oil, and that the production may now be considerably more than ever before. It is certain, however, that the very limited area of small producers of Germany will never exercise much influence on the oil industry even of Europe.

Italy.

Three small oil fields have been developed in Italy and indications of oil are spread over a very wide territory. Emilia, in the valley of the Po in Lombardy, and areas in the Pescara and Liri valleys in central Italy, have yielded oil in commercial quantities. The petroleum comes from rocks of Tertiary age, largely Eocene, and ranges in gravity from 24° to 44° Beaumé (0.9091 to 0.8046 specific gravity). The wells are shallow, not over 1,000 feet in depth, and are small producers. The entire output of Italy for 1915 was only about 40,000 barrels, or an average day's run for a good Mexican well. Italy will never yield more than trifling quantities of oil.

Austria.

The oil fields of Austria and Roumania form an intermittent belt, lying along the northeastern, eastern and southeastern flanks of the Carpathian Mountains. The Austrian fields are confined to Galicia and Bukowina. The two principal areas are the eastern Galician and western Galician districts. The eastern area may be sub-divided into the Boryslaw, Tustanowice and Bitkow districts, and the western area, near Krosno, into the Bobrka and Potok fields, lying near Krosno, and the Gorlice district, the westernmost one of the province. The fields are developed along subsidiary folds and sometimes complex structures in the Eocene and Oligocene rocks at the base of the mountain mass. The oil ranges from medium to high grade paraffin base, the gravity from 30° to over 50° Beaumé (0.8750 to 0.7778 specific gravity). The wells are from 1,500 to 2,500 or 3,000 feet in depth, though in Tustanowice, one productive well attained a depth of 5,800 feet. The production of individual wells is often large at first, but is not sustained as in some fields. Galicia attained a maximum production in 1909, when it produced nearly 15,000,000 barrels of oil; it produced only a little over 4,000,000 barrels in 1915, and though there are many untested areas, offering evidence of good production, it is probable Galicia will never again produce at the rate it has in the past few years.

Roumania.

Roumanian oil fields, occupying a southward extension of the belt in Galicia and Bukowina, lie along the base of the Carpathians. Five principal districts are at present developed, viz.: the Bush-tenari, Campina, Moreni, Filipeshti-Baicoi and Buzan. The oil, which varies in gravity from 20° to 50° Beaumé (0.9333 to 0.7778 specific gravity) and is at one place of paraffin base, at another, asphalt base, is found in anticlines and complex faulted zones in rocks of Eocene and Oligocene age. The wells range in depth to 3,000 feet or over and one at least has yielded as high as 3,000,000 barrels during its life. The production of Roumania is now about at its zenith, about 13,000,000 barrels being yielded both in 1913 and 1914 and a little over 12,000,000 barrels in 1915. Intensive development may maintain this production for a short time, but as a factor in the future, Roumania cannot expect to exceed its present relative position of fourth or fifth in the world's producers.

Russia.

The word "Russia" fills the mind with pictures of unusual and great things. It is true to its traditions as regards oil. The oil fields of Russia, as we know them, are confined principally to the northeastern shore of the Black Sea, the western shore of the Caspian Sea and the flanks of the Caucasus mountains, lying between the two. The region is divided into a number of important fields, of which those near Baku on the Caspian shore, are the best known and most important. Other fields are the Grosny, Ural Caspian, Cheleken and Maikop, and others to be described under "Asia." The oil comes from Tertiary beds, usually along anticlines, though productive areas with complex structure are not rare. Practically all grades of oil are found in the Russian fields, the usual product being around 30° Beaumé or 0.8750 specific gravity. Enormous productions at shallow depths have been encountered in the Baku district in particular, where, in 1901, about 85,000,000 barrels or one-half of the world's supply of oil was coming from 4,000 acres of producing territory. Russia is a country in which the government regulations have tended to retard, rather than accelerate development, and were it not for the fact that nature has been so generous with her as regards oil, she would not occupy the position of second place among the world's producers as she does now. Russia reached one apex of production in 1901, when she produced over 85,000,000 barrels; in 1915, she produced only 68,000,000. Such

large areas, both in European and Asiatic Russia, yield unmistakable evidence of the presence of oil in large quantities that it is to this country, among those of Europe and Asia, to which the future must look for a supply. Many obstacles, both governmental and natural, will have to be overcome to recover the oil, but demand will conquer these, and for many years to come Russia can be counted on to hold second rank and eventually first among the world's producers.

Asia.

Russia.

The future possibilities of Asiatic Russia have been mentioned above. The areas which give the greatest promise, or in which development is now going on, are in the Fugana district of Turkestan, on both sides of the Hissar mountains, near Lake Baikal, in the Transcaspian province, and on the island of Saghalin, north of Japan.

Turkey.

Mesopotamia and the Tigris and Euphrates valleys yield small quantities of oil for local consumption. Still other areas in this country offer superficial evidence of the presence of petroleum but little systematic prospecting has been done and though it is possible that some commercially important fields may ultimately be opened up, it does not seem probable that Turkey will for some time contribute materially to the world's supply.

Persia.

The principal deposits of Persia are confined to the southwestern part, along the base of the Zagros range, although important deposits are known on the Caspian shore, south of Baku. The oil in the Zagros range comes from Miocene rocks, while that from the Caspian region comes from older beds. The oil ranges in gravity from about 24° to 45° Beaumé (0.9091 to 0.8000 specific gravity), and are used largely locally for refining purposes, especially for the manufacture of kerosene and fuel oil. Some of the wells yield good productions, one at least giving a total of over 100,000 barrels. Owing to the fact that Persian oil fields have been developed as yet only in their more accessible portions, and that much highly probable territory remains untested, it seems likely that the country will eventually become an important factor in Asiatic oil production.

Arabia.

Indications of petroleum are found at several localities in Arabia, especially near the Persian Gulf, Red Sea and in Yemen province, but little or no development work has been done. The oil comes from Tertiary and Cretaceous beds. So little is known of the country that nothing can be said definitely as to its future, although it is believed that no very important deposits will be developed there for many years to come.

India.

India is the only important oil producing country of the British Empire. The important districts are in Burma, while Assam is just beginning to be developed. The principal Burmese fields are Yenangyaung, Yenangyat, Singu and Minbu, all near the Irawaddy River. The oil comes from Tertiary strata is principally of a refining grade, ranging in gravity from 30° to 40° Beaumé (0.8750 to 0.8235 specific gravity). Wells are now drilled to a depth of 3,000 feet and some are good producers. The production of India (practically all from Burma) has been gradually rising until in 1915, it yielded over 8,000,000 barrels. Numerous districts in Burma and Assam show promise, and this country will no doubt become more and more important as a source of oil as time goes on.

China.

China has not as yet produced oil in important commercial quantities, although considerable prospecting has been done within the past two or three years by the Standard Oil Company of New York, in association with the Chinese government. Indications of oil are found at many localities, principally in the Jurassic rocks, according to Redwood. From the evidence now available, it seems probable that China will never play a very prominent part in the production of oil.

East Indies and Adjacent Islands.*Dutch East Indies.*

Important oil fields are found in the Dutch islands of Borneo, Sumatra and Java. The oil is found in anticlinal folds with steeply dipping sides; and seepages, mud-volcanoes and other phenomena mark the surface of the fields. The oil-bearing strata are of Tertiary age and are generally associated with coal and lignite. In Borneo, both asphaltic and paraffin oils occur in the same field at different depths; in the other fields the bulk of the oil is paraffin

base. The oils are mostly of the high-grade refining type, ranging above 30° Baumé (0.8750 specific gravity) and as high as 53° Baumé (0.7650 specific gravity). The wells vary in depth from shallow holes to over 3,000 feet. The production of the Dutch East Indies has risen from a little over 2,000,000 barrels in 1900, to over 12,000,000 barrels in 1915. Those familiar with the islands claim that there are hundreds of square miles of oil land yet undeveloped, so that it seems probable that this source, so important at the present time, will remain so for many years to come.

Small East Indian Fields.

Among the small islands or groups of the East Indies yielding appreciable quantities of oil are the Celebes, Tunor and Ceram. The geology of these fields in general is similar to that of the larger islands just mentioned. They are not as yet an important factor in the industry, but will eventually contribute their pro rata to the world's supply.

Philippine Islands.

Indications of high grade petroleum are found at several localities in the Philippines, and some prospecting has been done in small way. Capital stands ready today to go in and make thorough test of the favorable localities, as soon as a stable government is established in the islands. Prospectors are willing to take a chance with the none too good natural conditions in these islands, but are unwilling to place their investments under the control of a vacillating government like that of the past four years. It is questionable whether these islands will ever produce large quantities of oil.

Japan and Formosa.

The existence of oil in Japan has long been known, but it is only within the last two years that this country has begun to intelligently develop its deposits and place its output on an important basis. The oil fields of Japan extend from the Pacific coast of Totomi to the west side of North Japan, and are a southward extension of the Saghalin fields. The oil-yielding formations are of Tertiary age and the oil of about 25° Baumé (0.9032 specific gravity) and similar in composition to the California oils. The deposits, though not extensive are still of such importance as to suggest a much larger annual production ultimately than the 3,000,000 barrels produced in 1915. A small production comes from Formosa and this island may eventually be further developed.

Australia—New Zealand—New Guinea.

Indications of petroleum are found in southeastern Australia, at several places in New Zealand, and in western central New Guinea, but up to date, no commercial deposits of oil have been opened up in these great British possessions. The New South Wales oil shales have been exploited to some extent, usually disastrously to the investor, and a small production developed in North Island, but it yet remains to discover anything of importance. The general consensus of opinion is to the effect that this quarter of the globe will never yield important quantities of oil.

Africa.*Egypt.*

The only production of oil in commercial quantities in Africa comes from Egypt, where Tertiary beds near the Red Sea yield a good production of fair grade oil. The production, which amounted to nearly 800,000 barrels in 1914, fell to a little over 200,000 barrels in 1915, due to the war. It seems probable that further development in the Egyptian fields will result in a greatly increased production over that yielded to date.

Algeria.

Favorable indications in the Miocene formations of northern Algeria have led to recent investigations by the Pearson interests of London. A little prospecting has already been done, but no positive results obtained. The country gives promise of ultimately yielding oil in commercial quantities.

Other Parts of Africa.

Nigeria has been tested for oil at one or more places, so far without favorable results, and other portions of the continent, notably Belgian Congo, Gold Coast, and the Island of Madagascar yield favorable indications of oil. So little is known of these areas that any prediction as to their future possibilities would be extremely hazardous. It is reasonable to suppose that somewhere within the great areas of sedimentary rocks of this continent, commercial quantities of oil exist and will be eventually exploited.

Summary.

Summarizing the data contained in the foregoing paragraphs, it is seen that the countries which have attained their maximum

production, and are either about to decline or have already started to decline, are the United States, Italy, Galicia, Roumania and Germany. Canada attained a maximum production in 1900 and Russia in 1901, but owing to the possibilities of new fields yet to be opened, it seems probable that both of these countries will soon start to increase their production, with the probabilities strong that Canada, at least, will some day pass her former banner year. All of the other countries may be credited with a constantly increasing production. The total world's production has been increasing gradually, since the first production in Roumania in 1852, and it seems likely that after the close of the war the greatly increased demand for oil will result in increasing the world's output beyond the 427,000,000 barrels yielded in 1915, and possibly to beyond the half billion mark. The demand will probably be such as to cause this great output to be maintained for as long as the fields of the world can supply it. Disregarding Africa, which is an unknown but probably not highly important factor in the situation, it is the writer's belief that the high point in production for the entire world will occur within the next ten years.

FEDERAL CO-OPERATION WITH THE OIL INDUSTRY.

H. G. James, Kansas City, Mo.

With proper co-operation between Federal authorities and the oil industry expensive investigations could be eliminated; disquieting and incriminating rumors might be prevented; conservation of a great resource extended, and future demand for gasoline and other petroleum products largely met through more scientific methods of operation.

These results cannot be obtained by drastic retaliatory or meddling rules of regulation, but through a wholesome, desirable and constructive co-operative policy.

Petroleum has become an article of commerce and daily necessity of such tremendous importance that the public welfare demands that every possible facility shall be granted for its protection, development and conservation. The development of the Mid-Continent and Gulf Coast fields has been contemporaneous with the development of the motor-driven vehicle. In that time it is estimated 960,000,000 barrels of petroleum have been produced in that territory, and it is predicted these fields will produce 4,000,000,000 barrels more before they become exhausted. It is safe to say that, because of insufficient knowledge of petroleum distillation, not more than 30 per cent of the intrinsic value of this vast amount of crude petroleum was saved. The purpose of this argument is to arouse interest in a comprehensive campaign to prevent this unnecessary waste of a valuable resource in the 4,000,000,000 barrels yet to be produced in this single district, to say nothing of the remainder of the country. It is not so much a matter of how great a production of crude oil we may attain, but how far we make go what we have. Waste is a crime. Perpetuated waste which we know can be arrested is worse than a crime. We know from experience that only benefit can come from intelligent, constructive, conscientious engineering and chemical research and co-operation on the part of the Federal Government with the oil fraternity. Oil is not a seasonable crop that may be reproduced next year, but when once exhausted is gone beyond recall. There has been lost an incalculable wealth in the billions of barrels of crude petroleum which

are gone forever. This has been proved by experiences the past two years. An industry, struggling to meet an overwhelming demand, reaches out to the Federal Government for aid and co-operation, and thus far has reached very largely in vain, most of the time hampered and annoyed rather than co-operated with and assisted.

Importance of Petroleum.

Petroleum has been a commercial product fifty-eight years. Probably no other industry has witnessed a more marvelous development in this period. The world's total production up to January 1, 1916, aggregated 6,017,457,366 barrels. Of this amount other nations than the United States produced 2,400,896,122 barrels, leaving the total product of this country from the discovery of the Drake well in August, 1859, to January 1, 1916, 3,616,561,244 barrels, valued at \$2,969,292,635 in its "raw" state. These figures give a suggestion of the extent of the industry and its great importance to the country.

The use of petroleum has increased until more than one thousand useful articles are made from it. Thousands of industrial plants which are not generally considered in reports on petroleum manufacturing institutions use some product of petroleum as their basic raw material. When one hears experts prophesying the exhaustion of petroleum within thirty years, one is harrowed with thoughts of how the world will proceed without the use of this mineral product. It has worked its way into our everyday life until the sudden loss of few, if any, other articles would create such hardship upon all of the people. If we were to awaken tomorrow morning and find that petroleum and its products had been completely wiped out of existence, until substitutes could be provided, not a wheel of industry would turn. As you reflect, can you imagine any other one thing that would be so seriously missed? Your trains, your steamboats, your automobiles, your tractor engines, your stationary engines, your elevators, your wagons, and, in fact, every carrying vehicle would stop running. Scores of medicinal articles would disappear from the shelves of the apothecary shop. Thousands of tons of petroleum mineral rubber now used in the manufacture of automobile tires would, of necessity, have to be substituted. Vast quantities of carbon used in the manufacture of penholders, talking machine records and such articles of daily use would have to come from another source.

The total value of petroleum produced in the United States

for the fifty-eight years of the industry has amounted to \$2,969,-292,635. These figures are merely suggestive. Again, the business has only reached extensive development within the past few years. The total crude production of petroleum in the United States in 1915 (official figures are lacking) was valued at \$192,594,469. The total production of natural gas, a product found in drilling for petroleum and which belongs to the industry, was valued at \$101,-312,381. The output of casinghead gasoline, made from gas taken from oil wells and which industry has only been started within the last few years, was valued at \$5,510,823, or a total of \$299,057,673. This is 10 per cent of the total value of crude produced in the fifty-eight years since the discovery well was drilled. It must be taken into consideration that natural gas and casinghead gasoline were not used for commercial purposes during the first thirty or thirty-five years of the oil business.

The importance of the industry in the United States is further illustrated by the fact that the world's total production of crude oil in 1915 was 447,660,777 barrels, including both marketed and stored output. Of this amount the United States produced 301,-872,208 barrels (the remainder of the world producing 145,788,569 barrels), or 67.4 per cent. And we are told, and I believe it is true, the oil industry is even now only in its swaddling clothes. Ten years ago it was supposed high grade crude was nearly exhausted. But less than two years ago a single pool in the Mid-Continent field attained a daily production of 300,000 barrels of high grade petroleum, and this area was so small that it could be set down within the official boundaries of some of our larger cities without overlapping into the fire limit. No one is competent to estimate how many similar pools may yet be found in most unexpected places in this and other countries. Personally I am thoroughly convinced that the supply will equal the demand for generations yet to come. But much depends upon our use of the developed supply.

In 1859 there was only one oil producing well in the United States. That was the Drake well at Titusville, Pa. By the beginning of the Civil War test wells had been started in various parts of the country. One was drilling on the Little Wee out on the prairies of Kansas. I have been told that another had been started about that time in California, and every now and then I am amazed to learn that a test had been begun in some very unusual part of the country either just before or just after the War of the Rebellion. Yet it was not until within the last twenty years that the

development was carried actively and generally over the country. Today petroleum is produced in commercial quantities in seventeen different states and is being found in smaller quantities in six or eight other states.

There are several trunk pipe lines carrying crude from Oklahoma and Kansas northeast to Chicago and Alton, Ill. (East St. Louis), and thence to the Atlantic seaboard. There are three pipe lines from Oklahoma to Gulf ports in Texas and Louisiana. The pipe line system on the Pacific coast, in the Gulf coast region, in the Mid-Continent region and through the Atlantic states is one of the industrial wonders of the age. No figures are available to show the number of wells drilled along these lines. Over 79,000 have been drilled in Kansas and Oklahoma alone, and it is safe to estimate that no less than 500,000 wells have been drilled in the United States. It is impossible to conceive the impetus this great movement has brought to the general prosperity of the nation, to say nothing of pleasure, comfort and luxury that have attended it.

There are more than 300 refineries in the United States, the daily crude capacity of which exceeds the daily production of petroleum. The total investment in refineries alone is estimated at approximately \$430,000,000. The investment in pipe lines, producing wells, storage tanks, oil machinery manufacturing concerns, tank cars, etc., carries the petroleum investment in this country into the billions of dollars, and we are only starting. So rapid is the development of the business that today it is impossible to secure the delivery of new tank cars in less than eight months, and it is almost impossible to secure any promise at all for the delivery of refinery equipment.

The importance of petroleum is further illustrated in the fact that in 1915 the total value of crude oil, natural gas and casinghead gas at the well was \$299,057,673, while the total iron ore shipments aggregated only \$101,288,984; the total value of gold production was \$101,035,700; our entire silver production in 1915 was only \$37,397,300; our smelter copper production was \$242,900,000. Thus the value of oil country products at the well was almost three times that of iron ore and gold, almost eight times that of silver, and one and one-fifth times as much as copper. In other words, last year it led everything in the mining industry except coal and its initial value in 1915 was one-half the value of the oat crop of that year, almost one-third of the marketed value of wheat, and one-sixth the value of the 1915 yield of corn. Yet we have been pro-

ducing these grains since the days of Ruth and Naomi, and how much longer man knoweth not how to compute.

Possibilities of Crude Oil.

Notwithstanding the great uses to which petroleum has been extended, it is generally conceded the possibilities of crude oil have only so far been hinted at. Chemists admit less is known of the chemical reaction of petroleum than any other indispensable mineral product, and that it promises greater rewards of research than almost any other thing of general use today. The possibilities are bewildering to even expert chemists, and as these facts crowd in upon the attention of the petroleum manufacturer, he is overwhelmed with the losses which have been sustained in the crude manner of handling this raw material in the past and the pity of continuing the same in the future in face of surrounding conditions. We will agree there was possibly no way of avoiding this loss in other days when we were not aware of the intrinsic value of petroleum contents, but with the knowledge we possess today, every effort should be made, both on the part of the government officials and those directly interested in the business, to arrest any further unnecessary loss.

That old "saw" has been forcibly brought to attention the last year that "necessity is the mother of invention." Within the past twelve months the petroleum refiner was face to face with the proposition of a shortage of crude. The demand for gasoline had grown by leaps and bounds. The number of internal combustion engine-propelled vehicles was increasing at the rate of almost a million a year. The output of the Cushing pool had decreased from 300,000 barrels a day in a few months to approximately 75,000 barrels a day. The yield of other fields was also decreasing. It was a serious question of how to meet the increased demand for gasoline in face of the decreased output of raw material. That the refiner was able to meet the situation without any hardship upon the public, in fact with the public scarcely realizing that such a condition existed, is both a compliment to him and a suggestion of the possibilities in petroleum if sufficient attention is given. I would not suggest by my appeal for Federal co-operation that the refiner is not putting forth every possible effort to extend the uses of petroleum himself, but the difficulty is that his attention is so taken up with the needs of the hour and his business requires such a vast amount of capital, he is unable to go into research work except as

necessity requires. It is also desired to show that the loss in present methods, if stopped, might defer the day of shortage many years. The exigencies of the past two years, for example, forced upon the refiner the necessity of producing a larger amount of motor fuel from a given quantity of crude than ever before. The result is the refiner is making, through a more scientific knowledge of this business, at least 50 per cent more gasoline from a given amount of crude than he made two years ago. In some instances he is making 100 per cent more gasoline. If he had not been able to do so, many an automobile would have reduced its mileage during the past year. The refiner by scientific process has found that he can make as good a grade of gasoline today of 56 or 57 gravity as he used to make at 60 to 62 gravity. He is doing it on scientific principles. For fifty years there was scarcely any change in methods of refining. During the past two years there has been a wonderful change. It has suddenly been found that gravity is of little importance in gasoline and that the end point is all important. We didn't know anything about end point until recently, and what we have learned in this direction has given us a glimpse into the future, and we are almost afraid to guess what tomorrow may bring forth. We know that in some instances refiners are cutting down their crude run 75 per cent, yet getting more gasoline from the remaining 25 per cent of crude than was formerly extracted when the plant was running its full capacity of crude.

Further than this at least one large company is now engaged in "skimming" its crude oil and taking off about 10 per cent of gasoline, after which the skimmed crude is placed in storage tanks for future use. Heretofore crude was placed in storage and this 10 per cent evaporated in the air.

For half a century gas in oil wells had been permitted to flow into the air a total waste. Last year over \$5,500,000 was realized from gasoline compressed from the gas, and this year the sum will be nearly doubled. Yet only a small portion of the casinghead gas of the country is being thus utilized.

For many years the vapors from petroleum stills were permitted to escape into the air. One day a refiner conceived the idea of saving this fearful loss. Then it was discovered that one of the most valuable fractions of the gasoline content had been escaping. There are still many such ways of conserving the supply of this valuable product through greater efficiency, and my contention is that more general, comprehensive and far-reaching benefits in this

direction are possible through the efforts of efficiency engineers and chemists under governmental direction and supervision than by indifferent, personal, selfish effort.

A conspicuous possibility in illustration: Compression of natural gasoline from casinghead gas referred to above is a new and only slightly developed branch of the oil business. Casinghead gasoline is of very high gravity and a valuable product. Scant knowledge has been acquired concerning it and how to handle it to best advantage. At the present time from 30 to 50 per cent of this rich product is lost in what is known as "weathering." It can be held under high pressure, but the moment it is released it is beyond control. At the present time it escapes into the air a total waste, amounting unquestionably to millions of dollars, and of still greater importance when it is taken into consideration this is the best part of "natural gasoline," used so extensively in "lengthening out" naphtha and low gravity gasoline for motor fuel. Surely efficiency engineers could find some device for arresting this loss, and my notion is the Bureau of Mines should do it for the benefit, not of a few, but the profit of all. At least they could develop some method of capturing in high pressure tanks to be used for illuminating the millions of American farm homes now dark and gloomy after nightfall and making them attractive and pleasant places of abode as never before and at comparatively little expense.

What the Oil Men Ask.

For many years oil men advocated a bureau of petroleum or a cabinet portfolio representing petroleum and other mining interests. Then came the creation of the Bureau of Mines and later the establishment within the bureau of a department of petroleum. This department has been in operation but a comparatively short time and yet, by reason of the comprehensive understanding of the oil industry by Director Manning and his very able and broad-minded attitude toward petroleum, together with the co-operation of so capable a man as Superintendent Williams, has won the confidence of the oil fraternity who will be pleased to see all petroleum matters at Washington concentrated under the single direction of this bureau instead of in the present confusing, inefficient and ineffective manner in numerous departments.

Up to this year the bureau has had approximately \$100,000 to spend for petroleum and natural gas. The appropriation for the year ending June 30, 1917, is \$70,000. At the same time an appropriation of \$65,000 has been given to the Navy Department for

practically the same work the Bureau of Mines is attempting to do. The Bureau of Standards is also taking up certain work in connection with petroleum. Appropriations are made to the Geological Survey for the gathering of oil statistics. In addition to these the Federal Trade Commission has spent a large sum of money "delving into the mysteries of petroleum." If all these appropriations were combined and all matters pertaining to petroleum were centered in the Bureau of Mines, there is no question in the minds of those who have studied the situation that it would be better for both the industry and the public at large. I have no criticism of the men in these other departments. I am criticizing the system which is not comprehensive. Oil requires intimate knowledge. Messrs. Manning and Williams know the oil country. They could do all the work that these various other departments do at less expense and to the far greater good of the industry.

What the Bureau of Mines Has Done for Petroleum.

It has pointed the way to hidden values and quickened a deep interest in conservation policies and constructive research.

It has justified its creation.

In the course of three years and with less than \$100,000 to carry on its work, it has rendered to both oil producer and public service of incalculable value.

In the matter of gas conservation alone it has been the means of saving hundreds of thousands of dollars. The experts of the Bureau of Mines originated the "mudding process," by which great volumes of gas, encountered in drilling oil wells and which formerly had been permitted to flow into the air a complete and irrevocable loss, are now sealed up in the original stratum for future use. Losses in the past have amounted to millions of dollars. Wells testing twenty, forty and sixty million cubic feet a day were allowed to blow into the air until exhausted, and then drilling would be continued to the oil sand. When the Bureau's representative said this fearful waste must cease and that it would have to be shut in,

"Somebody said that it couldn't be done;
 And he with a chuckle, replied
 That maybe it couldn't; but he would be one
 Who wouldn't say so till he tried,

So he buckled right in, with a trace of a grin
 On his face—if he worried, he hid it.
 He started to sing, as he tackled the thing
 That couldn't be done—AND HE DID IT."

And now every time gas is encountered in a well drilling for oil, the owner, if he wishes to continue to the oil sand, shuts the gas off by the mud process, that was a joke and couldn't be done, and this valuable resource is reserved in its natural reservoir for future use.

It is submitted that if the Bureau never did another thing, it has justified its existence and repaid all it will cost the tax payer for years to come.

But the department has done more. Two years ago when the oil industry was confronted with a possible shortage of crude to meet the demands of the public for motor fuel, Director Manning "turned loose" a young man named Rittman to inquire into the possibilities of making more gasoline from crude oil. Hundreds of men had tried for years to do the same thing; the congress had fostered a scheme to provide a substitute in the form of denatured alcohol; the Standard Oil Co. had built many expensive, high pressure stills to this end and had reconstructed them and spent money like a drunken sailor to develop this growing idea and with only partial success; the Bureau of Patents revealed a mute tale of dashed hopes in scores of devices and schemes for advanced distillation; and quite naturally when young Rittman's ambitions became known,

"Somebody scoffed, 'Oh, you'll never do that—

At least no one ever has done it.'

But he took off his coat and he took off his hat

And the first thing we knew he'd begun it,

With a lift of his chin and a bit of a grin,

Without any doubt or quiddit.

He started to sing as he tackled the thing

That couldn't be done—AND HE DID IT."

The idea of cracking was not new. It had been attempted before Rittman was born; but that was all that came of it. Both the effort and the men had long since been forgotten. But this young, unpretentious chemist in the Bureau of Mines had a service to render a great industry. He discovered that after the "free" gasoline, if you please, had been removed from crude petroleum, that which remained could be "cracked" and reconstructed into

what has come to be known as synthetic crude and from which a greater per cent of motor-fuel gasoline could be distilled than was precipitated by present processes. Oil, declared Rittman, is made up of molecules, the smaller ones being gasoline and the larger ones, according to their size, kerosene, fuel oil, tar, etc.; that after the gasoline molecules are removed, the next larger ones can, by heat and pressure, be broken up into other gasoline molecules, and the still larger ones cracked into kerosene, fuel oil, etc. By adding more crude from time to time this process might be carried on indefinitely with a constantly increasing amount of gasoline refractionation. It was only a question of cost as to how far the process could be carried on.

This was an entirely new idea. It makes little or no difference whether the Rittman still has been a success or not; it is not a reflection upon Rittman how great a success the Standard's Burton method has since become; it is immaterial what has come of the mechanical feature of applying his discovery—he originated a new idea that is being developed and is bearing fruit. Hundreds of men are putting his idea into practice, and since his pronouncement on petroleum refining has witnessed its greatest evolution. It might be added that today refiners in the east, the Mid-continent and far west are installing Rittman process plants; they are getting results. Rittman, still modest and unhurt by fame, is known throughout the petroleum world for what he has done. Refiners everywhere are getting vastly more gasoline from the same amount of crude than they were getting before their attention was turned by this young man to his new theory of distillation. I am not attempting to give to him undue credit, but I do say that he made the discovery which directed refiners into new and broader channels and brought them greatly increased results. He gave them new confidence and spurred them to greater action than ever before.

My deduction is this: That if Dr. Rittman, by his work, gave a suggestion to the petroleum refiner that resulted in adding only 15 per cent of gasoline precipitation from crude oil, he performed a tremendous service to the public. It is unnecessary for me to show in concrete figures what this would mean. If it had not been for the added amount of gasoline it is now possible to extract from petroleum, the world would be suffering a famine of this wonderful product upon which we depend for the greatest industrial power in the world.

Long before Dr. Rittman was thought of, before the motor car had become an acknowledged necessity, the late President Moffitt of the Standard Oil Co. of Indiana declared the great concern of oildom was how to meet the future demand for gasoline. High grade crude was being exhausted; attempted increased refractionation had failed; no successful substitute had been found. Mr. Moffitt took a dismal view of the future. He believed petroleum had reached the limits of its output. That was ten years ago. The greatest high grade oil pools ever known have since been developed. Motor vehicles have increased by millions. Let me show you what the Rittman idea put into operation means. Last year in this country we produced over 300,000,000 barrels of crude. If Rittman can get 30 per cent more gasoline from crude by his process than we formerly got (and we believe he will), and all of the 300,000,000 barrels were distilled by his process, then we would have produced 3,780,000,000 gallons, nearly two hundred per cent more than we actually did produce, or a sufficient amount to supply 7,560,000 cars at 500 gallons each per year. The figures are bewildering when one considers this is several times as many cars as were in use last year. Fully one half the great petroleum production of California produces no gasoline at all, and the other half only produces about 5 per cent. Dr. Rittman expects to revolutionize this condition. Prior to two years ago the average reduction of gasoline from crude was not over 12 per cent, if indeed it was that.

I say the petroleum division of the Bureau of Mines has justified its creation.

Why a More Efficient and Better Equipped Petroleum Division of the Bureau of Mines.

First: Because, though only meagerly equipped, it has demonstrated its great value to the oil industry itself and the public in general.

Second: Because there is no question of the invaluable results from a more extensive development of the work.

Third: Because under present conditions there are great losses in a rich resource that might be arrested to meet an insistent demand.

Fourth: Because if this is not done and conservation policies are not more extensively introduced, the supply of gasoline and other products of petroleum must inevitably become scarce and prices higher.

Fifth: Because the manufacturer is so occupied and intent upon creating a sufficient supply to meet the demand that he is unable to give time or concentrate on experimental research.

Sixth: Because if this work is left to individuals to perform, it will be unavoidably delayed, and, when finally accomplished, will be for the benefit of the few only; whereas, if done by the government, it may be done at once, at the expense of all and for the benefit at once of the entire people.

The plans of the petroleum division of the Bureau of Mines are worthy of universal approval. They are comprehensive and intelligent. Already the division has created an official lodgement of inquiries and source of investigation concerning drilling for petroleum, preparation, treatment and utilization of both petroleum and natural gas, with a view to greater economic development, more thorough conservation through prevention of waste, and a more intelligent and profitable inquiry into economic conditions affecting the industry, including equipment and supplies, scientific research and experimentation, and study of the most efficient methods of drilling for and producing oil and gas.

The division naturally segregates itself into four sections: technology of production, technology of engineering, technology of chemistry, and compilation and dissemination of statistical and industrial information.

The purpose of the production section is to devise, demonstrate and urge the adoption of improved drilling methods for the production of oil and gas, especially the production of natural gas encountered in wells drilling for oil; to study scientifically methods of excluding water from oil sands, with a view to improving present methods; to study means of dehydration of oil where oil and water have become so intimately mixed that their separation is difficult or even impossible with present knowledge; to study advanced methods of skimming or topping oil, with a view to increasing efficiency of such plants; to provide refinery efficiency engineers now so greatly needed in the industry.

This department should supervise and inspect the operation of leases on lands under the control of the Department of the Interior; co-operate with the Indian Office and other bureaus of the government as may become necessary in matters pertaining to petroleum; see that the terms of these leases are carried out so as to prevent waste or damage, and at the same time intelligently safeguard the interests of the producer while representing the interests

of the allottee, give expert advice and assistance to the operators of these leases, so that both they and the lessors may receive maximum returns; co-operate with the Navy Department in matters regarding navy fuel oil and fuel oil reserves; and in general assist any branch of the government in engineering matters relating to oil and gas, the importance of which grows more apparent with each succeeding session of the congress.

The division of engineering technology is engaging in a study of the most efficient methods of transporting and storing crude petroleum. It is inquiring into various methods of fire protection with a view to reducing fire losses. The losses of crude petroleum from lightning in new fields, where the oil is heavily impregnated with gas, have been exceptionally large, and in this direction expert investigation may prove of great importance. It is proposed in the engineering division to make special inquiry into methods of storing oil with a view to reducing evaporation losses to the minimum, to advise with licensees as to the construction and operation of Rittman process plants, and for co-operation with refiners and others in the establishment of experimental plants for the purpose of working out tests on various petroleum products produced in different parts of the country.

In the division of chemical technology experts are investigating the most modern and efficient means of refining and treating petroleum and its products. They are doing research work in cracking of oils and converting less valuable products into more valuable products thereof, including the production of gasoline from heavier distillates. In the chemical division it is also proposed to delve into the possibilities of increasing the yield of lighter and more valuable products of petroleum. In this department it will become more and more important as petroleum becomes exhausted, to investigate the possibilities of a supply of oil from shales and devise the best methods of treating them. It will also be the purpose of this division, if it is properly financed and equipped, to co-operate with refiners throughout the country in improving technologic methods and in disseminating information regarding refinery problems, and also to devise uniform methods of testing petroleum. They propose to prepare specifications for the purchase of petroleum and petroleum products, and in general to endeavor to eliminate refinery wastes, prevent improper utilization and increase the production of petroleum products most valuable to the public.

It would be difficult to estimate the benefits of work conducted on this scale by the petroleum division of the Bureau of Mines. The department is now contemplating an experimental station to be established next year somewhere in the western oil fields, which will devote attention to the treatment of oils, and its possibilities will depend very largely upon the appropriation given for its maintenance. So many possibilities open up when the chemist bursts the petroleum burr of investigation that he must have the means to carry his work to its ultimate conclusion if he would find all the kernels inside and bring the greatest possible results to the industry from its research. It is proposed to establish this station in an oil producing state which can provide a site and the greatest assistance in equipment and maintenance.

It is to be regretted that it is necessary to hamper or to limit a federal enterprise of this character and of this importance by dependence upon public assistance.

In exemplification of the foregoing, it may be said that the engineers of the petroleum division with present limited funds have investigated underground wastes of oil and gas resulting from improper operating methods and will soon impart this information for the benefit of the industry. At the present time the division is investigating the use of compressed air and water in oil recovery, which is of much importance. The properties of commercial gasoline and methods of analyzing petroleum and petroleum products and the analytical distillation of petroleum have been investigated and studies carried on of traps for separating oil and gas produced from petroleum wells. One of the engineers of the Bureau is now engaged in investigating the production of gasoline from casinghead gas. Another has already entered upon the problem of a mechanical device for controlling oil fires and methods of extinguishing such fires, as well as the prevention of the same. The navy department is vitally interested in an investigation how to determine the best designs and specifications for earthen storage reservoirs, concrete line reservoirs and steel tanks. A bibliography of petroleum and allied substances is being prepared for the year 1915, and it is hoped that a similar compilation will be made for every calendar year in the future. This work will be greatly improved if funds are provided for the gathering of statistics on the distribution of petroleum relating to refined products and an investigation of conditions affecting the supply and demand, together with the disposal of oils in times of overproduction, with a view to keeping the producer

and consumer informed as to market conditions by means of press bulletins.

I think it will be admitted the Bureau is doing a splendid work for petroleum, but it is being done in a hampered and restricted manner. There can be no doubt but if all matters pertaining to petroleum at Washington were centered under one head with adequate appropriation, far more could be accomplished—and a work too that is imperative. Larger financial assistance is absolutely necessary to extend the work to its fullest and logical possibilities. I have no doubt that oil men would be willing to contribute liberally toward the expense of such an enterprise if there were a legal way for them to do so. Since there is not, there should be no hesitancy on the part of congress.

Today if a member of congress, a producer or other interested citizen desires information concerning vital questions pertaining to petroleum, there is no place to obtain it. It is impossible to secure anything like reliable data concerning the manufacture of petroleum in the United States. There is not a bureau at Washington to which to appeal for statistics concerning petroleum after it leaves the well. The industry and the government are working very largely in the dark. It is an unjustifiable condition. It is not the fault of department officials at Washington. It is simply because Congress has strewn this work through many departments, left them short of funds and failed to appreciate the importance of the industry. Certain statistics are gathered, but they are superficial, inadequate and delayed until they become almost valueless. Besides this, there is no law to compel co-operation on the part of unthinking individuals with department officials. The petroleum statistical department of the Geological Survey ought to be united with the Bureau of Mines. The statistics ought to show the daily production of crude petroleum, amount daily consumed, quantity in storage, what products are made from certain crude oils and the amount, the varying contents of various crudes, number of refineries, ability of the industry to meet growing demand, etc. The official statement issued each June that so many barrels of crude were produced the previous year in the United States is of no importance whatever. That information was given in January by the trade journals. The government ought to have this data before the general public knows it. After that the important question to the consumer is "The Supply of Gasoline." What is the grade of crude being produced; is it richly impregnated with gasoline, or is

it an inferior quality? The crude of different fields vary and the crude of a given field may not be the same this year as last. We might have 50,000,000 barrels more crude this year than last and still be able to produce less gasoline. What about distillation processes? Are we getting more or less gasoline from crude than formerly? The more detailed information we can secure along these lines, the more intelligently the oil operator and manufacturer is going to work. This information ought to be produced disinterestedly by the government. It would be invaluable.

I wrote to Washington for information concerning the petroleum industry, and this is the reply I received:

"Your inquiry relating to the total investment of capital in the petroleum industry, including producing properties, refining plants, pipe lines, tank cars and storage tanks, and to the total payroll per annum of the petroleum industry, has been referred to the Bureau of the Census and the Federal Trade Commission, as no first-hand information on these subjects is available in this department.

"Your inquiry concerning number and character of products made from petroleum and the quantities of each product made in the United States in 1915, has been referred to the Bureau of Mines and the Federal Trade Commission.

"The portion of your request relating to the miles of pipe line in the United States has been referred to the Interstate Commerce Commission. Information concerning the pipe lines in California is available in Bulletin 69 of the California State Mining Bureau, San Francisco, which includes interesting data on the unit cost of pipe line construction."

And to this date I am no wiser on these points than I was.

Similar comments were made with reference to other data requested. I am not criticising the bureau from which this letter came. It is doing the best it can under the circumstances. I am making an argument, not a criticism.

Foreigners coming to this country are amazed at our lax ways. In Russia, which is America's greatest petroleum competitor, the oil operator must report to the governor of the province when he moves a rig on the ground to drill a well, giving full description of location; within ten days after the completion of the well, he must file a log of the well; and every month thereafter he must report the gross production of each individual well. The government issues two reports:

First: A monthly statement of the gross production of each district.

Second: A quarterly analytical field report which contains, in addition to production information, the individual history of all wells.

What would be the result of completed statistical records of petroleum in all its branches in this country?

Markets established by legitimate economic conditions, not by a few men of large capital.

An elimination of expensive, distracting, incriminating and ineffective investigations.

Steady and dependable quotations, reliable information upon which to base future calculations.

An intelligent, constructive and prosperous industry, with minimization of loss and waste.

Publicity has a marked quieting and stabilizing effect upon business. The Standard Oil Co., recognizing this, issues regular bulletins of information, whereas formerly it was as secretive as the proverbial clam. I would call to your attention that during the agitation over advancing gasoline prices, the Secretary of the Interior called upon the Director of the Bureau of Mines for a report of petroleum conditions. Within a few days a statement was issued which was at once recognized as conservative, comprehensive and reliable, and immediately it had effect. Not a single statement in that report has ever been questioned. Subsequently an extensive and expensive investigation was held, no report of which has yet been made. I submit that comprehensive and reliable reports on petroleum, just as we have concerning wheat, corn, copper, zinc, etc., would prove invaluable.

California has caught the idea. That state has a law requiring producers to report every new well drilled and every old well deepened, its complete log, its initial flow, etc. Monthly reports must be filed with the State Mining Bureau at Sacramento, showing wells drilled, total gross production, shut in production, amount stored in tanks, runs, etc.

There is a growing sentiment for federal supervision of inspection, now carried on loosely but expensively by states. Most refining business is of an interstate character and should be under federal authority. Conflicting state laws touching interstate business retard industrial progress, are uneconomical and fail largely

of their purpose. The expense of state inspections would abundantly finance a fully equipped petroleum division of the Bureau of Mines of inestimable value to all concerned. It is difficult to understand why anything so patent is permitted to go indefinitely unembraced.

The field of usefulness for the petroleum division of the Bureau of Mines is limitless. The possibilities of petroleum re-fractionation are so vast that no one would dare venture a prophecy. There can be no question of the need of a competent corps of research chemists, engineers and geologists, provided with adequate means and apparatus for carrying on the work.

I am not an advocate of government rules and regulations to control the oil business. I do not believe in government-made prices of manufactured articles. I am opposed to Federal meddling with industrials. What I do want is to protect and safeguard business with just laws, sufficient encouragement to develop our great national resources and enough restriction to bring to the ultimate consumer all that is due him. To this end I would give expert assistance to business involving the scientific secrets of national resources. Then I would "Federalize" all interstate matters pertaining to the industry. I would ask that the Director of the Bureau of Mines, familiar with oil country usages and conditions, or the Federal Trade Commission, if that be more desirable, be authorized to approve or disapprove plans on business action prior to their execution and that so long as the holder of such permit complied with its provisions, he should not, for the sake of politics or through prejudice, be subjected to hostile litigation; that before any action for violation of the provisions of the permit could be possible, a thirty days' notice to desist should be given, and failure to comply with such notice would render the holder subject to prosecution. There should be some tribunal for business advice and direction, removing the disturbing and often vicious attacks upon honest business. What the oil industry needs is the co-operation of the government in placing it on a strict business basis with like obligations and treatment in all branches, with wholesome, constructive, progressive policies governing. We can afford in these United States to assume just as encouraging an attitude toward business interests as do foreign nations toward their business enterprises, and when we assume anything but a just attitude, we not only do industry an injustice, but in a reflectory way we do a

greater harm to the consuming public for in the final settlement of all business matters the consumer pays the bill.

Today business is harassed by its inability to secure prompt correction of wrongs. There should be no wrong without a prompt remedy, and there should be, in my humble opinion, some tribunal to which even the popularly despised master of industry could go with his grievances with full assurance that he would have an unprejudiced hearing with immediate results.

In view of what has been set forth herein, am I not justified in declaring that the Bureau of Mines has vindicated its creation and placed upon Congress an obligation to foster its ambition to reach out into greater fields of usefulness, which every man familiar with it admits are boundless; and may I not be pardoned in forcibly asserting that the congress has apparently shut its eyes to the splendid work this department has been rendering or else it would not be necessary to plead for financial assistance which ought to come after such performance without pleading. Surely we must admit millions are appropriated for less meritorious causes.

OIL FLOTATION.

By Henricus J. Stander, Chicago, Ill.

At the last meeting of the American Institute of Mining Engineers held in Arizona, quite a good deal of discussion took place with reference to certain of the flotation phenomena. From the accounts I have read, it appears as if certain extremely valuable points were brought out by those who took part in the discussion. I shall not here attempt to comment on or criticize any of the statements made at that meeting, as I trust to be able in the near future to give the mining fraternity some definite empirical as well as practical data on certain of the questions raised on that occasion.

Before proceeding on any definite theme, I want to call your esteemed attention to an article by Mr. Will H. Coghill, in the September 2nd issue of the Mining & Scientific Press of this year. He writes: "So far as I can learn, not more than two of the great number of recent contributors of articles on flotation have had an opportunity for a deliberate study of the related sciences. The rest of us have a job to look after and are busy enough attending to it. Advancement is, therefore, slow. The papers of O. C. Ralston and E. E. Free are, of course, excellent." I believe Mr. Coghill is quite correct in what he says, but the point I wish to emphasize, judging from an experience in which I came in contact with not only most of the practical flotation men in this country and Canada, but also with most of the scientific investigators of flotation, is that the practical man in charge of the flotation machines plays a far more important part in the actual development of the process than we give him credit for. To give you an illustration: In a 1,000-ton per day flotation plant, in which a special flotation expert was employed, who had the very best cooperation of his assistant and of the chief assayer, I found, after spending seven days in their laboratories and plant, that the man who could give me the best information, without any doubt in his mind as to what his answers implied, was the flotation man on the morning shift. He knew exactly what to expect under any given condition. His knowledge came, of course, only from experience. It is the help of such men that the scientific investigator needs more than anything else. I myself have put a year on flotation in a

laboratory, and have carried on numerous physical and chemical experiments in relation to this subject. Yet I must admit, after having come in touch with numerous of these practical men, and having taken note of what they had to say, and giving them full credit for their practical views gained perhaps by hard experience, that many points seem far clearer to me now than when I was trying to solve it all in the laboratory.

I am not trying to discourage any type of investigation in the flotation field, for we need as much as we can get and especially at this time, but I am trying to show that the scientific investigator can gain a whole lot, in all cases, when he keeps in close touch with the practical flotation man and his views. Simply because a man cannot talk to you in terms of particles, occluded gas, electrical theory, surface tension, oil film, etc., is no reason in the world why you should not give him full credit for what he knows, for in most cases he knows his subject from a *practical* viewpoint better than you. It is only through a co-operation of all parties concerned that we can ever expect to reach a final and perfectly satisfactory solution of the problem.

Those of you familiar with the flotation process will agree with me, I believe, that this subject has been credited with an *undue* amount of phenomenal and unexplainable obstacles. That those principles upon which the very existence of the process depends are not to be explained by any *one* law is perfectly clear to most of us. Yet the number of flotation pessimists form too large a group; for upon a careful step-by-step analysis of the actual facts in the case, it does not seem as if we are so very far beyond our depths when trying to formulate the causes, *not cause*, of flotation.

In this brief talk, it is impossible to touch on all the points, but I should like to direct your attention to some of the very essential ones.

One of the first things that draws our attention is the fact that sulphides are peculiarly suited for flotation treatments. What is it about the sulphide that makes it so different from the silica? Applying a process of elimination, we find that gravity cannot enter into this discussion. What else do we know about the sulphide and silica bodies, respectively? We know that a silica particle absorbs water much more readily than does the sulphide. This is due partly to the property of porosity as manifested by these two respectively. The sulphide seems to constitute a much more compact and solid body. The very fact that the silica gets wet or

absorbs the water so readily explains why it should break the water film and become literally "soaked" with water. The sulphide, on the other hand, behaves differently, and even when in suspension in the water, it appears to have more of a film of water around itself than having, like the silica, the liquid throughout its entire system. This may seem fairly theoretical, but we cannot, of course, conceive of so small a particle of either silica or sulphide, but that it is made up of an extremely large number of molecules of either SiO_2 or, say, PbS , respectively. The particle of silica that passes through 200 mesh is far from presenting as compact a body or system as is the particle of sulphide crushed to the same mesh. This to me is one of the very important factors in the flotation process. Going back to the old surface tension flotation process, we find that the separation depended on the fact that the silica, as soon as it strikes the water film, sinks into the liquid, whereas the sulphide particle does not. Now why should the silica particle sink? First of all, it is necessary for the silica to pierce the surface of the water. Although much attention has been paid here to the so-called "Angle of Contact," I believe the fact that the silica absorbs water so readily, plays the main role here.

The porosity of the silica particle, its exterior outline (embodying its so-called angle of contact), its lack of presenting a solid, compact body, will all help it in breaking the surface film of the water, and furthermore allow the liquid to enter its very pores. And this, as you saw, is not the case with the sulphides.

I am not going to bother you here with the duty of oil or acid in this process, for we have been shown that a truly flotation separation can be effected without the use of either or both of these. The oil and acid both will have their respective effects on the surface tension of the liquid and on the materials in the liquid, but in this case foreign substances are employed to get as near as possible perfect conditions. So the discussion of these and their functions is at present outside of my subject, as I am trying to analyze the actual essentials in the so-called flotation phenomenon. To see what these essentials are, it appears as if it is only necessary for us to study the case where this strange process actually takes place in virtue of the properties of the substances in the ore and the water employed. Such is the case in the purely surface tension process. To show you that oil, acid or chemicals are what we can call accessories, and very *important* accessories indeed, when we are trying to perfect the process, I need only remind you of the present

Wood flotation machines and others of the same nature. I had the opportunity to watch the machines of Mr. Henry E. Wood in operation in his testing laboratory at Denver. With regard to this machine, I can say that I believe that Mr. Wood has succeeded, perhaps better than anyone else, in making a machine in which the sulphides get an almost perfect chance to stay on the surface and sink into the water; but the biggest thing for the inventor to overcome in this particular process is to make his machine such that the sulphides get as small a chance as possible to become wet.

In the agitation process (mechanical or pneumatic) the sulphides are already in the liquid, when they enter the flotation machines, and in this case the inventor tries to make a machine, with perhaps the use of outside help, by employing oil, acid or some foreign substance, in which the sulphide will again get a chance to come on the outside of a water surface, although this water surface may take the shape of an enclosing wall around an air-bubble in the liquid, either beaten in by mechanical agitation or passed in by means of what we call pneumatic agitation. The use of oil in this case may help to strengthen these numerous spherical water surfaces around the gas bubbles, or may enable the sulphides better to withstand the tendency of the water to wet them. The silica particles are drenched with the liquid, and so the oil may have a rather slight effect on them; yet I believe the effect of the oil on these numerous water surfaces (or what I called in an article "water-air interfaces") is far more important in the process than its effect on the silica and sulphide as individual particles.

Whatever methods we may be using or whatever improvements in the process we may employ, they all seem to tend to accomplish *one* thing, viz., to give the sulphide particle the best chance possible to *rest on* a water-surface, whatever slope this surface may take. We create such surfaces by agitation, mechanical or pneumatic by the production of gas in the liquid through the action of an acid on some material in the ore, such as carbonates, or by freeing dissolved gas through a decrease in pressure (vacuum action). In some cases we use only the exposed water-surface, in which case it is necessary to pay supreme attention to the way in which the ore particles enter on to the water surface. But in all cases, the sulphide must be given a good chance to assert its property of floating on a water-air or water-gas surface.

That the principles of many of the advanced theories play a part and help in the procuring of this desired condition, I firmly

believe. I do not, however, believe that any one principle, such as "occluded gas" explains the existence of the process. Different means may be used to attain the same end, and consequently different factors will enter into these different means employed; yet to understand why flotation takes place, it is necessary for us to lay bare only those *very* essential things necessary to produce a flotation action. This we find in the very simple surface-tension process. Coming down as far as this, we are then confronted with the question, "Why does the sulphide float on the water surface?" And I repeat that to me the following properties of the sulphide partly explain its behavior:

1. Its slight degree of porosity, or its obstinacy to let water enter its system.

2. The compactness of the molecules comprising the sulphide particle as compared with that of the SiO_2 molecules. And this would, of course, favor the above mentioned obstinacy.

3. The exterior form, shape or outline of the finely crushed sulphide particle being such as not to be near so liable to pierce a water-gas film as is the silica particle.

I must again repeat that the very fact that the silica seems so eager to get wet, in other words, absorbs water so very readily in its pores, contrary to the behavior of the sulphides, that this property is of utmost importance in the flotation process.

Some of you may be eager to ask: "But why is it that some sulphides are more flotative than other sulphides, since, according to this, they would then all come under one class?" Well, it is only necessary for us to recollect that the molecules of one sulphide, say, galena, will not be exactly as compact in comprising the particle of galena, as are, say, the molecules of MoS_2 in the particle of molybdenite. The sulphides will fall in the same group as far as their porosity, compactness of molecules and exterior surfaces are concerned, but the slight variations in these properties as manifested by the different sulphides, would warrant different degrees of amenability to the flotation process for the different sulphides.

The behavior of the different sulphides as far as these properties are concerned would also make it necessary that a definite sulphide ore should be crushed to a definite degree in order to obtain the best results in flotation.

I believe you have heard enough on the theoretical end of the subject, and it may interest some of you to hear about a few of the most interesting things I saw in visiting the flotation plants in North

America. Perhaps some of you do not as yet know that a 1,000-ton flotation plant is in operation in Alaska. Should you care to read an account on Alaska flotation, I refer you to the Alaska-Flotation article that appeared in the November 11th issue of the Mining World.

Perhaps the most interesting case I saw was up in the Cobalt district, Ontario, Canada. Most of the companies are treating their old tailing dumps. The concentrate may run as high as from 250 to 300 ounces in silver. The concentrate will also carry approximately

2.% copper,
0.5 to 1.0% nickel,
2.0 to 2.5% cobalt,
9.0 to 10% arsenic,
17 to 18% iron.

Most of these companies never knew that their ore contained any traces of copper, but when flotation was started to make a 300-oz. silver concentrate from a 10-oz. tailings, many were surprised to find copper appear in the concentrate. The concentrate is, of course, sold only for the silver values, as, according to the composition of the concentrate, the other metals are of no value in such a combination. Perhaps it may be made clearer by directing your attention to the Mond Nickel Co.'s problem. I warn you all not to ask me any detailed questions with regard to the nature of the ore and the troubles encountered in the flotation experiments, as it is not the policy of this and most of the other companies up there to allow detailed results to be given out. Yet I may state what their problem is. The object is to bring about a separation of nickel from the other metals, particularly the copper. Should any flotation investigator, whether a University research man or an employee of the state or government, ask me to express my views on the best and most interesting topic to work upon, I would immediately suggest the study and attempt to solve this problem: The separation, by flotation, of nickel from an ore carrying the sulphides of nickel, copper and iron. The problem would of course resolve itself into a preferential process. Preliminary roastings, the use of a chemical and the effect of oils, acid and alkali would all be points that would come under this work. The solution of this particular problem, and similar preferential-flotation ones, would be far more valuable than most of the theoretical problems that some of the investigators are now trying to solve.

ORGANIZED CAPITAL AND ORGANIZED LABOR AND THEIR RELATION TO SAFETY, EFFICIENCY AND CONSERVATION IN THE MINING INDUSTRY.

Col. George Pope, Hartford, Conn.

Gentlemen of the American Mining Congress: I esteem it a pleasure and privilege to convey to this assembly, on behalf of the directors and members of the National Association of Manufacturers, expressions of our friendly interest and regard. Permit me also to acknowledge the honor I feel in being invited, as the representative of the National Association of Manufacturers, to address your interesting, important and useful gathering. Let me briefly state that the National Association of Manufacturers is an organization made up of miscellaneous American manufacturing industries. We know that nearly all industry is organized, not only geographically through local, state or national associations, but also by groups of the same kind of industries. Our association, both in its geographical character—for we have members in practically all states of the Union—and in the varied, miscellaneous character of the manufacturers who constitute its members, is in many respects a unique, commercial body. Our scope of operation is along national lines. We co-operate cordially with local and state organizations and with other commercial associations throughout the Union; for we recognize the distinct and important functions which such organizations, from the nature of their objects and purposes, are called upon to perform. So that I am not overstating a description of the structure and purpose of the National Association of Manufacturers when I say that it is typical, representative and national. It attempts to reflect helpful industrial opinion, not for the exclusive benefit of employers and employees, but for industrial development in its largest and noblest sense. We proclaim and we believe in patriotic, nationalized American industry.

The character of industry reflected by our membership shows that the interests of the miner and the manufacturer are closely interwoven. As soon as the miner changes the form of the product dug from the earth, he becomes a manufacturer. Each is dependent upon the other. Deep in the pockets of the earth, the miner starts the elaborate process of manufacture. Coal, iron,

copper, petroleum—all these subterraneous products are the basic necessities for productive manufacture. On the other hand, the miner could not conduct his operations without the furnaces, mills and factories of the manufacturer. Among the members of the National Association of Manufacturers are representatives of every manufacturing industry of the country. Forty-one of our members make some kind or class of mining machinery, and if we counted those who make other supplies for miners, such as pipes, timber and metal supports, drills, hammers and special machine tools, the list would be much greater.

So that there is a very close commercial kinship between the general manufacture and general mining industry. You know better than I do how remarkable has been the increase in the production of the metals and useful minerals the world over. Nowhere, I am told, has this advance been more pronounced than in the United States, which is the foremost of mining nations, leading in the production of iron, steel, copper, gold, silver, coal, salt and petroleum.

It is at once clear to all students of industrial and social conditions that we are living in a highly organized period of development. All phases and departments of modern business are efficient and successful in direct ratio to the perfection of their organization. We need not dwell upon this obvious fact, except to wonder at our organizing genius. Labor is organized upon a peculiarly effective scheme for associated action. Associations for the improvement of safety devices; for health, hygiene, the economical administration of industrial enterprise; mining, transportation, farming—in short, our network of industries of every kind and description illustrate the successful application of the spirit of organization.

But out of these highly specialized and organized systems a new principle engages and commands our earnest attention, a principle which heretofore has not been either recognized or applied to any great extent, but a principle which is even more important if we are to compete with the other nations of the world. It is needless to say that I refer to both the spirit and the principle of co-operation. I think we will all agree that co-operation is both desirable and necessary. I cannot conceive of anybody opposing co-operation. But the serious and difficult problem consists in interpreting what we mean by co-operation, and applying the mean-

ing to the concrete conditions and problems confronting all phases of our industrial development.

Inefficiency, poor wages, poor living conditions, lawlessness, strike disorders and industrial discord, are the proof of either the failure or the absence of intelligent and scientific co-operation. When we stop and analyze, without passion or prejudice, we know full well that these disorders and complications in our industrial commonwealth prove that *some thing* is wrong, rather than that some *person* is wrong. I have lived long enough to believe that causes rather than individuals explain the faulty adjustments of social order. Never in the history of our country has there been such imperative necessity for scrutinizing the forces which are at work in our body politic and industrial than at the present time. Heretofore businessmen have been to a large extent responsible, through inaction, for the vagaries of dangerous legislative tendencies. To put it plainly, the average businessman has been too exclusively concerned in the manufacture and sale of his particular product or in the extension of his own affairs. He has been too willing to banish from his mind the obligation which he and his industry bear to the common good. He has been reluctant or negligent in the performance of the maximum duties of citizenship. You know, and I know, that many men's conception of citizenship consists in registration and in voting. When these duties have been performed we often feel that we have discharged every obligation imposed upon us as citizens. As a matter of fact, we know in our deeper consciousness that however important the act of voting may be, it consumes on the average of one hour per year. The truth is, American businessmen have been deficient in appreciating, realizing or performing the many exacting and difficult functions of citizenship. We have been too busy. We have been too much engaged in our particular business or enterprise. We have not watched the processes of change which are taking place, nor have we studied deeply enough the agencies and methods by which industrial forces are advancing. We have been too inclined to delegate public duties.

Co-operation is the shibboleth of citizenship. In social disorders, in industrial strikes and disordered conditions, responsibility can always be fixed. The human quality compels us to pass the responsibility to someone else other than ourselves. Show me a town or city in our country where there is a healthy and friendly relationship existing between the industries and their men, where

there are clean streets and fine public schools, and where there is a pride of locality, and you will find in such places the co-operative spirit in full play. Efficiency and conservation, better wages and better living conditions are merely the dividends of practical co-operative effort. I do not like the word "class" as applied to American industrial or social life. I dislike the use of the words "working class" or "employers' class." Such words intensify class consciousness and suggest a hostile attitude of mind. The antithesis of class consciousness is co-operation, by which we mean all working together for the benefit of all.

To bring about a higher plane of co-operation requires not only a proper attitude of mind but a considerable degree of personal disinterestedness. Co-operation is corrective as well as constructive, and, above all, co-operation is education, expressed in terms of the average man's conscience.

The National Association of Manufacturers has been deeply interested in a campaign carried on to promote industrial conservation. This propaganda is absolutely non-political, non-sectional and non-partisan. It is an attempt to bring to the attention of employer and employee, merchant, banker, clerk, and all persons constituting community life, the necessity of more cordial relations between each other, of greater local pride in their industrial and civic development, and a unity of purpose which spells lawful, legitimate and sound prosperity. Conservation does not mean reactionaryism. It does not mean going back to old forms, conditions or circumstances. By industrial conservation we mean not only the preservation of what we have, but its development by the united impulses of all engaged in industry, regardless of political creed, religious faith, racial distinctions, or anything else. This campaign for the promotion of industrial conservation has been conducted thus far throughout the New England States. Over thirty meetings have been held. The local employer and employee the bankers, storekeepers, merchants and newspaper editors have joined enthusiastically in their reception of the idea underlying this movement. It is brought to their attention how closely correlated the network of business and industry is. If there was a full performance of civic duties on the part of everyone in a community, lawlessness, strikes, poor living conditions, would gradually become minimized to almost a vanishing point. You can no more separate an industry from its locality than you can the workers from their own factory.

In the topic which has been assigned to me by your secretary, he includes the topic of industrial freedom. How can the individual, under highly organized, highly specialized systems, work out his own individual, personal destiny? That, indeed, is one of the solemn problems of a democracy. What must be the feeling of the individual who is one of fifty to a hundred thousand co-workers in one large industrial plant? What must be the thoughts of the individual miner, when he realizes his sense of detachment in the vast organization of which he is but a humble member? How about his feelings of democracy and his rights, as he views them from his standpoint? Are his sentiments of personal liberty as real as the manager or president of the concern for which he works? When disorders, strikes and strife occur, what must be his sentiments, feelings and thoughts? In this problem we have one of the most profound questions possible in any industrial society. I do not attempt to offer a solution of such complex questions; but I will say that I do not think this problem can be solved either by legislation, dictation or despotism, either benevolent or malevolent. I undertake to affirm that organization and co-operation are not intended so much to help one another as to make each man appreciate his personal, individual sense of duty. This is not Sunday-school or high-brow talk, nor a flabby, ethical point of view. I grow weary of legislative tactics. I am but faintly convinced that you can prescribe a man's duty to his fellowman or to his business or to his country, by statute. You cannot make a man patriotic by giving him naturalization papers. A man is not necessarily a good citizen because he is a successful businessman. Many of the wild claims of social legislation of foreign paternity, of questionable economic value and of dubious application in our industrial life, have arisen from a frenzied impulse to enact law. Laws have their legitimate function. Laws are necessary; but, excessive legislation, absurd statutes, inoperative legislation, is a sure indictment of the people themselves who permit such results.

My belief in the fulfillment of the industrial destiny of America is calm and undisturbed. But we must constantly build for the future. Some of us are often inclined to assign one single cause for industrial mal-adjustments and to particularize one single solution for the exclusive remedy. I do not believe in such homeopathic methods. Our population is over one hundred millions of persons. Our industrial, agricultural, transportation and mining investments are incredibly vast, and the number of workers in

this gigantic commonwealth of enterprise is over 30,000,000 human beings. A self-controlled, democratic form of government is the basis and bulwark for the safe conduct of these mighty forces. To keep these forces well ordered, to maintain a steady equilibrium of progressive and humane action, to preserve our liberties of thought and action, to develop the highest types of citizenship, to build for our descendants so that their heritage may be secure and safe—these are the big and vital questions that go to the very quick of industrial society in America.

Better living conditions, lawlessness, strike disorders, better wages—these are the mere surface indications and the ebb and flow of the tremendous problems awaiting our combined genius, intelligence and patriotism for wise, just and permanent solution. We must co-ordinate our resources, our duties and our responsibilities. You in the mining world have your own inherent problems to face and solve. We in manufacture have our distinctive issues. But there must be bonds of sympathetic and co-operative action. We must address ourselves to the broad survey of our industry as a whole. We must assemble our parts into a united and harmonious industrial government.

Co-operation, therefore, is the goal we should strive to reach. Not merely co-operation among the members of an individual industry, but among all industrial and commercial organizations, for in the last analysis their interests are mutual. These interests are not merely for the benefiting of immediate interests of the employers, but extend to the interest of the employees, for each is dependent upon the other for efficiency, better wages, better living conditions and industrial freedom, and these conditions being obtained we have, I believe, the best protection against strikes and lawlessness.

Co-operation between employers and employees must exist to promote the conditions industrially which we all desire, not in a paternal attitude but in the establishing of a spirit of confidence that the material welfare of employees is truly the object and care of the employer. This is not an altruistic thought, for in individual cases it has been proved practical and successful.

There are many industrial and commercial organizations, local, state and national, but in a large majority these organizations are composed of members of an individual industry. They are capable of and do accomplish a great deal, but could accomplish still greater good if individual members more generally would merge their single

interests into the interests of the whole, realizing that which benefits the community, also benefits the individual. It is the community which we wish to be successful and contented, and that means the individual as well. Unfortunately, there are too many employers whose apathy and neglect and even antagonistic attitude towards movements and industry now demanded by the enlightened spirit of the times seriously retard progressive work.

But this co-operative effort must be carried still further to accomplish the successful results desired. As I have already stated, there are a large number of national associations of employers, each one acting independently of the other, no co-operative effort having been heretofore successfully made to utilize as a unit the work of all. As a result of a series of conferences during the last eighteen months of a body of gentlemen without organization but representing, finance, industry, and commerce, an organization known as the National Industrial Conference Board has been organized. The membership is composed of national associations of employers. Each organization being represented on the conference board by two of its members. Twelve of these national organizations are already members of the Board and the membership will be extended to others. Its object is to provide a clearing house for information, a forum for constructive discussion and machinery for co-operative action on matters that vitally affect the industrial developments of the country.

To stimulate the keen interest and active assistance of employers toward constructive study and equitable solution of industrial problems.

To foster the maintenance of harmonious relationship between employer and employees and between both and the government.

To assist in the formulation and enactment of sound and constructive legislation to oppose the passage of unsound and unfair laws and to urge the amendment or repeal of impracticable and unjust statutes. To secure the proper co-operation between the government and industry. To create a general realization of the national benefits of industrial prosperity to employer, employee and consumer and a better understanding of industrial questions and their relationship to the public welfare.

To carry on this work the Conference Board proposes to establish a fund of \$100,000 a year for three years. Subscriptions to this fund by organizations, corporations and individuals so nearly aggregate the amount desired that its success seems to be assured.

In his recent article in the "Atlantic Monthly," Mr. John D. Rockefeller, Jr., describes, with great candor, his idea of the partnership of labor and capital, evolved from the so-called Industrial Constitution which formed the basis of a working arrangement between the Colorado Fuel & Iron Company and its employees. I do not attempt to go into the merits of the industrial plan to which he refers, but there is one striking paragraph in his article with which I most cordially agree and to which I call your particular attention. He says:

"Because evils have developed and may develop as a result of these increasing complexities in industrial conditions, shall we deny ourselves the maximum benefit which may be derived from using the new devices of progress? We cannot give up the corporation and industry on a large scale; no more can we give up the organization of labor; human progress depends too much upon them. Surely there must be some avenue of approach to the solution of a problem on the ultimate working out of which depends the very existence of industrial society. To say that there is no way out except through constant warfare between labor and capital is an unthinkable counsel of despair; to say that progress lies in eventual surrender of everything by one factor or the other, is contrary, not only to the teachings of economic history, but also to our knowledge of human nature."

It seems to me that Mr. Rockefeller has well summarized the essence of the spirit of industrial progress when he says, in the quotation I have just made:

"Shall we deny ourselves the maximum benefit which may be derived from using the *new devices of progress*?"

This epitomizes the thought I would leave with you today, namely, let us study, apply and utilize the new devices of progress; for by this is clearly meant the application of our minds toward intelligent, scientific and tolerant agencies whereby industrial society may become bettered, more humane and more enlightened.

DYES AND EXPLOSIVES FROM COAL AND PETROLEUM.

Dr. Walter F. Rittman, Pittsburgh, Pa.

Mr. Chairman and Gentlemen: The annual consumption of dyes in America is, approximately, 75,000 tons. In terms of submarine cargoes, this would mean—allowing one thousand tons per submarine—about seventy-five submarine cargoes per annum. Of this total amount 90 per cent is made up of two colors. We usually do not realize that fact. Sixty per cent of all the colors used in this country are black, 30 per cent blue, and the numerous other colors make up the remaining 10 per cent.

We hear various opinions and estimates regarding the importance of the dye industry. Some believe that the very foundations of our country depend upon it. Others, again, believe that in terms of dollars and cents it is no more important than Woolworth's candy item. True, it doesn't amount to more than that, but it is wrong to consider it in that light.

The importance of the dye industry is more in its relation to other industries, such as the leather, textile and, more particularly, the explosives industry. The world has learned the military significance of Germany's wonderful dye industry.

It is very natural that these two industries should be parallel, because they use identically the same materials to start with, and the processes of manufacture are practically the same up to the very end.

Therefore, we have the close relation between these two industries: first, because they use the same materials; second, because they are manufactured by much the same processes. The same equipment that makes the dye materials, makes the explosives, and it is a matter of a week or two to convert a plant from one into the other.

It is said that modern warfare is a problem of chemistry and physics. Explosives in the old country are being shot off at the rate of several thousand tons a day. At the battle of Ypres, which was early in the war, there was consumed more explosives than was used in the whole Boer war. If, therefore, the progress in the use of explosives continues to be as rapid as in the past fifteen years, it is hard to comprehend the quantities or volume that will be necessary in our next war. And therefore it is of primary

importance to recognize whether or not we can supply ourselves with the raw materials for handling these situations.

The interest displayed by foreign governments, and I have been in touch with a number of them, in dyes and explosives produced from petroleum is considerable. In a country like Argentine, for example, there is no coal; therefore there is no benzol from coal, and oil must be used for its production. Argentine has a commission in America today. The government of Japan, likewise, is tremendously interested in the petroleum dye industry for much the same reason.

The little republic of Cuba is interested in developing a dye industry from its own petroleum, and they are just finding petroleum down there. This shows the close relations between these two materials, and how in certain parts of the world oil furnishes the only way out.

That is not true in the United States. It is possible to make benzol and toluol from the by-product coke ovens for from three to seven cents, and it is impossible to make benzol and toluol from petroleum for less than fifty cents. Therefore, the two methods of manufacture are not on a competitive basis, except under conditions such as have maintained the last two or three years.

The steps in making either dyestuffs or explosives are not so intricate as one would expect. I will make a statement which is not at all mine—i. e., that all of our dyestuffs and practically all of our explosives, excepting nitro-cellulose, are made from less than six materials, six basic compounds: as benzene, toluene, naphthalene and anthracene. Practically all the patents under which dyes are manufactured have expired.

Therefore, in considering the problem of dyes and explosives, we come back to the materials from which they are produced, i. e., the hydrocarbons.

One problem involves the other, and it is a consideration of the hydrocarbons that I wish to dwell upon in this Oil and Gas Section.

The old idea of separating oil problems from gas problems is wrong. It is just as wrong as the old organic chemistry that made part one, aliphatic hydrocarbon, part two, aromatic hydrocarbons. Modern chemistry merges one into the other, and in the same way modern chemistry and science recognize the absolutely close relation between coal, peat, shale, oil, gas and whatever other hydrocarbon materials one considers. It is possible to make the same

things from coal that we make from oil, that we make from peat, from lignite or from gas, a common basis of material. They are not always made in identically the same way. Instead of dividing our many initial substances, we must divide our products, and there again we find a close relationship.

A few years ago a statement that benzene and hexane are close cousins would have been fatal to one's scientific standing. Today you can make it with impunity; in fact, you are supposed to know it.

The point I wish to bring out in my talk today, and I will have only one point to make, is this, that there is a common type of initial substances disregarding whether they are solids, liquids, or gas, because all substances are so closely related.

Coal does not contain benzene or toluene. The benzene and the toluene from coal is made by high temperature distillation. It is the result of the temperature that prevails in the retort. That was found out to the sorrow of a lot of people who took large orders for benzene and toluene at the beginning of the war and then used low temperature distillation processes. Of course, there was no benzene or toluene formed. In the same way, if we subject oil to the temperature that maintains in the by-products coke oven we get benzene just as surely as we get it from the coke oven.

Again, another evidence of this close relationship is indicated in the various commercial phases of the hydrocarbon industry, such as the artificial gas industry, the liquid fuel industry, the solid fuel industry. I want to show by example how we can never consider one of these without at the same time considering the others.

Two-thirds to three-quarters of the gas used in this country today is carburetted water gas. In that process from three to six gallons of gas oil are used per thousand cubic feet of gas produced. We used to pay two and a half cents for gas oil. The price has since gone from two and a half to three, to four, to five, to six and it hasn't stopped. Why? Because a fellow had an idea of making gasoline out of that gas oil, with result that the gas industry today is in straits for its oil supply. This shows the relation between the gas and oil industry. The gas man today is thriving because of the high price of his by-products. The gas situation must change. It will change. But what will it be? The carburetted water gas man will find some way of using any kind of oil in his machine. That is one way out for him to use his present equipment.

Another very pronounced tendency in the gas industry today is the by-products coke oven. It is increasing at a tremendous rate. We last year produced in this country something like 13,000,000 gallons of light oil. This year we will produce twice that much. Of a hundred thousand tons of coal coked, less than half of it was coked in by-product ovens. Within another year three-fourths of it, and the time will come when coal burnt in the kitchen stove will be coked in some way or other, making smokeless fuel. That means two things, gentlemen: it means a clean America, and it means an economical America, because we are now throwing out of the stack the most valuable constituents.

The objection to the by-products coke oven of today is that it is not rich enough. The answer is to make a rich gas and bolster it up. I think these various vertical retorts and other retorts connected with the coal gas distillation are of very great importance. My point here is to show how the gas man has been stimulated to new procedures and methods through the gasoline consumption, showing the relation between the two.

Now, let us proceed to the liquid fuel. First of all, we run into the internal combustion engine, the chief user of which is the automobile. We have in this country today three and a quarter million machines. Ford alone is turning out 2,200 a day. His output together with the others constitutes between seven and eight thousand every time the sun rises. That means that from July 1, 1916, to July 1, 1917, there will have been produced in this country over two million automobiles. The life of the average automobile is five years. Speaking of Ford, I recall a rather interesting thing. I have just come back from Cuba. The word "automobile" is not universally used in their language, that is, in the interior parts, but the word "Ford" is. And you will hear some people speak of a Studebaker Ford or a Maxwell Ford.

Yesterday we heard a lot of talk about fuel for the navy. I am not alarmed over that problem, because I believe in the ingenuity and in the progress of the American to solve it, just as he has solved the gasoline problem which was ten times more formidable than the present fuel demands of the navy. Where are we going to get this fuel? We will get it first from oil, and when our natural oil has run out we will start in with the shales. And in the meantime we will distill all of the coal and we will make it from that.

We are using in this country per annum, roughly, 500,000,000 tons of coal. It is possible to get from that coal 10 gallons of oil per ton, which means 5,000,000,000 gallons of oil right there. The theory of today is the practice of tomorrow. The luxury of today is the necessity of tomorrow. That is our theory of working in these developments.

Now, the solid fuel: There has been a gradual change in it. You would be astonished to learn how coke is replacing hard coal in America. And it is right that it should. An investigation is being made by the Bureau of Mines right in this city of Chicago, and the consumption of coke in place of hard coal is tremendous. What does that mean? It means that if we start in that way we shall become a more economical country. Chicago is not the smoky city it is commonly supposed to be, because several years ago everybody got busy on the smoke problem. It has resulted in two things in Pittsburgh: a cleaner city and a more efficient city. I speak of these things from an economical point of view, because when a thing pays people will do it; when it doesn't pay they won't do it.

Today in this very hotel there is a man talking about making coke from Illinois coal at two and a half dollars a ton. A couple of years ago that would have been absurd. Today it is practical. What does that mean, gentlemen? It means that all this bunk, if you please, about coking coal and non-coking coal, and so forth, is not true, but it is a result of our lack of understanding the problem. Several of us made coking coal from non-coking coal by adding heavy hydrocarbon constituents, and we hope to know what those constituents are. Having that information, the question arises: where can we get more of them? If we get more of them we can add them to those materials where they are lacking. The test was to simply harmonize this heavy material, and it coked. That may be commercially correct; it may be wrong.

Now, then, coming back to the subject in hand, the source of materials for making dyes, which automatically carries with it drugs and explosives and chemical solvents such as are used in the rubber industry and leather industry, it is very gratifying for me to tell you that America is making splendid progress in her manufacture of dyes. In another two years the dye industry will no longer be a serious problem.

Today we make large quantities of blacks, but black is very easily made, because if you make a mistake it is still black. A

beautiful orange, and the delicate shades, present greater difficulties. The line of attack that I look for from Germany after the war, is on this other ten per cent, and they have shown splendid business judgment by bringing over, if you will notice, not blues and blacks, but the delicate colors. Later they may say, "If you want the ten per cent colors you better buy the 90 per cent from us." So it is rather important that we do develop those other colors.

Now, to recapitulate my talk. There is no fundamental division scientifically between coal, lignite, peat, shale, oil, gas, etc., which materials furnish the raw materials for the manufacture of dyes, drugs and explosives. It is a question of volatile matter or a question of hydrocarbon content, because hard coal is the one extreme, methane is the other extreme. Twenty-five per cent of the methane is hydrogen; practically none of the coke is hydrogen. None of the hard coal is volatile, or all of the methane is volatile. It is a case of getting proper blend and combinations.

The solution of the problem will come by a careful study of the laws of physics, chemistry and nature, and by a sympathetic and harmonious co-operation with these laws.

COMPULSORY INVESTIGATION OF INDUSTRIAL DISPUTES—COLORADO'S NEW INDUSTRIAL LAW.

Wayne C. Williams, Industrial Commissioner of Colorado.

The one overshadowing internal problem confronting the Federal Government and the forty-eight states is presented by the disputes between employers and employees. It involves the reconciliation of the hitherto conflicting interests of capital and labor. It is the most important, the most fundamental and the most vexing problem that has ever confronted public officials and the citizenship of a state. It is closely analogous to the one overshadowing international problem, which is reconciliation of the conflicting interests of sovereign nations; the establishment of world peace; the institution of an international tribunal of justice to do away with war. To the former problem, the one involving industrial peace in this nation, the State of Colorado offers a new solution and invites her forty-seven sister states and the Federal Government to consider the law and the methods and recommendations that are being worked out under that law, as offering a new solution for this difficult problem, and we invite the attention of the nation and the patient sympathetic consideration of all thoughtful American citizens to the operation of this law, as developments are made under it. The State of Colorado, by House Bill No. 177, Chapter 188 of the Laws of 1915, offers as a solution of industrial troubles the principle of compulsory investigation of industrial disputes, and I invite your attention to a consideration of what that law is and the results of one year's administration under it.

It is true, and unfortunately true, that most communities and governments do not awaken to a consideration of the seriousness of industrial warfare nor of the solution of the problem presented until some ghastly tragedy or some bitter private warfare burns it into the common mind of the people of that commonwealth. So it was in Colorado, so it has been and will be in other states of this union. Colorado has suffered from serious industrial disturbances, so have other states. We are not one whit worse than other states, but the press of the nation has given us undue prominence whenever a dispute has arisen within our borders. We have a peaceful,

happy American population of 1,000,000 people, with resources hardly scratched, and fertile valleys that help to feed the world. We have less industrial trouble to the square mile than most any other industrial state in the union. Nevertheless, the good name of the state has suffered from the disputes of the past, but we have one advantage over the other states: We have learned a sobering lesson from this bitter struggle; we have taken a leaf out of the book of experience, and have inaugurated a constructive method of avoiding and eliminating such disputes in the future. If we fail in this method, we shall at least have the merit of having tried to do our best. If we succeed, as we confidently believe we shall, we invite all other states and the national government as well to adopt this plan and to institute the principle of compulsory investigation of labor disputes.

The bitter industrial strife in Colorado caused thinking men to see that the state, representing society in its organized form, was:

1. A necessary party in all industrial disputes.
2. That the state must, by some constructive method, enter into and handle the disputes before they spread beyond legal restraint into the arena of warfare.

To those who say that the state has no right to participate in industrial troubles and that it is too large an extension of the functions of government, I answer, that question is foreclosed; that it is too late to discuss academically the functions of the state; that the state always has been a party and always has interfered with industrial disputes, but usually too late to accomplish anything. Every American citizen is familiar with the usual course of a strike. It begins with the walkout, it lingers through the early stages, it assumes an angry mood when nonunion workers are brought in, and then, too often, it results in violence and disorder, when the passions of men are aroused and bitter hatred has taken the place of calm reasoning. The state stands idly by with folded hands, awaiting the gathering storm-clouds, until warfare is actually threatened or breaks out. Then the state gets into the controversy; troops are called out; guns are brought into use; there is bloodshed, death, more bitterness, charges and counter-charges, suspicions, and the seeds are sown for future industrial discontent. Now, if the state is going to get into the controversy at all, why not get in earlier? Why not enter the dispute at the beginning instead of at the end? This is the practical question, which the lawmakers of Colorado faced, and under the leadership of our

brilliant Governor Carlson, the compulsory investigation law was enacted. This law creates an Industrial Commission of three members, and confers upon it several broad industrial powers having to do with the administration of the Workmen's Compensation Law, with the enforcement of all labor laws, with the general investigation of labor questions and the inspection and fixing of standards of safety. The law then imposes upon the Commission the general voluntary duty of promoting conciliation in industrial disputes. This is section 27, which reads as follows:

"The Commission shall do all in its power to promote the voluntary arbitration, mediation and conciliation of disputes between employers and employes, and to avoid the necessity of resorting to strikes, lockouts, boycotts, blacklists, discriminations and legal proceedings in matters of employment. * * *

This section is found in many of our States and provides nothing new. The vital sections of this law are Sections 29, 30, 31, 32 and 33, which are as follows:

"Sec. 29. Employers and employes shall give at least thirty days' notice of an intended change affecting conditions of employment with respect to wages or hours; and, in every case, where a dispute has been made the subject of an investigation, hearing or arbitration by the Commission, or the board, until the dispute has been finally dealt with by such Commission, or board, neither of the parties nor the employes affected shall alter the conditions of employment with respect to wages or hours, or on account of the dispute, do, or be concerned in doing directly or indirectly, anything in the nature of a lockout or strike, or a suspension or discontinuance of work or employment; but the relationship of employer and employe shall continue uninterrupted by the dispute, or anything arising out of the dispute; but, if either party uses this or any other provision of this act for the purpose of unjustly maintaining a given condition of affairs through delay, such party shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine of not more than one hundred dollars."

"Sec. 30. It shall be unlawful for any employer to declare or cause a lockout, or for any employe to go on a strike, on account of any dispute prior to or during an investigation, hearing, or arbitration of such dispute by the Commission, or the board, under the provisions of this act; provided, that nothing in this act shall prohibit the suspension or discontinu-

ance of any industry or of the working of any persons therein for any cause not constituting a lockout or strike, or to prohibit the suspension or discontinuance of any industry or of the working of any persons therein which industry is not affected with a public interest; provided further, that nothing in this act shall be held to restrain any employer from declaring a lockout, or any employe from going on strike in respect to any dispute after the same has been duly investigated, heard, or arbitrated, under the provisions of this act."

"Sec. 31. Nothing in this act shall be construed to make any findings, determination of the rights of said parties, decision or award of said Commission or of any board of arbitration appointed thereby upon the facts of such controversy, binding, conclusive or enforceable upon any of the parties thereto, or affected thereby, unless

(1) Such parties have agreed in writing prior to the commencement of any such investigation or arbitration, or during the continuance thereof, to accept and be bound by the terms of such findings, determination of rights, decision or award, and then only to the extent in such written agreement provided; or,

(2) Unless said parties shall agree to accept and be bound by such action of the Commission or board of arbitration after the same has been made known to them; provided, however, that in either such instance, the findings, determination of rights, decision and award of said Commission or board of arbitration, when confirmed by formal order of said Commission, shall be and remain in full force and effect, according to the terms and for the time provided in such formal order of the Commission, and shall be binding, effective and enforceable upon the parties thereto, as any finding, order or award of the Commission under the provisions of this act."

"Sec. 32. Any employer declaring or causing a lockout contrary to the provisions of this act shall be guilty of a misdemeanor and upon conviction thereof, shall be punished by a fine of not less than one hundred dollars (\$100.00) nor more than one thousand dollars (\$1,000.00) for each day or part of a day that such lockout exists.

Any employe, who goes on strike contrary to the provisions of this act shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine of not less than ten

dollars (\$10.00) nor more than fifty dollars (\$50.00) for each day or part of a day that such employe is on strike.”

“Sec. 33. Any person who incites, encourages, or aids in any manner any employer to declare or continue a lockout, or any employe to go or continue on strike, contrary to the provisions of this act, shall be guilty of a misdemeanor, and, upon conviction thereof, shall be punished by a fine of not less than fifty dollars (\$50.00) nor more than one thousand dollars (\$1,000.00), or by imprisonment in the county jail for a term of not more than six months, or both such fine and imprisonment, in the discretion of the court.”

Our law is in a large measure a copy of the Canadian Act, with which all of you are more or less familiar. Sections 56 and 57 of the Canadian Act are substantially identical with Sections 29 and 30 of the Colorado Law, except that the Canadian Act applies only to public utilities, while our law seems to have a broader application, at least the Commission has so construed it, and has made it apply to every employer of four or more persons. For the convenience of the student on this question I will quote the Canadian provisions of the law:

“Sec. 56. It shall be unlawful for any employer to declare or cause a lockout or for any employe to go on strike, on account of any dispute prior to or during a reference of such dispute of a Board of Conciliation and Investigation under the provisions of this act, or prior to or during a reference under the provisions concerning railway disputes in the Conciliation and Labor Act: Provided, that nothing in this act shall prohibit the suspension or discontinuance of any industry or of the working of any person therein for any cause not constituting a lockout or strike: Provided, also, that, except where the parties have entered into an agreement under Section 62 of this act, nothing in this act shall be held to restrain any employer from declaring a lockout, or any employe from going on strike in respect of any dispute which has been duly referred to a board and which has been dealt with under Section 24 or 25 of this act, or in respect of any dispute which has been the subject of a reference under the provisions concerning railway disputes in the Conciliation and Labor Act.”

“Sec. 57. Employers and employes shall give at least thirty days' notice of an intended change affecting conditions of employment with respect to wages or hours, and in the event of such

intended change resulting in a dispute, until the dispute has been finally dealt with by a board, neither of the parties affected shall alter the conditions of employment with respect to wages or hours, or on account of the dispute do or be concerned in doing, directly or indirectly, anything in the nature of a lockout or strike, or a suspension or discontinuance of employment or work, but the relationship of employer and employe shall continue uninterrupted by the dispute, or anything arising out of the dispute; but if, in the opinion of the board, either party uses this or any other provision of this act for the purpose of unjustly maintaining a given condition of affairs through delay, and the board so reports to the Minister, such party shall be guilty of an offense, and liable to the same penalties as are imposed for a violation of the next preceding section."

"Sec. 58. Any employer declaring or causing a lockout contrary to the provisions of this act shall be liable to a fine of not less than one hundred dollars, nor more than one thousand dollars for each day or part of a day that such lockout exists."

"Sec. 59. Any employe who goes on strike contrary to the provisions of this act shall be liable to a fine of not less than ten dollars nor more than fifty dollars, for each day or part of a day that such employe is on strike."

"Sec. 60. Any person who incites, encourages or aids in any manner any employer to declare or continue a lockout, or any employe to go or continue on strike contrary to the provisions of this act, shall be guilty of an offense and liable to a fine of not less than fifty dollars nor more than one thousand dollars."

It has been said that the State of Massachusetts has a law similar to the Canadian and Colorado law affecting industrial disputes, but an examination of that law shows several differences that must be considered. The Massachusetts law does not provide for compulsory investigation of industrial disputes with the added feature of restraining either side from going on a strike or lockout during investigation to fix the blame as to who started the strike without just cause. The Massachusetts statute is as follows:

"Sec. 11. A mayor of a city or the selectmen of a town, having knowledge that a strike or lockout such as is described in this act is seriously threatened or actually occurs in such city or town, shall at once give notice to the State Board. Notice may be given by the employer or by the employes con-

cerned in the controversy, strike or lockout. When the State Board has knowledge that a strike or lockout, which involves an employer and his present or former employes, is seriously threatened or has actually occurred, and such employer at that time is employing, or upon the occurrence of the strike or lockout, was employing not less than 25 persons in the same general line of business in any city or town in the commonwealth, the State Board shall, as soon as may be, communicate with such employer and employes, and endeavor by mediation to obtain an amicable settlement, or endeavor to persuade them to submit the controversy to a local board of conciliation and arbitration or to the State Board. If a settlement is not agreed upon and the parties refuse to submit the matter in dispute to arbitration, the State Board shall investigate the cause of such controversy and ascertain which of the parties thereto is mainly responsible or blameworthy for the existence or continuance of the same, and shall, unless a settlement of the controversy is reached, make and publish a report finding such cause and assigning such responsibility or blame. * * *

I am informed that the Massachusetts law is working well and is accomplishing definite and tangible results and it is pleasing to hear that Massachusetts is solving her industrial problems. There may be room for diversity of methods and statutes. James Bryce once pointed out the great value of separating this Nation into forty-eight semi-sovereign states, because it afforded an opportunity for each state to work out different methods and solutions and reforms for all of our various problems. In this respect we may look upon our forty-eight states as great social, legal and industrial laboratories, where, under our free American institutions, our citizenship is working out great problems that affect human destiny.

Colorado is the first state in the Union to follow the Canadian law and to provide for compulsory investigation of industrial disputes and to prohibit both sides from participating in either a strike or lockout, until that investigation has been finished. It is interesting to note that this principle is the same one that has been embodied in the peace treaties prepared by William J. Bryan, while Secretary of State, and adopted by the United States and thirty other nations of the world. These treaties provide for a compulsory public investigation of the points in dispute between the nations and for a waiting period during that investigation, in which neither nation shall prepare for war, or engage in war. Thus we see a further analogy

between capital and labor and the disputes between nations. The plan and principle involved in this Colorado Act is working so well, that I predict the same principle will work when applied under the Bryan peace treaties. This method may not always work, it may break down here and there, but in the main, it will work well; it is based upon sound psychology and good common sense, and upon a practical realization of the facts of life and the way in which men do things.

This law embodies certain fundamental principles, which it will be well to state. These principles make clear the working theory of the law and have furnished the motive for its enactment and the administration of the law itself, brings out in clear light the actual operation of these principles.

In brief the law operates in the following manner: The employes of a manufacturing plant desire a raise in wages, or shorter hours. Under the old system, they could or could not give a notice to their employer as they might desire. They could go on a strike without a warning, and they could be locked out without any warning. There was no central body to appeal to, no one to investigate the dispute or find out the actual merits; there were charges and counter-charges, rumors and accusations, and more or less chaos and anarchy generally; the plant tied up, the men idle and their families suffering, bitterness increasing every hour; importation of strike breakers, disorder and often terrible consequences. This is not the history of every strike, but of many strikes. Under the operation of the Colorado law, the first step is for the employes to notify the employer of any change of wages or hours which they desire. This is made in writing, and a copy goes to the employer and to the Commission. The notice is for thirty days under the statute; during which period, the Commission may permit the two sides to privately negotiate with each other, or if they do not want to do so, the Commission will get them together and endeavor informally to adjust the dispute. If these informal efforts fail, the Commission may, upon its own motion or upon request of either side or both sides, start a formal investigation. The investigation is held, witnesses are subpoenaed and put under oath, complete and exhaustive testimony is taken as of all matters in dispute. When the investigation is completed, the Commission makes its findings. These findings or the award as it is called, are not binding upon either side, although either or both sides may accept the findings, either before the investigation begins or at its conclusion, in

which event, the award is binding. The only restraint upon the two sides is that prior to and during the investigation, the employer cannot lock his men out, or change the conditions of employment, and the men cannot go on a strike. The status quo is preserved; the men must remain at work at the usual scale of hours and wages, until the Commission makes its findings. After the findings have been made, either side is free to do as it chooses. The old weapons of industrial warfare may be resorted to, there may be strikes and lockouts or any other legal act along lines of force and coercion.

Thus we see how the law operates, and we begin to understand the significance of a restraining period of this character. The first object and result of such a law is that it provides a cooling-off period, in which both sides have an opportunity to avoid hasty and precipitous action, and to think over calmly the responsibility and grave possibilities of the situation. Hasty and thoughtless action has never helped any cause; it has never moved America or her institutions forward one inch; it will never aid the cause of industrial peace.

The second object and result of the operation of this law is to compel collective bargaining. Nearly every modern thinker on industrial and social topics endorses the theory and principle of collective bargaining. It is a practical, wise and efficient measure of promoting industrial peace and justice. It is urged by newspapers, magazines and thinkers generally, as being the ultimate hope of all those who long for industrial peace, as being fair and just as between employer and employe. This law compels the very thing that is declared to be so desirable; it brings the parties together, compels them to sit down face to face, to look each other in the eye and talk over their differences. The result of this is to cool both sides down, and to eliminate a large number of the points of dispute and misunderstanding. I am prone to believe that one-half of all disputes between men could be amicably settled if both sides met face to face and talked things over. I have been interested and amazed to see the number of misunderstandings that exist between employer and employe, when there exists no way of compelling them to talk things over together. It is collective bargaining too in the sense that the employer or employers in a group meet either the employes of a single plant grouped together, or the employes in an entire craft to be dealt with together.

The third object and valuable result of this law is that it provides for a public body with power to ascertain the facts of any

industrial controversy. This lack of some authoritative body to ascertain the exact facts of a controversy, has been admitted on all sides to be a serious handicap to a clear understanding of the issues in any industrial dispute. Each side has usually contented itself by issuing bulletins and charges, stating its own side of the controversy. The public has not known what the facts were, and every man has read those facts which suited his own prejudices and has shut his eyes to the other side. The Commission has power to subpoena witnesses and put them under oath, and it exercises this power; it has power to go into the accounts and books of the employer and employe; to inquire into the cost of living, cost of production, state of the market, the effect of freight rates and every other factor which enters into the question of wages and hours. There are no limits to the Commission's power to get at the real facts.

The fourth and final valuable result from this law is that the facts when once gathered by an authoritative and impartial public body, are given to the public, and there results the widest publicity of all the facts bearing upon the controversy. The public is informed as to the terms of the dispute and the conclusions of an impartial body as to the merits of that dispute. Publicity is given to the findings of the Commission, and it remains then for public opinion to do its work, and to compel both sides to adjust themselves to the award which the Commission found to be just.

In the operation of the law, certain rules of procedure have been developed, which reflect certain angles of the whole labor question, and which it would be well to state here. These rules are in brief as follows:

1. No technical rules of procedure are ever followed or permitted. The statute provides for a liberal construction and operation of its terms and the Commission firmly insists upon this.

2. No technical form of notice is ever required. It is sufficient if there be actual notice to each side that the Commission is about to investigate.

3. The Commission may not wait for one of the warring parties to invoke its powers of investigation, but may voluntarily upon its own motion, investigate and invoke its own powers.

4. Employes may appear and bargain through a union if they so desire, and the union may appear before the Commission as the representative of the employes. Employers may appear by agent or attorney or through an employers' association if they so desire.

Both kinds of organizations have appeared before the Commission. While the law speaks of employer and employe and seems to contemplate a dispute between a single plant and its employes, and while in the last analysis each finding of the Commission is a finding as to each plant or company, yet employes may appear through a union, and the employer through his association. It some times happens, too, as a matter of practical co-operation that the employes in a dozen plants are all in a union, and that the heads of the dozen plants are all in an association of employers, and the operation of collective bargaining is widened in such a case.

5. The law limits the thirty days' notice exclusively to wages and hours, and if the dispute is over some craft or trade question, and does not involve wages or hours, it has been ruled that the thirty days' notice need not be given; therefore employes could strike on any question except that of wages or hours and not give thirty days' notice, with this one exception and qualification; that in case of any industrial dispute involving any sort of a question, if the Commission starts an investigation (even if no thirty days' notice is required), there can be no strike or lockout during that investigation. This rule is a wise one, and prevents many disputes from reaching a serious stage.

6. Some informal pleadings are permitted, such as a motion to strike, or in relation to special appearances for the purpose of quashing the proceedings. Any such motion as may challenge the jurisdiction of the Commission will be entertained, and the Commission will in every case first consider and decide the question of its jurisdiction and of its right to proceed. If it determines that it has no jurisdiction, the case ends there; if jurisdiction is taken, the investigation proceeds. But while informal pleadings are permitted, they are never allowed to control the Commission, in the sense that mere pleadings can determine the status of the parties before the Commission or determine the result of the Commission's hearings. If the pleadings assist in the preliminary and informal questions which first arise, they are permitted, otherwise the Commission does not specially regard them. In other words, the adjective law, as lawyers call it, which is the law which relates to procedure, never controls the fundamental rights of the parties before the Commission.

7. The Commission has no one set mode of procedure which is followed in every case. While the general lines of the procedure are very much the same, and while some general modes of operation

are apparent in various disputes, the Commission has adjusted, yet the Commission finds that each dispute must stand on its own basis and be determined by the particular conditions which arise in that particular dispute. The Commission does not begin its intercession in a dispute by a firm show of authority if it can be avoided. It intercedes with each side as a friend and well-wisher; it stands for the best interest of society as a whole; it commences informally; and throughout all its proceedings it acts on the theory that its policy should be of two-thirds diplomacy and one-third authority. When a notice is received by the Commission the first step is to get in touch with both sides and find out what has been done or is being done toward negotiations. If the two sides are in touch with each other and are negotiating, the Commission stands aloof and watches negotiations. If the two sides are not negotiating, the Commission calls them into conference and endeavors to start negotiations. It is sometimes the best policy to call both sides in at the same time before the Commission; in other cases, it is the best policy to call in each side separately. Often more can be accomplished by working with the opposing sides in private conference than can be accomplished with them together. If there is any past history or ancient bitterness, it is sometimes better to allow these differences to be thoroughly talked out before the two sides settle down to the actual consideration of the terms of a constructive agreement.

In addition to this work in bringing two sides together, the Commission has had one capital and labor banquet, attended by a large number of representatives of both sides of the industrial world and by many prominent public officials.

The Commission has also assisted in bringing representatives of both sides of a craft into general conference for the purpose of improving general craft conditions. These conferences have been called, not when there was a dispute or hard feelings, but at a time when the feeling was amicable, and when both sides felt the need of improving general conditions in their craft.

The result of all these negotiations has been to strengthen the bonds which unite employer and employe, to produce a feeling of harmony and co-operation which has hitherto not existed, and a feeling of mutual respect and self-restraint in all dealings between the opposing sides of industrial disputes. One or two concrete cases will best illustrate the method of administration which the Commission employs. The first situation arising under the new law occurred soon after it went into force. Early one morning the

managers of a large cracker factory employing 225 people in Denver, began calling in their employes one by one and reducing their wages. News of this spread rapidly over the plant and within an hour the entire force was on a strike. No union existed among the employes of the factory. The Commission at once got in touch with both sides and called them in for separate private hearings. While the Commission had the right to request the district attorney to proceed criminally against both sides, the Commission felt that the law being new, they should first be given a chance to obey it. The law was read and each side asked if they were willing to obey it. Both sides agreed at once to obey the law, and the next morning the entire force went back to work, the incident was closed, and nothing has ever occurred in that plant since that time.

In the machinist strike, the machinists gave the usual thirty days' notice and following the failure to secure a conference with their employers, the Commission arranged a number of informal conferences. These had progressed to a point where a settlement seemed assured, when the employing machinists' representative made a bitter speech in the presence of both sides that aroused all of the ancient passions and bitterly inflamed both sides. After this meeting an agreement by informal conference was impossible. The union machinists asked for a formal investigation which was granted and held. Some of the employing machinists refused to attend the hearing. The Commission stood ready to vindicate its authority, but the union machinists requested that we hear them without attempting to test our powers. The Commission rendered its decision and after further conference between the men and their employers, a strike was called. This strike lasted less than ten days and the final adjustment was made on the basis of the Commission's findings or award.

In the tailor dispute, all the journeymen tailors in Denver were organized into a union, general conditions in the tailor trade had been chaotic for years. The tailors asked for a formal investigation, which was granted by the Commission and after an extensive hearing, rendered its findings, which were substantially in favor of the demands of the union tailors. Within two days after the findings were announced, every merchant tailor in the city but one, had agreed to accept the findings of the Commission and put the wage schedule into force.

One day without any warning 700 smelter men walked out of the Arkansas Valley Smelter in Leadville, one of the great mining

camp of Colorado. Only 100 men were left in the plant. The men had not been organized and there had not been the slightest intimation that trouble was threatened. The men's grievances included contract system of labor, assignment of wages and a demand for increased wages. The Commission went at once to Leadville and found a hopelessly confused situation. The strikers were composed almost entirely of recent arrivals from the Balkan States. Out of the entire several hundred, there probably were not a dozen men who were naturalized citizens, or who knew anything of our language, institutions or laws. The men had no real leader and were simply out after being informed, in stubborn defiance of the law and because of conditions, which they found it difficult to properly describe. The Commission felt that it was not a case where there should be prosecution of the men. Their ignorance of the law and general lack of understanding of American institutions all contributed to cause the Commission to deal leniently. The Commission met the men in a mass meeting and explained to them through interpreters what the requirements of the Industrial law were. The men at first protested, but reason gradually asserted itself and within a week the entire force had returned to work. The Commission then began an investigation of the grievances of the men. The Smelter Company offered to adjust every grievance of the men, except wages, on any terms which the Commission thought best. The smelter managers have already adopted measures to prevent the contract system and assignment of wages and the adequacy of these measures is now being considered by the Commission. The Commission will not halt until these grievances are absolutely eliminated. The Commission saw that the question of wages was a very broad one, involving numerous factors affected by conditions throughout the nation. The preliminary plans were laid for a broad, thorough and exhaustive investigation. Recently the smelter has raised the wages, granting a part of the demands of the men.

A summary of the industrial disputes before the Commission shows the following:

During the year preceding the date of this present report the Commission has passed upon over seventy-five industrial complaints. Eight of these have resulted in formal hearings and formal awards by the Commission. Probably half of these seventy-five complaints threatened serious strikes, but most of them were adjudicated informally through conciliation and mediation. The formal awards

occurred in the cases of the tailors, machinists, waitresses, biscuit makers, mill men, mailers and various plants doing business with the above crafts. In these awards the Commission found in some cases in favor of an increase of wages and in other cases against the increase. The principle on which the Commission proceeds is that there are three parties in every industrial controversy: employers, employes, and the public. The Commission has declared for an eight-hour day and for a minimum wage for women of not less than eight dollars and thirty-three cents per week. The Commission has before it two complaints for formal investigation now pending and awaiting future adjustment. These are the wage demands of the coal miners in the Huerfano County District and the metalliferous miners in the Leadville District.

During the two years the Commission has been administering this law there has not been a strike of any moment or consequence in the State of Colorado.

Among the crafts represented in these disputes before the Commission were, cracker makers, tailors, barbers, machinists, painters, maltsters, bill posters, smeltermen, dry goods clerks, brewers, street car men, carpenters, sheet metal workers, railroad men, sign painters, coal miners, granite cutters, cigar makers, horseshoers, garment makers and bricklayers.

A review of the work of the Commission would be inadequate if I did not mention the part prohibition has played in aiding industrial peace. Prohibition is proving a great success in Colorado and the absence of the saloons is an important factor in preventing violence at the time of a strike. This is particularly marked where foreigners such as the Leadville smeltermen are involved.

I believe profoundly that this law will work to the advantage of labor and of capital, and that it will bring a larger measure of industrial peace than our State or any other State has hitherto enjoyed. It may not solve the whole problem of industrial disputes or eliminate all strikes, but it will tend to solve the problem, it will lessen the number of strikes, and it is at the very least a step in the right direction.

The labor unions of Colorado generally have obeyed the law without question. Their painstaking care to comply with every provision has been a source of gratification to the Commission and has been a fine example of the best type of American citizenship in its obedience to law. No one could have witnessed the general conformity of the trades unions in Colorado to this new industrial

law, and say that labor unions do not obey the law. The State Federation of Labor has sent out a letter of instructions to every union affiliated with that organization, notifying them of the steps necessary to conform to the law, and urging them to keep within the law in all disputes. I believe that the great majority of laboring men in Colorado have come to see clearly the great advantage this law brings. There are some individual labor leaders, who have not yet endorsed the law nor the principles behind it; some of them are in a mood to be convinced, but have not accepted it, fearing that it is some new and strange contrivance designed by the selfish power of capitalists to destroy labor.

Of course, the law is nothing of the sort and its actual operation is rapidly dissipating this idea. The objections offered to the law are these:

That the law abridges and restrains the right to strike and that any such form of compulsion so called, is un-American and is a form of slavery.

The law does and does not restrain the right to strike. Considered from one viewpoint, it does restrain this right in a limited and temporary manner, and by this means it prevents sudden violence and promotes peaceful negotiations; it also restrains the right to lockout working men. It prevents the employer from cutting wages and lengthening hours and discharging his men while the dispute is in progress. From another viewpoint, the law does not restrain strikes. Suppose a group of men on April 26th, who work for a common employer, meet to discuss and formulate demands for higher wages, and suppose it is urged that they go on a strike May 1st. Some one suggests that it would be better to postpone the strike one month, or until June 1st, and that this date complies with a law requiring thirty days' notice. Suppose the employees actually agreed to comply with this law and did so by giving the thirty days' notice. This is a concrete example of how the law operates. Can it be said that such action and such continuance of work amount to slavery? The employees have simply advanced the time at which they will put their demands into effect. They have merely postponed the resort to force in the hope that force will not be necessary. The employer knows that their right to strike has not been taken away from them and that back of their demands is this potential right which may be exercised. Often the knowledge of this potential right to strike is of more value to workingmen than the actual resort to the strike itself. The public

has an interest in the matter and has a right to demand that all peaceful means be exhausted before the strike or lockout is resorted to. If this be slavery, then we must find a new meaning for that term. It does not comprehend a single element of slavery. Very often trade agreements provide for a thirty days' notice before going on a strike, which would bring about compulsory work just as truly and effectually as this law brings about compulsory work. The only compulsory labor the American nation recognizes or ever will recognize is a compulsory labor imposed upon every man based upon the divine law that man shall earn his bread in the sweat of his brow.

To say that this kind of restraint is un-American is to make a mere rhetorical objection to the law. The law was passed in the wise exercise of the police power of the state, to protect society from sudden and violent disputes and all of the harmful results which so frequently flow from them. If this kind of compulsion be un-American, then the same thing must be said of that compulsion which prohibits any man from using violence toward his neighbor, which compels capitalists and laboring men to observe certain fundamental rights in their dealings with each other, which compels men generally to obey the law. We have compulsion on all sides of us; that is, a government of laws, not a government of man, or whims or caprice. It is not surprising that some employers or employees chafe under the restraint of compulsion. The two forces of capital and labor have been almost sovereign in their power. Public officials have been afraid to deal with them. They have been allowed to work out their own industrial disputes, but both of these powerful and valuable forces in American life must be brought under complete restraint of law.

2. Another objection has been that the law interferes with the power of the union to collectively bargain and make its own terms. There are three answers to this objection:

(a) The Commission never uses its own power to compel the two sides to bargain together if they themselves will voluntarily get together and bargain.

(b) The right to independent bargaining collectively is not absolutely taken away from either employer or employee; it is only temporarily withheld while the Commission investigates.

(c) The one thing the Commission does is to actually compel both sides to bargain collectively; it enforces and compels the exercise of the very right that some labor leaders say has been taken

away by the law. Thus their objection is refuted by the very terms of the law itself. When we reflect that in so many instances employers have refused to treat with their employees or with labor unions and have said "there is nothing to arbitrate," we must certainly admit that if there was anything that labor needed, it was this law, which compels employers to arbitrate, at least to the extent of bargaining collectively before the Commission. If the law provided for compulsory arbitration then indeed could men say that it provided a form of compulsion, which took away the right of independent bargaining, but the law does not do this, the findings of the Commission are not binding unless both sides choose to accept them and make them so. The findings of the Commission are merely persuasive.

3. The other objection made to the law is that it will operate in favor of the employer by enabling him to bring in strikebreakers during the waiting period and hold them in readiness for an anticipated strike. The best answer to this objection is that the law has not worked that way. On the contrary, it has worked the very opposite. It has done more to keep working men in their jobs than anything else could have done. The conferences before the Commission tend to draw the parties together, not apart, and in all of the disputes which have occurred, not one employer has sought to offend the Commission or disregard the spirit of the law by bringing in strikebreakers. But there is, in my opinion, a better answer to this objection, which is that there was nothing which prevented an employer from bringing in strikebreakers before this law was passed. The situation of the laboring man who has a job is no worse now than it was before; on the contrary, it is better. It is idle to say that an employer might bring in strikebreakers during the thirty-day waiting period provided by this law when, as a matter of fact, he could bring them in at any time preceding the thirty-day period under the law.

The American nation must not withhold the power of the Government in regulating these two great forces of industry, merely because opposing forces will seek to control the governmental organ which does the regulating. Mr. Commons recommends mere voluntary arbitration and friendly mediation with no coercive powers whatever. He takes the position that there should be laws regarding the general relations of capital and labor, and that within these laws the two sides should be allowed to bargain and secure whatever advantages they can over each other. This method simply

throws the whole industrial question into the arena of force; it reminds us of that paradoxical and absurd farcical situation that exists between the warring nations of the world today, in which men must kill each other by certain commonly accepted rules of international murder, and we hear generals, prime ministers and governments disputing over whether men were killing by the right rule or the wrong rule. The world is going to get away from such legalized warfares as quickly as it can. Society, through the state, will increase its regulating control of these two great forces, and in my judgment, unless this principle is accepted and lived up to by the opposing sides of industrial disputes, the Federal Government and all the states will some day provide for compulsory arbitration, a thing to which a portion of Labor and Capital is now opposed. The success of the operation of this law in Canada, and the continuation of its success in Colorado, will be the very best answer to the objections which are urged against the law.

Some employers have urged objections against the law also. Their chief objection has come from the fact that the law gives the Commission the right to examine their books to determine in any given dispute whether they are making such a reasonable profit as affords just grounds for an increase in wages. But without such power the Commission could never pass upon a wage dispute.

Speaking, as I know I do, for my colleagues and myself, I declare that we are an impartial Commission, and that we stand squarely between the opposing sides in every dispute; that we have a high sense of obligation and duty to the State of Colorado, that we seek to deal only with fairness and justice, and we have a high and honorable ideal, which inspires in us the ambition to promote industrial peace. There can be no higher ideal for any man than that he desire peace. Peace with justice. And it must be forever true that what is right and what is fair can better be determined by the peaceful processes of friendly, calm and reasonable negotiations than by the bitter processes of hate, strife and industrial warfare. Working men and employers have lost more by the bitter clash of warfare than they have gained. Both sides will gain far more in the future by reasonable mediation and friendly conciliation through an industrial commission than they can ever gain by the strike or by the lockout. In any individual dispute, one side or the other may feel that they have not secured by bargaining as much as they would have secured by force and coercion. They

are probably mistaken, but even if they be right, in the long run they will secure more by bargaining than they will by force.

Is it too much to expect that we are entering upon a new industrial era, both in my beloved State of Colorado and in every state of this union? I think all signs point toward a new, a better, a fairer condition in industry. I believe that all hopes and aspirations of men are toward peace; not a peace of mere weakness and negation, but a constructive peace, a peace of mutual self respect and esteem; a peace based upon fairness and justice, and a clear recognition of the superior value of resorting to reason rather than force for the settlement of all disputes. I look to a future day when all opposing parties in industrial disputes, in all of the states of this union, will come with their grievances into a common council chamber to adjust and settle every controversy by the process of peaceful negotiation, and I look to see the nations of the world arise from this horrible nightmare of war and turn toward each other in a new spirit of friendliness, self-respect and fairness and form and meet in a common council in a league of world nations to enforce peace, where there will be compulsory investigation of every international dispute, and public opinion behind the findings of the court will compel the opposing nations to accept the award made by this parliament of man. Can we ask for any higher ideal or seek any nobler ambition than to do our part in hastening the arrival of such a day? May God grant that such a day will speedily come.

THE ANTICLINAL THEORY.

Dr. I. C. White, West Virginia.

Mr. White: Mr. Chairman and Gentlemen of the Oil Section: It is seldom that a prophet lives to see his prophecy fulfilled. I am an exception to that rule. I am still here and have no idea of leaving soon, although I discovered this theory back in 1882, thirty-four years ago—I should say I rediscovered it. After I had promulgated the theory and published it, I began to look up the literature on the subject and then found that it had been first discovered and promulgated by Dr. T. Sterry Hunt, a Canadian geologist, back in 1859, and that later, in 1861, probably without any knowledge of what Hunt had done, just as I myself was ignorant of it, Professor E. B. Andrews, of Marietta College, Ohio, had discovered the same thing in walking over a region in West Virginia territory, which we call the Volcano Uplift, where oil was first discovered in West Virginia and utilized many years before it was utilized in Pennsylvania, and before Colonel Drake drilled the first well near Titusville, Pennsylvania, in August, 1859, expressly for oil. Also, still later, Professor Höfer, the celebrated Austrian geologist, who visited this country in the seventies to study the Pennsylvania oil fields, had published the same theory in his notable book, "The Oil Fields of the World," printed in German, which I didn't have access to then. So that three men, all the way from 1859 to 1878, had discovered the anticlinal theory, but none of them made any effort to put it into practical operation. When I discovered anew the anticlinal theory, I began at once to make practical use of it in the location of oil and gas wells. One of the first locations I made on this theory was a gas well near Washington, Pa., where coal was not convenient and natural gas was desired for domestic purposes as well as for manufacturing. Some people there desired a gas well, and asked me to make a location for them. The Pennsylvania Geological Survey began in 1875 and lasted until 1884, under the direction of Dr. J. P. Lesley, and the oil and gas geology was relegated to one man, the late Mr. Jno. F. Carll, who was born and lived in the Titusville oil region of the state, an old land surveyor, and who apparently could not grasp the anticlinal theory of

oil and gas, although he lived in the midst of and in sight of the first oil well drilled by Colonel Drake.

When any of the other assistants on this Survey encountered any oil or gas territory they were expected to turn it over to Mr. Carll without devoting any serious study to the subject. We were not expected to study oil and gas questions particularly since we would be trenching on the department of a man who was devoting his entire time to it, and it was supposed to be in the interest of efficiency to leave these subjects to him, so that the rest of us devoted our attention to the other geological features connected with coal, limestone, iron ore, and other minerals, and thus it happened that none of the other assistants had devoted much attention to the study of oil and gas geology up to the time I undertook this study in 1882. At that date I got special permission from the director of the Pennsylvania Survey to devote a month's time to the study of oil and gas geology. I was then connected with the West Virginia University, and was doing geologic work for the Pennsylvania Survey during my summer vacation, in order to eke out the magnificent salary of eleven hundred dollars a year. I was to undertake this study for the Forest Oil Company. The gentleman who was field superintendent of that company, Mr. Wm. A. Earseman, had read some of my geological reports on Western Pennsylvania, and in looking over the list of geologists whom he desired to interview, to see if they could do anything with the problem of finding oil and gas from surface indications, he came across my name, and from what he had read of my writings he thought I would be the proper one to make the investigation. So that Mr. Earseman for the Forest Oil Company, of which Captain J. J. Vandergrift was president, with the concurrence of the latter (whom many of you may know as one of the principal men in the Standard Oil Company), got permission to have me take up the matter to see if geology could give any geologic answer to the question of where oil and gas are located. He had gotten tired of drilling water wells and dry holes in the search for oil and gas, and he thought it was possible to limit greatly the area to be searched with the drill.

And I should say that I got a suggestion from him in the private talk that he had with me when he came to engage my services for that study. He told me that he had noticed that some gas wells were located near the points on the maps where the geologists of the Second Geological Survey of Pennsylvania had drawn anti-

clinal axes. He said—he wasn't a geologist, he didn't know anything about the rocks, and would not know an anticline if he saw it. That is what he wanted me to do. So that I started out to see about it. That was my business, to be able to locate an anticline as well as a syncline.

The first thing I did was to visit the regions where they found oil and where they found gas. A great well had been blowing into the air for many years near the town of Murraysville, Westmoreland County, Pennsylvania, known as the Murraysville gasser. I went to see that, and found it located on the crest of what was known as the Murraysville anticlinal. The gas had been leaking up there for ages, coming out of the ground on this anticline. I went to St. Joe, in Butler County, Pennsylvania, where large gas wells had been drilled. I went to Burning Springs, near Charleston, West Virginia, and to Warfield, Kentucky, where another great well had been blowing into the air for years, and also visited many other locations of large gas wells. They all gave the same answer. I found that the oil and gas and water were arranged in natural reservoirs, as they would be arranged had you put them all into closed vessels, say into a barrel and closed the aperture. You would then find the gas at the top, the oil next, and water at the bottom, or in the order of specific gravity. It seemed perfectly simple, after making all those studies in the field, where the wells had already been drilled. The anticlinal theory seemed proven beyond a doubt, but I desired to test it out still further by finding actual gas wells on this theory. One of the early locations was made on the Brown farm, twenty miles east of Pittsburgh, beside the Pennsylvania Railroad, for J. M. Guffey, of Pittsburgh, and here a gas well was drilled on the crest of the Murraysville anticlinal, that produced thirty-five to forty million cubic feet of gas daily, and which was regarded of such great importance by Mr. Guffey that he had the great Pennsylvania Limited (probably the only time in its history that it was stopped between Altoona and Pittsburgh, unless by accident) flagged, and it remained at Brown's Station fifteen minutes while this well was lit and shown to President Cleveland during the first trip he made to the West soon after his inauguration. It burned to a height of 135 feet above the derrick floor.

That was only one illustration of my success in locating gas territory on the anticlinal theory. It was so simple that I couldn't get many of the oil fraternity to believe it. Mr. Guffey did believe

in it, however, and he authorized me to have several hundred thousand acres of land leased for him in West Virginia on this theory. Mr. A. W. Mellon, of Pittsburgh, furnished the money to pay for the leasing. Mr. Guffey was not a capitalist at that time. I secured the 600,000 acres of leases, practically all the oil and gas territory that has since been developed halfway across the state, a territory which has since that time produced hundreds of millions of dollars' worth of value in oil and gas.

Mr. Guffey, as I say, couldn't get any of his oil fraternity people to go in with him and put up the money to test this great leasehold for oil and gas. He didn't have the money to develop it himself. In his dilemma he turned to political friends, like Wm. Flinn, Robt. Elliott, Chris. McGee, and several of that type, all "tenderfeet" in the oil business, who had never been in it before. Men of that character seldom succeed in any new business. They got "cold feet" too soon, just as they did in this case.

These politicians would not drill first in West Virginia, as I wanted them to do, but they secured some gas territory in Pennsylvania, and formed the Wheeling Natural Gas Company to take gas to Wheeling. They knew there was money in the gas business, but weren't so sure about oil, so I could not get them to go down into West Virginia, except later, after the company had gotten into the gas business in Pennsylvania, and constructed a pipe line to Wheeling from the gas fields. Mr. Guffey had agreed to turn over 400,000 acres to this Wheeling Natural Gas Company for so much paid-up stock. They didn't pay him any money, and the other 200,000 acres he didn't think that he should turn over to them, and hence he kept that amount of acreage of leases out of the transfer, and when the locations were made he had instructed his field men to take out so many acres to make up something near 200,000 at various places in West Virginia. I didn't know where they had been taken out, but as it happened some of the locations were near where farms had been reserved from the transfer. So they were about to get into a row among themselves, and the president of the Wheeling Company declaring there wasn't a drop of oil in the state, said to Mr. Guffey, "We will give you back the entire leasehold," and they did, and although there was only ten cents rental an acre on them, he got frightened because it meant \$40,000 a year, and he didn't have the \$40,000 to pay the rental. So he rushed around and surrendered them at a cost of \$6,000 to get them off the books,

and just as he got his record cleared, and the leases returned to the farmers, the oil developments began to take place.

I got disgusted in dealing with oil men second hand, so I concluded I would do some development myself. So I formed a company, and we started in the leasing business and took up some of this territory that they had surrendered. We didn't go very far, because we didn't have very much money. I agreed to furnish the geological knowledge, locate the territory and the wells. A brother professor in the university, a professor of engineering, agreed to make the levels, run the necessary lines on the coal beds, and another friend who was clerk of the county court said he would do the recording, and another party was going to pay for taking the leases, the actual cost of leases, so that we divided it up among ourselves. And then when we got the land, none of us knew anything about drilling. We wanted to get an oil man to drill the well. We couldn't get one of them to do it. So we got another "tenderfoot" named Jack Montgomery, of Washington, Pennsylvania, who never drilled a well in his life, but who believed in the anticlinal theory because he knew I had located a gas well twenty miles from any other gas field on the path of an anticline, so he thought it would be a good gamble. He had some money and he put it up to drill. This first test well near Mannington, Marion County, West Virginia, was thirty-five miles in advance of any other oil well, thirty-five miles away from any production. It is a celebrated well and I have given its history in the publications of the Geological Society of America. It was located ten miles west of where the oil fraternity, on the "degree-line theory" that Mr. McDowell has just described, would have located a test well. Everybody said, "You will get salt water." They couldn't see the wrinkles in the rocks that I did. I should say that I think they all hoped it would be a dry well, because they rather resented the idea that a college professor or geologist should break into their profession. They wanted some "practical" man. They didn't believe that a man who had taught in a college or who had ever been known as a geologist could have anything "practical" about him. In fact, one of these "practical" oil men who had a large acreage at the time projecting down into West Virginia was known to remark that if he "wanted to be absolutely sure of getting a dry hole he would employ a geologist to locate it." I went to that gentleman and offered my services to him to put him right. He shook his head. He stated that "others might follow Prof. White; he would

follow Prof. Drill." He lost the fortune he had already won, and the potential fortune that was in his hands at the time had he acted on the anticlinal theory I had already demonstrated and published.

I should say that this experiment at Mannington was watched by the oil fraternity with great interest, and they had their scouts on hand when the well was completed in October, 1889, and proved to be a productive oil well. So that beginning with that date some of them began to take notice. But it has been a long, hard fight. Some of my brother geologists on the Pennsylvania Survey, who should have aided me in the work, were the first to attack the anticlinal theory because they apparently thought my discovery was a reflection on them for failure to discover the same many years before.

I should say that one man in this country, the late Dr. Edward Orton, was of great service in the battle. I had to convince even most of my geological brethren, to say nothing of the oil and gas men, who were naturally inclined against me because, as I say, they resented the fact that I was a professor of geology who was not supposed to know much of practical affairs in the oil business. They had been in the business too long to learn anything of value from a college professor. But Dr. Edward Orton rendered very valuable service in winning the fight for the anticlinal theory by showing its application to Ohio oil and gas pools.

On this theory I succeeded myself in finding some oil and gas, but as soon as I could get rid of it at a fair price I sold my producing interests and got out of the business, so that I could devote my time to the study of geology, in which I was more interested than in making money. And I will say that I am probably the only state or government official in the world that is serving his state as "a labor of love." I have been State Geologist of West Virginia since 1897, and my salary is nil. I do it as a labor of love. During the period of my oil and gas demonstrations of the anticlinal theory I accumulated enough money so that I don't need the small salary that the state might give.

I thought you would probably all be interested in hearing something of the way in which this anticlinal theory was promulgated, and, as I say, I am not the first author of the theory, but I knew nothing of these prior publications. It was a discovery of my own, aided by Mr. Earseman and Captain Vandergrift, who gave me the opportunity, so that Mr. M. R. Campbell, of the U. S. Geological Survey, who has written a history of the anticlinal theory, gives

me the real credit for promulgating the anticlinal theory, because I made it practical and kept working on it until it has finally permeated the minds of the oil and gas men who make the production of oil and gas a business. I thank you all for your appreciative attention to this story so largely personal.

THE RESPONSIBILITIES AND DUTIES OF THE PUBLIC IN MINE SAFETY WORK.

Dr. F. W. McNair, Houghton, Michigan.

Mr. President and Gentlemen: Since my name is not on the program I have no doubt you know that I have been assigned to represent the public within the last few minutes. In spite of its unfairness to me personally, I am not sure but that this assignment is fair to the public, whatever it may be to you. I have not been thinking of this question of safety-first and the responsibilities of the operator and the responsibilities of the miner. I have thought of it for only a few moments since your secretary told me I would be called upon, and perhaps in that unpreparedness to face the situation I very well represent the public. If you think back upon the public attitude in regard to these questions you will see that as a rule the public does not think about them, and the public does not care about them until some frightful accident in a coal mine, or something of that sort, is headlined in all of the newspapers, suddenly arousing the public until it is ready to do something and do something very radical. What it then wants is to wipe out all the corporations over night. It wants to penalize all of the mine managers or it wants to penalize all of the mine workers. The public is very apt to say and to do without very much preparation in the way of thought.

Now, I think that the public is responsible in relation to this question, just as it is in relation to any other question that is before the people of the United States, just as it is in relation to any other question upon which the public, either state or national, must legislate. We say that the public ought to do this and ought to do that. As a matter of fact, isn't it true that it is very difficult to arouse public interest, and to keep public interest aroused in any question until it is logically and safely settled? Whatever I may think the public ought to do, are we not faced with the fact that the public will act only as it has acted before. The public, after long education, established the Bureau of Mines. The public is pretty apt just now, when questions like this are brought up for decision, to ask what is recommended by such an organization as

the Bureau of Mines or the American Mining Congress, and to follow such recommendations. Whatever the ideal condition ought to be, that is about as far as you can get public responsibility.

I do not live in a coal mining country. I live in a metal mining district, and in the immediate vicinity of mines where considerable is being done to educate the men in first-aid and safety work. The public, even the public of the mining district, knows nothing whatever about what is being done. It is not news. The newspapers do not feature it. And I submit that about all we can expect from the public is to read the pronouncements of the Bureau of Mines, and the resolutions adopted by the American Mining Congress, and when next it is called upon to dictate legislation, that it will be influenced in its demands by such resolutions and such pronouncements.

The public does get interested occasionally in some things. Just now, for instance, it is interested pretty largely in the matter of workmen's compensation; and I suggest to you that perhaps the most effective way in which the public can influence the mine operator and the miner is through the movement for workmen's compensation. In Michigan we have a workmen's compensation law which I am happy to say was brought about by actual co-operation of the mine operators and the miners, as well as other manufacturing interests and laboring interests in the state. I am persuaded that this workmen's compensation law has had a great deal to do in influencing both the mine operators and the miners in this matter of safety-first.

The public conscience ought to be aroused all the time, but there are so many questions upon which it ought to be aroused, and there are so many people trying to arouse it, that I sometimes think the total result is to put the public conscience to sleep. Its conscience once aroused on this subject, the public would no doubt take the right action, and I am glad to see that that is recognized not only by the representative of the United Mine Workers who has just spoken to you, but by other speakers. When aroused I am satisfied the public will do right, but I do not feel like holding the public responsible for any very direct result in regard to this matter until the facts can be put before it much more efficiently than they have been as yet, and to get those facts before it is the duty of such organizations as the American Mining Congress and the Bureau of Mines.

I thank you. (Applause.)

THE RESPONSIBILITIES AND DUTIES OF THE MINER IN MINE SAFETY WORK.

Thomas L. Lewis, West Virginia.

Mr. President and Members of the American Mining Congress: I hardly know how to express myself on this occasion for the reason that the late David Ross was assigned the subject of the responsibilities of the miner in mine safety work. I always spoke of Mr. Ross as Dave, having known him intimately for thirty-five years, and realize the splendid work that he did for the mining industry in this country. Broadminded in every sense, capable of discussing the mining questions from an impartial standpoint, David Ross was at all times able to defend any position he took. In the death of David Ross the mining industry of the country has sustained a great loss, and this is especially true of the mine workers of the United States.

The subject which I know that he could have handled in a masterly manner, if it had been his privilege to be here with you, I have been assigned and shall in the few moments allowed me undertake to explain to you, from my viewpoint, the duties of a miner and his responsibility in mine safety work.

Those of us who are familiar with the mines and the surroundings of the mine workers understand there is constant danger surrounding his occupation. I undertake to classify the dangers into two classes, i. e., the unknown danger, and the known danger.

The unknown danger exists in those mines that generate any quantity of fire damp and where each individual mine worker is responsible for the safety of every other person working in the mine. The unknown danger includes conditions of roof where it may appear to be perfectly safe, and yet something in the earth itself has its effect, and a fall may take place, instantly injuring a mine worker or causing death. There is an unknown danger likewise in driving mules or running the motors and trips in the mine, for the reason that the man who drives the motor, runs on a track that he presumes has been made perfectly safe. Yet it is possible, under the most careful management, and under the direction of the most efficient track layers and under the best system of timber-

ing mines, something may have occurred in the absence of the motorman, in traveling the passageways of the mine, unknown to him, when going along the entire at a very high rate of speed. The roof may have fallen, a defect in the rail, or a break in a piece of timber, causing something to be on the track that would throw the trip off, which would injure or kill the motorman or the trip rider.

There are dangers in mines known to everybody who understands anything about the work. For instance, the different kinds of coal in which men work, undermining it, under the old system of pick mining, there were certain kinds of coal that we could undermine a certain distance with safety, but if it were mined any greater distance, it became very unsafe. We might work under certain kinds of slate, hanging over our heads in the mine, with perfect safety, understanding and realizing the character of it. On the other hand, we know that any considerable quantity of slate hanging over a man's head where he is loading coal or working in the face, is more or less dangerous. Many of us, in order to avoid the extra work of cleaning the coal, would take the chance of loading the last shovelful of coal from under that slate rather than pull it down and make it safe while laboring at the face of the work. The danger is known to us and it is the risk that we are willing to take in order to avoid the necessity of doing a little extra labor in cleaning the coal, which causes many accidents.

The point that we want to bring out and emphasize is this, that the operator can furnish the best and most improved safety appliances that the human mind can invent, put them in the mine to safeguard the lives of men who are employed there; the different branches of our government can enact laws to penalize operating men for failure to furnish the very best safety appliances and everything can be done to make a mine as perfectly safe as human inventive genius and knowledge can make it, and yet, in the last analysis, the responsibility for the safety of the man who works in the mine rests upon himself. It is not even a collective responsibility. There may be ninety-nine men out of one hundred employed in the mine who will resort to the best methods and precaution and do everything in their power for their own protection, and yet the negligence or carelessness of one man in that mine may cause an explosion, and this is especially true in mines generating fire damp where it will sweep the one hundred men into eternity.

There is no one who can prevent that calamity except the one hundred men who work in that mine.

The question is, how are we going to make it possible to prevent the numerous accidents that take place in the coal mining industry of the United States? There are a great many ideas advanced in regard to the best methods. So far as the safety first movement in itself is concerned, a wonderful work has been accomplished. Operating men realize the necessity of furnishing the greatest possible protection for the lives of the men in the mine. Mine workers generally, and I will say a great majority of them, are co-operating for the purpose of reducing the large number of accidents and the large number of fatalities in the coal mining industry; but there is a minority that in some manner must be regulated.

I am a firm believer in the principle of appealing to a man's intelligence rather than his prejudices in order to secure the very best results; but I have long ago been convinced there is a certain number of men in the mining industry who will not be convinced by the power of reason and intelligence. There must be some plan adopted whereby we can compel a certain minority of mine workers to protect themselves, whether or not they have any desire to do so. I do not mean by that that there is any man who wants to deliberately become injured or injure himself. I don't believe any man, if you would ask him the question, if he would like to go into a place when he knows that he is standing more than an even chance of being killed or injured, that he would deliberately go into that place. Yet I know positively there are men who become indifferent to the dangers that surround them, and, if you will permit the word, become reckless of the results of their own work.

I make the statement without fear of successful contradiction that fifty per cent of the fatalities in the mining industry of the United States are not only avoidable but preventable, preventable by the acts of the men themselves who are killed in the mines. I make the same statement with reference to the number of accidents that occur in the coal mining industry of the United States. If this be true, how are we going to adopt any plan or any method to stop this wholesale slaughter of human lives in the coal mining industry? Some people say the operators are to blame. There was a time in the history of this country when I believed the operators contributed to that condition. Others claim that it is inefficient inspection of mines. I believe there was a time in this

country when that was largely true. But we have reached the point where we must make the man take care of himself when he is unwilling to do so.

The question is how are we going to do it? For instance, if we have a man running around the streets of Chicago endangering the lives of people of this community we have a way to stop him. There is a man in uniform who is notified, if nobody else wants to assume the responsibility, who takes hold of that man and takes him away and puts him where he can do no injury to anybody. And while it may be a radical position to take, so far as I am concerned, and it is no new idea of mine, I believe in applying exactly the same remedy to those men in the mines who are unwilling to take care of themselves and help protect their fellowman. It can be done by an efficient patrol system in the mine. Where you find a man working under a piece of slate that is dangerous and he knows it is dangerous, but rather than pull that slate down for his own safety, he keeps on loading the coal from under the slate in order that he will not have to do a little extra work, and you have another man who is inspecting the mine and he discovers a mine worker doing that kind of work, there is not any question about what ought to be done. The miner ought to be taken out. The inspector ought to have the authority of the law to do it. "Here, you have violated the law that states specifically that you must not work in a place of known danger." Take him out and give him from two to five days in jail and he will not repeat the violation of the law. If he knows he is going to jail, if he continues that kind of business, he will refrain from the practice. Some people say, "Oh, no; that is too harsh. The thing to do is to fine a man who is guilty of continuing to work in a place that he knows to be dangerous." I do not take any stock myself in penalizing by fines, because my experience has been that coal men or any men would rather pay a thousand dollars fine, if he could do it, than spend one day in jail. It is the fear of the punishment for the violation of the law that makes good citizens out of thousands of people who otherwise would be law violators. I think the time is coming when the mine workers of this country themselves, whether they are organized or unorganized, will recognize the feasibility of just such a plan to prevent accidents.

And, after all, who is it that the law will reach if we have such legislation? Not the man that is going to protect himself, not the man who wants to avoid danger, not the man who believes

in the safety and protection of the lives and the limbs of every other man working in and around the mine, but the individual who has no regard for his own life but has a great deal less regard for the lives and the limbs and the health of his fellow worker.

I may not be in accord with the ideas of other men on this question, but when we study the statistics, when we learn of the number of men who are killed from riding motors, who get into trips where they haven't any business, where they work under a roof ready to drop on them, when we know there are men who are recklessly drilling holes and firing shots, when they don't know what the results are going to be, if they happen to be windy shots or blown-out shots, from which all our dust explosions take place, when we realize we have a certain class of men who will take those risks and do those things, then, gentlemen, it seems to me that the American Mining Congress can do no better work along that line than to begin an agitation, if you want to take no action, begin the agitation of a new movement, a new method for preventing accidents in the coal mining industry of the United States. You have carried on the work of the safety first movement until we have reached practically the climax in it. The operators everywhere are taking the initiative without any reference to law enforcement and they are introducing and using the most modern safety appliances that money can purchase. But if you stop to think that after you have furnished the very best and most modern safety appliance, after you have the most efficient inspection department, after you have provided your fire bosses and safety patrolmen, if they haven't got the power to enforce their orders, then the entire safety movement becomes a farce so far as reducing the fatalities and the injuries in the coal mining industry in the United States is concerned.

I do not know whether it is a new thought to you or not, but I am firmly convinced in my own mind now, I was convinced of it when I had other responsibilities resting on my shoulders and I shall continue to take what I consider a positive, if it is not a radical, stand in compelling a certain minority of men in the mines to protect themselves, whether they want to do so or not.

I thank you. (Applause.)

THE VALUE OF STATE MINING ORGANIZATIONS.

Prof. C. F. Willis, Tucson, Arizona.

Mr. Chairman, Ladies and Gentlemen: I am here somewhat as an afterthought. When I came to this convention I came to listen and learn, but after I arrived here Mr. Gallbreath told me that I must inflict a few remarks upon you, and I chose as my subject the Value of State Mining Organizations. So I will say to you a few words on organization and co-operation.

Gentlemen, we sit back in our swivel chairs and bewail the fact that the mining industry cannot get the recognition that it should, that the mining industry cannot get the federal and the state aid that it should; that the mining industry cannot get the laws that it wants and should have; that the mining industry gets all the worst of it in the passing of state laws. I want to say to you that the mining industry is a most misunderstood industry, and while I regret to say it, it is regarded by the layman with suspicion.

Now, we all know that the farmer gets all the laws he wants, and we know that he gets good ones. As we all know, the farmer gets 30 cents per capita from the public fund, and he produces only \$900 per capita, while the miner gets only 2 cents per capita, and produces \$1,800. Just think of that comparison. Now, the farmer gets all the assistance he needs and most of the assistance he wants. The farmer is not hampered or hindered by any law, but, rather, he is assisted by the laws. Farming, mind you, is regarded as a clean, open, aboveboard industry, while mining, although we know it to be just as clean, is not so regarded by the public.

You are aware of the fact that the mining industry as a whole is not treated on the square. We are not fairly treated. We know we are getting the worst of it, but I ask you, why? Let us just look the facts straight in the face and talk plainly to ourselves, and let us disabuse ourselves as to the facts. Why does not mining get what is coming to it? Why does not the mining industry demand what is coming to it? And why cannot we make our demands stick? Gentlemen, the conditions are of our own making; we are responsible for them, and when we face them squarely and honestly, we must admit that we ourselves are at fault. Why

are we at fault? We lack adequate organization and co-operation. Why does the farmer get his laws passed? Simply because he is organized. Why does the farmer get his large appropriations from the state and federal government? It is not because there are so many farmers, but just simply because they are organized. Organization is the reason. Why did the farmer get his rural credit bill in such a short time, while the revision of the mining laws ended in a mixup and a dispute? Simply because the farmers are so well organized. They were organized and they agreed on just exactly what they wanted, while the miners have a thousand diverse opinions as to what they want, so they cannot really agree on what they do want.

Gentlemen, you organize your business into its component departments, and you organize your individual departments still further. You continue your organization right down to the individual, and as a result you get efficiency. Why does not the nation need such organization? The nation does need organization, and mining is but one department of the nation's industry. We have the general organization, the American Mining Congress, and we have the privates, the mining operators, but where are the colonels, the majors, the captains, the lieutenants, the sergeants and the corporals? Gentlemen, we have not completed our organization. We have the top and the bottom, but we have not the intermediate steps organized.

Gentlemen, let us learn our lesson from the farmers, and I am sure we all envy them their conditions. When once their organization was started and well on its way, the national government took it up because the national government had to,—because the farmers demanded it, and now in every state leaders are appointed, state leaders, who are paid out of the federal funds, to further organize and maintain the organization of the farmers. Yes, more than that, leaders are appointed in each state to organize the boys and girls into clubs and bring them up, imbued with the ideas and ideals of organization. As the situation stands today, almost every farmer within communication of a social or population center is a member of a farm improvement association; that farm improvement association is a member of the county association; the county association is a member of the state association; the state association is a member of the district organization, and the district organization is a member of the national association. There is your

organization of the farmers, gentlemen, step by step from the individual up to the national association.

When any questions of state affairs or candidates for state office are taken up, they are taken up to the state organization, or the state association which is composed of delegates from the county associations which, in turn, is composed of individual associations, and the individual associations are composed of all the farmers. Now, when these farmers want something they get it. They get it not by reason, so much, of their numerical strength, as from the fact that they know what they want, or they decide what they want, and then they ask for it. They enjoy such privileges as franking through the mails, and, in fact, the Government of the United States is now paying the expenses of maintaining and further organizing and making more useful the organizations which they themselves inaugurated, and which gave them what they wanted.

Now, those are not the only advantages. There are many others. One of the greatest is in their own inter-communication. They get together. They hear each other's problems. They discuss the economies of their business. They learn the other fellow's problems. They learn how he worked out his problems and they learn from the other fellow's experience.

Gentlemen, just think how many thousands of dollars would have been saved to you had you known that there were at least 100 other people grappling with the same particular problems that had been bothering you. You spent many hundreds, or possibly thousands of dollars in the investigation of your particular problem. Yet you did not know that that expense and investigation had been duplicated a hundred times. Had you gotten together with the other fellow and exchanged experiences and views, you would have found, perhaps, the other fellow was further along with his investigation, and you would have been content to wait until you learned the result, and thus have saved for yourself and ninety-nine other individuals the expense of duplication.

Just take this thought home to your own business. You certainly would consider the unit system of organization absurd in your own affairs, your own business affairs, and yet you permit it in the great national industry of mining.

I recently heard Ralph Parsett, the well-known lecturer, humorist and philosopher, and I remember one illustration he made. He said, "As the circus posters would say, I have prepared at great expense and trouble my apparatus, with which I wish to illustrate

my point. I have here a Mason jar with a lot of beans representing individuals. Here are several bunches of about ten beans in each bunch glued together. They are still individuals, but they are banded together. They are fastened together by means of glue." Then he illustrated his point. He took the beans which were glued together and many loose beans, and putting them into the jar, said, "In they go, into the mill wheel of the nation's progress, which continually stirs them up and shakes them back and forth and up and down. But look," he said, "the ones which are banded together are on the top. They demand attention. They get attention. Let us push them down again and shake them into the hustle and the bustle of the hurly burly of the business of the country again. They will not stay down. They bob up again and demand and receive attention, while the individual beans fall to the bottom. They demand your attention before you can ever give your attention to the affairs of the individual. Here is a lonesome little fellow down at the bottom crying out, 'Help me, help me; please give me a boost.' Now, we will be kind to him, and I will put him on the top, where he will receive attention." Then he shook the jar of beans and, of course, the individual bean sank to the bottom. The world does not stand still, but continues to shake us and stir us around, and, as illustrated by Mr. Parlett, down goes the individual to the bottom, while the individual beans banded together by and for a common interest come to the top, and demand and receive attention.

Now, think it over. You can try that experiment yourself. Just take the beans that are banded together and put them down at the bottom of the jar, with the individual beans on top, and shake them, and up to the top again will come the banded ones, just as when the affairs of our great nation roll on, up to the top comes the influence of organization which pushes the individual out of sight. Try this yourself and then think about it, and then try it again and you will convince yourself that it is not an accident, but one of the surest of all of nature's laws.

Gentlemen, you spend hours and days and weeks, and quite often years, and many thousands of dollars in trying to improve the conditions of your business. You spend hundreds and thousands, and often hundreds of thousands of dollars trying to improve and better the conditions of your business. But let me ask you, and you ask yourself, how much time and how much money and how much organized thought and effort and labor do you spend

in endeavoring to improve the conditions under which your business is run? You will doubtless say, "I give it a great deal of thought and attention," but let me ask you again, if you keep those thoughts to yourself what good is all this effort going to do? On the other hand, however, you meet over the dinner table with a small body of local men interested in the same line of business and your thought and experience become known. Your delegate passes it along to the council meeting, and so on it goes until it is a component part and parcel of the detailed information at hand on file in the national office.

I can imagine many of you are saying to yourselves, "That fellow is a dreamer; organization will not accomplish all that it thinks it will. Organization is not the panacea of all evil." Quite true. I agree with you: it is not, but let me just tell you a little story of my own observation, if you will pardon my going into personalities, as it were.

As you doubtless know, it was but a few years ago when the State of Arizona had an unenviable reputation—I may say a bad reputation, or at least a reputation for freak laws, a reputation for labor dominance, a reputation for unfair treatment of capital and so on. I know that much of this was not true, but the trouble lay in the fear of what might be done, more than of what had already been done. There was unrest and uncertainty in the air. Then, two years ago, when the American Congress met in Phoenix, Arizona, a state chapter was suggested, and this was extended to the county sections, with the stimulation and enthusiasm created at the meeting in Phoenix. The feeling of working together spread, the influence spread, and it was quite natural that the next suggestion was, "Why not pool our technical problems, as well as our civic and economic problems?" The result of that feeling and enthusiasm was the formation of the Arizona Section of the A. I. M. E. Although the promotion of safety work was a part of the mining congress program, it did not fit in smoothly with the work of the local chapters, and the direct result of that knowledge was more organization, an organization called the Southwestern Mine Safety Association. The local chapter included not only the mining men, but those men whose business depended upon mines, machinery men who sold the mining machinery, the merchants who sold provisions to the people engaged in mining, the bankers who handled their money, the farmer who disposed of his product in a mining camp, the consumer of total production; in fact, everybody

interested in mining, and let me ask you right here, what business is there that is not interested either directly or indirectly, or a larger or less extent, in the mining industry? It is true that it took quite some time to show them and convince them as to their relation to the mining industry, and much time, effort and expense was expended in organization work, but let me just cite to you a few examples of what has been the result of but two short years of work in this direction, much of which was spent merely in the men getting together.

The first legislature met but one month after organization, and found, of course, that the local chapter was quite unprepared to deal with the situation. It was active, however, and although no real constructive, helpful legislation was obtained, much legislation which seemed destructive was balked. At that time one of the main issues was mine taxation, and you won't find in Arizona today a mining man who will not tell you that a direct result of the work was a more equitable distribution of taxes. Now, this was about the first thing accomplished, accomplished, mind you, without much of an organization, and only after two short months of work.

The second result of this work was that it created a better and more unified feeling among the operators in the State of Arizona. As a result of their getting together in these organizations, they have realized how many, many things they have in common, and that are in perfect harmony and accord with each other's interests, and, as a result thereof, they also, the individual operators, are in perfect harmony and accord.

Another thing we attribute to this organization work it was largely responsible for the establishment of the Arizona State Bureau of Mines, and for the bringing into the State of Arizona one of the first three federal mining experimental stations. This latter accomplishment would have been quite impossible, had it not been for our organization. In the State of Arizona there were the cities of Globe, Douglas, Bisbee, Tucson, Prescott and Phoenix, all clamoring for the station, but when the organization decided that Tucson should have it, Globe, Bisbee, Douglas, Prescott and Phoenix all got out and worked for Tucson; they pulled for Tucson, and Tucson got it, and from now on the whole State will support and assist Tucson in the maintenance of that station. It is not like the situation they have up in the State of Washington with Spokane and Seattle flying at each other's throats, and as a result of the factional fight neither one getting what they desire.

One of the greatest results of our organization work is that it has done away almost entirely with these sectional jealousies that invariably hurt a State, these sectional rivalries. Down there now our slogan is not that "I'm for Bisbee," or "I'm for Prescott," but it is, "I'm for Arizona."

Let me cite to you another instance of the benefit derived from our organization work. When the copper tax came up in the revenue bill during the last session of Congress, then it was that Arizona organization came into play, and, gentlemen, in less than 24 hours after that came up, every individual or local chapter of the organization was writing and wiring to Washington, and let me tell you our senators and our representatives at Washington would never have dared to come home if that bill had passed. Now, it is undoubtedly true that many other states did their share in this work, but the fact that Arizona was organized, unified and ready to use that unified organization, gave us quick action with a minimum of trouble and with direct results.

Now, there is another phase of this matter to which I wish to call your attention with regard to the manner in which organization is helpful to the mining industry. In our own state the organization played an important part in the recent election, particularly in the selection of better and more able men to run for office; the organization down there was partially responsible for the overthrow of the Democratic Governor, who has been in office for five years now, and who was considered unbeatable, his position impregnable from a political standpoint. However, in spite of the fact that the State of Arizona is normally two to one Democratic, a member of the American Mining Congress, and a Republican, is reported elected Governor, because the present incumbent was considered by many to be Socialistic, radical, and unfair to capital. Whether or not those accusations are true, is not for me to say, but I do know that organization is the reason for his overthrow. By this I do not mean to say that the operators have gone into politics, for they have not gone into politics, nor have they made, or are they making, any attempt to run the state politically.

Another step towards the goal of desired conditions, in so far as organization is concerned has been taken by the formation of the State Board of Trade, which consists of representatives of all of the organizations in the state; from the Cattlemen's Association, the Farm Improvement Association and the Taxpayers' Association, the Chambers of Commerce, local section of the Mining Con-

gress, and of all the others. This Board of Trade meets four times yearly. The main object of the State Board of Trade is co-operation. It has an executive board of five men who represent the cattle, agricultural, mining, mercantile and banking industries. This carries out our plan of organization to its ultimate conclusion and, as it were, caps the climax down there, or puts a fine finish, if I may say so, on our organization, for, as you know, without co-operation from all industries, and the molding, fostering and up-building of a spirit of everybody working for one cause, the cause of the State of Arizona, organization will fail in its main purpose. Under proper organization it is not the miner against the farmer, or the farmer fighting the cattleman, or labor against capital, but it is the farmer, cattleman, the mine operator and laborer all pulling together for the good of the state, and for the good of the nation. Now, we do not expect to reach or come anywhere near that goal in this generation, but I certainly believe that the old saying "hitch your wagon to a star" holds true in organization, and the higher we keep our aims, the higher will be our attainments.

Gentlemen, we have accomplished all of this in two short years, with an organization that was immature in its component parts, but we face the real work ahead with a real organization, with real ammunition, real breastworks and a real army, organized and ready to fight.

I know that you will all say that you are too busy to attend to this sort of thing, but let me ask you, when you have a job in your own organization that you are too busy to attend to, what do you do? You assign it to some one else who is under you. In this case you can assign this job to the American Mining Congress. There is not an operating mine in this country that could not well afford to spend \$10,000 a year for ten consecutive years to duplicate what Arizona alone has done, and what Arizona is going to do in that time.

Gentlemen, let me say to you in conclusion, join the company. Let your company join the regiment; let the regiment join the corps, let the corps join the army, and, under the able generalship of the American Mining Congress, it cannot and will not be said again that the mining industry does not receive the consideration to which it is entitled. It will demand the attention which is its rightful due, and will receive it. I thank you.

(Applause.)

UNIFORM COAL MINING LAWS.

Jas. W. Paul, Pittsburgh, Pa.

Standardization of mining laws has been discussed by a number of organizations and institutes but as yet no material progress has been made so far as suggested standards apply to coal mining laws.

The question has received attention by the Mine Inspectors' Institute of U. S. A., at several of its annual meetings since its organization in June, 1908, and a committee was appointed, which submitted a report recommending the preparation of statistical data on mine accidents with a view of securing uniformity in the publication of accident statistics, and while the members of the Institute adopted the report, practically none of the states altered their published schedules to conform with the recommendation.

The main purpose of the Inspectors' Institute was to promote uniformity in coal mine legislation, but in this work the Institute has been much handicapped by the frequent changes made in the personnel of the state inspectors and the lack of co-operation of the states in not providing for the attendance of the inspectors. Many of the inspectors are of the opinion that it is practicable to adopt a uniform code of laws covering many pivots of similarity in coal mining, while some inspectors claim that the effort is not worth while owing to the dissimilarity of local conditions.

We will grant the contention that a universal code covering mining in general would not be applicable to all local conditions, but will not concede that uniformity is impracticable in many features of a law which has for its purpose greater safety in mining.

The work of unifying and standardizing the forms of reports in mine accidents has received renewed impetus through the conference of inspectors, commissioners of labor and compensation chiefs which was held last spring in Washington at the instance of the Bureau of Mines. However, the inspectors and the heads of the State mining departments have the authority within themselves to adopt these forms of report without the sanction of legislative act.

It is to be hoped that there will be a general adoption of these forms for standardizing accident statistics, thus admitting of a scientific study and comparison of all mine accidents in the country.

As to uniform legislation, there is need of a tentative draft for preliminary study and criticism. This Congress is pre-eminently fitted to undertake this work, since it is representative of labor, capital and men of technical attainments. The manner of accomplishing this preliminary draft is open for suggestions, but the author will presume to outline and suggest the following for your consideration:

1. Appoint a legislative committee on coal mining laws from the membership of the Congress.
2. Select an advisory committee from among the following:
 - (a) American Institute of Mining Engineers.
 - (b) Mine Inspectors' Institute of U. S. A.
 - (c) United Mine Workers of America.
 - (d) National Safety Council.
 - (e) U. S. Bureau of Mines.
3. Have the chairman of the legislative committee confer with members of the advisory committee and in co-operation with them, draw up a code tentatively and submit the draft to the several Institutes for consideration, suggestions or amendments at their annual meetings. A redraft containing the suggestions and amendments should be furnished the advisory committee and finally be returned to the legislative committee for its consideration before submitting the finished form to this Congress.

Unless full freedom is given all parties in interest to criticize and offer suggestions to be considered for incorporation in the finished code, the work of the Congress will not be received, in some quarters, as deserving favorable consideration.

It appears that the legislative committee would avoid much antagonism and opposition to its work if it should decline to incorporate any provision in the draft which has to do with fixing wages or compensation for accidents. Let these features be provided by the states as they deem most fitting. The most this Congress can hope to accomplish will be to furnish a reasonable and practical code which may be suitable for adoption in all coal producing states without undue hardship on the industry or labor. An appeal, however, may be made that each coal producing state adopt the code

by legislative act or authority and designate an agency through which the enforcement of the provisions of the code may be carried out in an efficient manner.

The most logical agency for enforcing the provisions would come within the province of the mine inspection service of the states.

Similarity of Conditions.

In all classes of coal mining there are many conditions which are similar, particularly as they are factors pertaining to the hazard of mining. Coal dust machinery, haulage systems, mine roof, traveling ways, ventilation, drainage, lighting and the use of explosives are some of the factors that are common to all coal mines.

Some desirable points of similarity in coal mining legislation are presented for your consideration and discussion:

1. Experience and qualifications of the Mine Inspector.

All states which have state inspection require that the inspector shall have certain qualifications such as a certain length of experience in mining and a knowledge of the elements of mining, but in few instances is the inspector required to have a technical knowledge of the science of mining.

2. Certificates of competency and qualifications.

In a few states the inspector must have qualified before an examining board before he is eligible for appointment or election to the position of inspector. In the majority of the states the inspectors are appointed through political preference and in like manner they are too frequently dropped from the inspection staff.

3. Appointive power.

The appointive authority in the majority of the states rests with the governor. In two states the inspectors are elected by the general electorate, and in another they are selected by a state commission.

In a number of the states the inspectors are under the direction of a chief of the inspection service; in one state under the direction of an industrial commission and in other states the inspectors are independent of any directing head.

4. Terms of office of the inspector.

To conform with the spirit of the spoils system, the inspectors are generally appointed for a term of 4 years, and if he has been a good servant to the state and his party, he may be reappointed for a second or third term. Some effort has been

made to eliminate political preferment in some of the states but it has been successful in part only in one state.

It may be inadvisable to include the above subjects in a code of uniform laws since each state has its notions as to how it should manage its internal affairs. The above, however, illustrates the lack of uniformity in the matter of selecting the inspectors and is symbolic of many features of the laws of the different states.

There are, however, a number of important points to which uniformity is applicable and highly desirable. Some of these are:

1. Qualification of mine foremen and fire bosses, and a uniform certificate which may be accepted by the several states without re-examination.

2. The adoption of a form of inspection certificate which the inspector shall issue following his visit to a mine.

3. Vesting in the inspector authority to promulgate rules to govern conditions which appear to him to be dangerous, but which are not covered by law.

4. Methods of conducting ventilation; frequency of air splits and use of brattice at the working face. Volume of air required and quality of air.

5. Establishment of a safe clearance on haulage roads and ample room at points at which trips of cars pass or are assembled.

6. Method of checking men in and out of mines.

7. Code of signals for hoisting in shafts and slopes and for haulage underground.

8. To prevent overwinding in shafts, and safety in hoisting in shafts.

9. Fire protection on the surface and underground.

10. Electrical installations underground.

11. Mining methods with view of safety and conservation of fuel.

12. Use of, storage and handling of explosives.

13. Shot firing methods and preparation of the shot.

14. Danger signs and guide signs underground.

15. Safeguarding man trips.

16. Regular and systematic inspection of hoisting machinery, rope and appliances.

17. Use of electricity in gaseous mines.

18. Escape ways, refuge holes and safety chambers.

19. Telephone underground, safe installation and use.

20. Underground sanitation, wash and change houses.
21. Emergency hospitals and first aid stations.
22. Conditions under which gasoline and volatile oils may be used or stored underground.
23. Timbering in mines. Local conditions govern the system of timbering best suited to take care of roof hazards, but most of our laws are deficient in not requiring the adoption of some system of timbering or some regularity in placing timber and props. State inspectors report a reduction of accidents as the result of the adoption of a regular system of timbering by some of the progressive mining companies, but in each case the roof conditions determined the details of the system.
24. Coal dust hazard.

It is an open question if this Congress is justified in attempting to formulate a uniform law that will be applicable to all bituminous mines. Our state laws are very indefinite in their treatment on this subject and are not based on scientific principals. Most of the laws put the responsibility on the state inspector, to see that all dangerous coal dust is removed from the mine or is kept properly watered down or sprinkled with water.

It is to be hoped that the U. S. Bureau of Mines may be able to furnish a practical solution to this hazard which will be given universal adoption.

25. First Aid and Mine Rescue.

Little legislation has been adopted by the states having to do with the establishing for rescue stations and the teachings of first aid to the injured, and while these subjects have been given much consideration and many rescue stations have been established by the operators and in a few instances by the miners, the time seems propitious for presenting a draft for legislation which will result in uniformity where rescue stations may be adopted as the result of future state legislation.

The author favors the establishing of joint rescue stations which may serve a group of mines.

For a general review of the mine inspection laws of the states, the author of this paper will refer the reader to a paper on "Mine Inspection" presented by the author and printed in the Transactions of the International Engineering Congress, 1915.

THE COMMISSION PLAN OF PREPARING MINING LEGISLATION IN INDIANA.

M. I. Scollard, Indiana.

By an act approved on March 10, 1915, the General Assembly of the State of Indiana created a commission of six members to codify the laws relating to mines and mining and to recommend such amendments and changes in the mining laws as will be conducive to the highest and best interests of the mining industry in all its relations. The Commission consists of two miners actively engaged in the mining of coal, two persons familiar with the operation of coal mines, a mining engineer recommended by the Federal Bureau of Mines, and the Director of the Bureau of Legislative Information. Five hundred dollars was appropriated to defray the expenses of the members of the Commission and to assist in conducting such investigations as might be authorized.

In its membership and organization and in its equipment to discharge the functions which the law prescribes, this Commission is ideal. By this arrangement, equal and adequate representation is afforded to each interest affected by men commanding the confidence of their colleagues and selected for their familiarity with the problems involved, directly and indirectly, in the business of mining. Both the miners and the mine operators are thus afforded the opportunity of advancing or opposing any regulation which may be beneficial or detrimental to its interests. The mining engineer, appointed on recommendation of the Federal Bureau of Mines, is enabled to place at the disposal of the Commission a technical and scientific knowledge of mines and mining problems. As a representative of the Federal Bureau of Mines, he not only adds prestige to the Commission but is enabled to detach himself sufficiently from local controversies to advance recommendations with authority and freedom from partiality. It is an additional good fortune that the engineer appointed is a resident of the state and as such, familiar with the peculiarities of mining problems in Indiana. The Director of the Bureau of Legislative Information is the officer whose duty it is to investigate any question which may become the subject of legislation. He is likewise the official draftsman for the General Assembly and is supposed to possess a technical and scientific knowledge of the construction of laws and the statement of statutory provisions in precise legal language. All investigations authorized and all the tentative drafting has been done in co-operation with and

under direction of this department. At its first meeting, and before an organization had been formally perfected, the Commission solicited the assistance and co-operation of the State Inspector of Mines and has freely and cordially availed itself of the knowledge and experience of that department.

The paramount duty of the Commission is to consolidate and codify the existing mine laws of the state. These laws were enacted independently during a period covering more than a dozen years, and each of the six laws now constituting the statutory regulations pertaining to mines has been repeatedly amended. As a result, the laws have become somewhat confused; overlapping and contradictory provisions prevail; where later laws supersede earlier ones, the confusion is multiplied; where the laws are cumulative, the administrative officers are frequently in doubt as to their rational application. Besides, the law as it stands is somewhat baffling for purposes of consultation. Hence the Commission has concluded, first of all, to consolidate and rearrange the existing laws in a more logical and scientific order, treating but one single subject in a section, and grouping those sections together consecutively which bear upon the same general subject.

The second thing which the Commission is attempting to do is to incorporate in the newly codified law such additional provisions as the recent development of the mining industry has rendered desirable or imperative. In order to more satisfactorily determine the present status of mine legislation, the Director of the Bureau of Legislative Information has made a critical examination and analysis of the mine laws of other states and has prepared a workable synopsis of his investigations and placed it at the disposal of the members of the Commission. A member of the staff of the Bureau has also spent some time in consultation with the experts of the Federal Bureau of Mines and has been enabled to present, by their cordial and painstaking co-operation, many valuable suggestions to the Commission. This material serves as a working basis and as each section is taken up, suggestions are presented and discussed by the several members of the Commission and the State Mine Inspector.

The superiority of this method of codifying laws is obvious. It affords sufficient leisure to work out the details of bills with care; it enables the Commission to avail itself of the services of experts; and it presents to the General Assembly a consistent measure commanding the united support of all interests affected.

Among the supplementary provisions which have been under consideration by the commission and which will in all probability be incorporated in the law are the following:

In the State of Indiana there are a large number of clay mines operated by the use of complicated machinery which have never been placed under the jurisdiction of the department of inspection. Aside from the dangers attending the process of blasting, which is negligible in a clay mine, since none of the chemical elements present are susceptible of supporting combustion, the perils of a clay mine are fully as great as those of a coal mine and no good reason can be assigned for exempting them from regulation. The Commission, therefore, proposes to recommend that all clay mines be placed under the jurisdiction of the inspection department and subjected to such reasonable regulations as may be prescribed by law.

Mechanical processes employed in mining have been introduced more rapidly than the safety and precautionary regulations and measures necessary to safeguard the miners from the new and additional perils to which these new processes expose them. Since the last revision of the law, for instance, electrical power and electrically driven machinery has been introduced extensively. This involves the installation of high power transmission wires throughout the haulage roads and entry ways which not infrequently are exposed for want of proper insulation or protection. As a result, to the fatalities previously recorded from falling slate, premature blasts and asphyxiation has been added that of electrocution. Many operators have voluntarily established and maintained adequate safeguards against this new danger; other operators have responded cordially to the recommendations of the inspection department to install such safeguards as the nature of the danger seemed to warrant; others, through indifference or disinclination to incur the necessary financial outlay, have declined to equip their mines with even the simplest and most inexpensive safety devices until some unnecessary revolting and costly fatality has resulted.

During the past few years, and subsequent to the last statutory enactment on the subject, first motion hoisting engines have been installed in the most modern and up-to-date mines. The law as it stands is designed to limit the speed of the cage in lowering men into and hoisting them out of the mine to 600 feet per minute. The provision, however, is made to apply to the velocity of the engine and a strict compliance with this obsolete statutory regulation would warrant the engineer in speeding his cage to 2,000 feet per minute,

an indefensible practice rendered strictly legal because legislation has proved too dilatory to respond to modern economic progress.

It may happen that gas which generates in abandoned oil or gas wells is liberated by blasts exploded in mines approaching the vicinity of such wells and fill the rooms of the mine with gas and render them dangerous to the miners. It has been suggested that the location of all such oil and gas wells be recorded with some county officer and that the engineer preparing the map of the mine shall be required to indicate the location of such wells, if any exist.

Among other recommendations, the following may be briefly summarized:

To require mine operators to install and maintain lights at the surface landing; also to provide a signal from the surface landing to the engine house to be used when lowering men into the mine; in addition to the speaking tubes, to install telephones in all mines having a depth of 250 feet or more, connecting the engine room with the shaft bottom; to require that first aid supplies furnished shall be such as are approved by modern sanitary science; to prohibit shot-firers to descend into the mine until the close of the shift and until all miners have been hoisted out of the mine; to make it unlawful for miners to have in their possession tools used for tamping purposes other than those prescribed by law; and recommending that the working place of each miner shall be examined for gas not less than three hours before each shift. The question of ventilation is still under advisement by the Commission and suggestions have been advanced and considered relative to the quantity of air supplied to a mine; the distance apart of breakthroughs; and the number of men assigned to each separate current or split. The question of the storage of powder in mines has likewise been under consideration and the Commission has agreed to incorporate a section requiring miners to store their powder in substantial wooden boxes securely locked.

It is fortunate that this meeting of the Uniform Mining Laws conference has been held before the Indiana Commission has completed its labors, as we shall doubtless be enabled to obtain many valuable suggestions from the papers and discussions presented here.

ADVISABILITY OF PREPARING MINING LEGISLATION THROUGH COMMISSIONS.

Samuel A. Taylor, Pittsburgh, Pa.

The question of whether or not a commission is the best way to arrive at a proper mining law is one worthy of careful consideration.

I have been asked to talk about the experience of Pennsylvania in this line.

To begin with, I will have to say that so far as I am informed, there has not been in Pennsylvania any commission to suggest a mining law.

I have not had the opportunity to inquire into the matter from records to ascertain definitely whether there has been any commission or not; but from my own knowledge and from inquiry made among mining men there has not been any such commissions; at least for the bituminous coal mines, although I understand today there has been for the anthracite coal mines.

However, I have served on a commission in Pennsylvania, the purpose of which was to ascertain whether or not there was any need for a law governing the practice of engineering in this state, and if so, to suggest or prepare a draft of a law and submit it to the governor of the state for transmission to the legislature.

I might relate briefly the method of procedure of the commission charged as it was with a two-fold purpose.

The first of which was to ascertain if such a law was desired or necessary. This phase of the inquiry would not be applicable to your case, for the reason that I think all are agreed a mining law is necessary. However, in our case, in order to ascertain the mind of the engineers and those interested in the proposition, we held three public hearings: one in Pittsburgh, the western end of the state; one in Philadelphia, the eastern end, and one in Harrisburg, the central and capital of the state. These hearings were held after we had prepared a tentative draft of a bill, and sent it out to all interested throughout the state, with a request that those receiving the copy would study the contents of the bill and give us

their views, either in writing or by appearing before the commission at the public hearings.

The result of this method was such that it proved the wisdom of the arrangement, for we had several hundred persons that responded to the request for information, and the information received from them was of such a nature that the commission was able to make a very exhaustive report to the Governor.

In discussing the question before us, I am quite sure that all who are interested in coal mining in any way will be in favor of a mining law.

Let us look briefly into the question of what should constitute a good mining law, and then see if in the preparation of such a law a commission would be an effective way of handling the proposition.

A good mining law should, in my opinion, conserve three main interests: First, the miner, as to safety and healthfulness of the mine in which he has to labor; second, the operator or owner, which in addition to the necessities of the above statement for the miner, as to the requirements for safety and healthfulness, should also conserve the property interests, both as to economy of operation and securing of all, or as nearly all, of the coal as possible, without adding burdens which would be of no interest in particular to the miner and only redound to the selfish interests of some business outside of the regular business of producing coal; third, and one which in the ordinary method of drafting mining laws is very often lost sight of entirely, viz., the interest of the consuming public, both as to the present requirements, and also looking to the future, by having in mind the conserving, insofar as practicable, of the fuel supply for future generations.

I am of the opinion that if in the preparation of a mining law it is gone about with all of these things in mind, that some of the rash and useless things in many of the mining laws now on the statute books of our coal mining states would be done away with, and in their place would be placed laws amply protecting the miner, without adding such things as are of no particular advantage to them, or to the safety of the mining property; but which only add to the expense of equipping and operating the mine, with the consequent extra charge having to be borne by the consumer in the end.

I do not think it is necessary to elaborate on this phase of the subject to any great extent, but simply cite an example of what I mean by exacting things which do not add safety or health to the

miners. One thing in particular is the amount of air required to be passed into mines. In many of the old laws this was stipulated at 100 cubic feet per minute per man, which in many of the later laws has been increased to 150 cubic feet per minute per man. Now the first amount was fixed in the Pennsylvania law (which was one of the first) on the basis that a normal man would consume when working under normal conditions between 9 cubic feet and 10 cubic feet of air per minute; and with this as a basis they figured that to make the amount ten times this at the fan would be ample to not only give the men all the fresh air they would need to breathe, but also carry off all objectionable matters which might be encountered or produced in the mine.

The reasons for the new requirement were never to my mind clearly set forth. One of the arguments was the introduction of more machinery in the mines. Now, to my way of thinking, these machines making, as they do, more dust, should have less air rather than more, for the introduction of more air had to be accomplished with a greater velocity, as the sizes of entries or airways remained the same.

This greater velocity of air carried more of the dust in suspension and made it more dangerous as to the extent of an explosion, should one take place, than would be the case if only such an amount of air as was necessary were required.

The forcing of the excess air through the mines cost the operator a considerable amount more than under the old law, without any advantage to the men, but with the disadvantage to the operator having to invest more money in machinery; and if he can protect himself by getting a higher price for his coal, then the third party, or the consuming public, has in the end to pay more than he should; while the miner, under the old law, was fully protected, for when it was necessary for more air, the mine inspector had the right to compel the same, which I think is much better.

Now, this is only one of a number of things that are in many of our laws which are unfair to either the miner, operator or the consumer, and which should be avoided as far as possible in the preparation of a fair mining law.

To accomplish the preparation of such a law, I think it is of the utmost importance that those charged with the preparation be free from the pressure of politics, as usually exercised or practiced in the passage of legislation. At the same time, the task should be

entrusted to those who would have some qualification, either by personal knowledge or ability, to ascertain the facts from the mass of information and suggestions which are ordinarily available, and sometimes even attempted to be forced into a bill from some personal motive.

In conclusion, it does, therefore, seem to me that a commission composed of a miner, an operator, a mining engineer, a lawyer and someone possessed of sufficient knowledge, both as to mining in a general way and economics in a broad way, as would enable him to safeguard the interest of the public or the consumer, would constitute a body that would be able to prepare a law that would give the best results as a fair, comprehensive and workable proposition, for the mining industry. If a larger commission is desirable, it could be formed by doubling or trebling the above unit.

WHAT CAN UNIFORM MINING LEGISLATION HOPE TO ACCOMPLISH?

By Van H. Manning, Washington, D. C.

In order to make plain the scope of my remarks, I shall begin by defining the term "mining legislation." This term I apply to all legislation relating to the acquisition and transfer of mines and mineral lands, to the safety and health of those engaged in the mineral industries, and to the prevention of waste and the increase of efficiency in the utilization of ores, metals and mineral substances. In thus applying the term, I may seem to broaden my theme unduly, but my reasons for doing so will be evident if you will consider that the ultimate aim of such legislation should be to increase safety, improve health, and, by lessening litigation and removing legal uncertainties, to advance national efficiency. At present the mining industry, using that term broadly, is not only burdened with much confusing legislation, municipal, state and national, but it also suffers from a lack of legislation essential to assuring the wise and efficient use of our mineral resources. As an example, I may cite the multiplicity of regulations governing the transportation, storage, and sale of kerosene and gasoline, and the utter lack in many states of effective legislation for preventing enormous waste of petroleum and natural gas. Also, I call to your attention the uncertainties of our Federal mining land law, and the lack in many states of adequate laws for protecting the safety and health of metal miners.

In discussing what may be accomplished by uniform mining legislation, I shall for convenience consider the matter with regard, first, to efficiency, and, second, to better health and greater safety.

I shall give especial attention to the work of the Bureau of Mines, which, as you know, has "Safety and Efficiency" as its motto, and to the efforts of the Department of the Interior.

Work of the Bureau of Mines.

As Director of the Bureau of Mines, Dr. Jos. A. Holmes called attention to the lack of uniformity in the mining laws of the different states and the desirability of uniform legislation. The matter was ever before him in planning the investigation of the bureau,

and he constantly sought the co-operation of engineering societies and of other organizations in the endeavor to aid the enactment of better laws. One of the fruits of his efforts was the publication, as a Bureau of Mines bulletin, of a proposed code of regulations for metal mines. This code was prepared by a committee of five distinguished mining engineers, John Hays Hammond, W. R. Ingalls, Jas. Douglas, J. Parke Channing, and J. R. Finlay, and representing not only the earnest thought of these gentlemen, but the suggestions and criticisms offered by members of the Mining and Metallurgical Society of America, the American Institute of Mining Engineers, and other organizations. These rules provide for a thorough system of mine inspection and for safeguarding the miner against the dangers of his occupation. Though their chief aim is safety, yet they are intended to contribute to greater efficiency in mining methods.

In efforts to protect miners from the hazard occasioned by oil and gas wells drilled through coal beds, the Bureau of Mines was instrumental in having a conference of coal mine and oil well operators and state geologists held in Pittsburgh in February, 1913. At this conference desirable changes in well drilling practice were discussed, as well as a proposed code setting forth the duties of oil and gas inspectors, and the precautions that should be observed in drilling and plugging wells.

Engineers of the bureau, in cooperation with members of the American Society of Electrical Engineers and other interested parties, have recently prepared a draft of a proposed law governing the installation of electrical apparatus in coal mines. This draft embodies the results of investigations dealing with the use of electricity for light and power, and the establishment of effective safeguards against explosions or fires from sparks, flashes or arcs, and against shock from contact with live wires or with equipment accidentally charged. The proposed regulation will soon be published as a technical paper. A set of regulations prepared by the Bureau of Mines in cooperation with other interested parties some years ago, was bodily incorporated in the mining code of the State of Pennsylvania.

Revision of Federal Mining Land Laws.

From time to time a demand has been heard for a revision of our Federal mining land laws that would clarify the vague, conflicting or contradictory provisions of the present code, or for

the enactment of a new code that would embody the present needs of the mining industry. This demand has been ably voiced by eminent engineers and members of the bar, who have called attention to the burdens inflicted on innocent parties through the provisions of the so-called law of the apex, which gives the locator of a vein the right to follow the vein on its dip, and of tunnel site locations, which give the owner of such a location the right to mine ore from a vein covered by a patented claim located on the outcrop.

One of the national mining societies, the Mining and Metallurgical Society of America, has taken an especially prominent part in urging the need of a better mining land code, and in enlisting the co-operation of national and state organizations and of Government bureaus. On December 6, 1915, this society called a meeting in Washington, D. C., in which representatives of these organizations, of the national Government, and of many operating mines collaborated. The resolutions adopted at that meeting called for a thorough revision of the mining laws of the United States so as to co-ordinate and harmonize its various provisions; recommended the creation by Congress of a Government commission, appointed by the President, to consider and investigate the different questions and issues, and to make recommendations in regard to the proposed revision.

Owing to the conflict of interests in Congress and the attention given to problems created by the war in Europe, the commission called for by those resolutions was not appointed and little progress has been made toward revision of the mining land law.

The Department of the Interior and the Federal Bureau of Mines have favored and still favor a revision of the mining land laws that will eliminate uncertainties, conflicts and contradictions, lessen the chances of litigation over mining titles, and thus relieve the industry of unnecessary burdens. The mining code of the Federal Government should exemplify simplicity, clarity and directness. It should serve as a basis for laws governing the acquisition and transfer of mineral lands under state control, and thus should contribute to national efficiency. The Bureau of Mines seeks the co-operation of all parties interested in bringing about this result.

The need of wide co-operation in obtaining satisfactory mining laws has been recognized by the Secretary of the Interior, who invited all state mine inspectors and state compensation commissioners to attend a conference in Washington, in February, 1916. At this convention one of the principal subjects discussed was the

need of uniformity in obtaining and presenting mining statistics. Under present conditions mine operators are asked to report substantially the same information, though perhaps in different form, to four or five different agencies of the state or Federal Government. As a result, to many operators the compiling of such reports has become a matter that entails considerable work and sometimes the employing of extra assistants. It was felt that much of this duplication of reports could be eliminated, thus not only lessening the amount of work involved but permitting one report to convey all the information desired by state and federal officials.

Another important subject discussed at the convention was the present lack of a uniform understanding of what constitutes an accident serious enough to come within the requirements of state laws, which provide that all serious accidents shall be reported to the mine inspector and shall be included by the inspector in his annual report. Lack of such a standard definition makes impracticable a fair comparison of the accident risk in one state with that in another, and the need of a uniform method of reporting such accidents was generally recognized.

Classification of mine employes by occupation was another subject that engaged attention. It was appreciated that to know the number of men killed or injured in a particular occupation is of little value unless the number of men employed in a work of a similar nature is known also. This information is now being reported in some states, and it is hoped that the practice will extend to all states.

Discussion of present methods of reporting the average number of men employed at mines brought out the fact that there is no uniformity regarding the number of employes in the reports now being submitted by mine operators. Physical differences between one coal field and another make it impracticable to enforce identical regulations in the operation of all mines throughout the country. However, if coal mining be considered as a whole, we find that even as regards the many features common to all coal mining, there is a lamentable lack of uniformity in state laws.

Probably no one is opposed to mining legislation that shall be as uniform as conditions permit, and it would seem that the only room for difference of opinion is in regard to conditions that are not alike in different states. This phase of the question should be carefully studied by some representative committee authorized to

draft a proposed law covering all phases of the industry that admit of uniform regulation.

A law thus framed would serve as a definite working basis, and would be submitted to the mining interests in each state for suggestions. With these suggestions before it, the committee would be in a position to draft a law reasonably satisfactory to all states, and the final draft prepared by the committee might be submitted through the proper channels to the legislature of each state having a mining industry of sufficient magnitude to warrant the enactment of a mining code.

In order to bring about such uniform legislation, the following motion by A. E. Spriggs, formerly Lieutenant-governor of Montana, and seconded by Mr. Ed. Boyle, state coal mine inspector of Oklahoma, was unanimously adopted:

“It is the sense of this meeting that the matter of procuring uniformity of mining laws be referred to the Bureau of Mines, with the request that they do all in their power to bring about that most desirable end.”

To assist in carrying out the foregoing program, and also as an aid to a committee that might be appointed for preparing the proposed coal mine law, a committee was appointed to report on standard forms for reporting mine accidents, mine equipment, and other information required by many state mining laws. This committee has had two conferences and is now about ready to render its report on the standardization of mine statistics.

In its efforts to improve health conditions in mining communities, the Bureau of Mines has co-operated with the Public Health Service and the California State Board of Health in general investigations of health conditions and in the study of two diseases, miner's consumption and hookworm. These studies show the prevalence of miners' consumption and pulmonary tuberculosis in certain districts where the mine air contains sharp particles of silicious dust, and demonstrate that an unsuspectedly large number of men in the Mother Lode gold mines of California were infected with hookworm. They also call attention to the need of adequate preventive measures being adopted not only in the states where the studies were made, but in other states where similar conditions may result in the spread of the two diseases. Other preventable diseases, such as typhoid fever, annually kill or temporarily disable large numbers of persons in the mining industry.

Adoption and enforcement of necessary preventive measures and of strict sanitation may come within the province of officials of mining companies, or of local and state boards of health, but evidently the battle against disease cannot be waged as it should be unless different communities and different states enact laws that will provide for efficient sanitation, the keeping of proper mortality and morbidity records, and the quarantine of persons suffering from contagious diseases. The provisions of such legislation and their application should be so uniform that the morbidity figures for certain districts can be compared with those of another, thus permitting the drawing of reliable conclusions as to the relative healthfulness of different methods and practices, the exact determination of what diseases are most apt to affect the mining industry, and the special safeguards that may be required.

Ills From Present Lack of Uniform Legislation and the Need of Uniformity.

In the mines in this country are men from every nation in Europe. Thousands of them had no mining experience before they came to the United States and possessed a merely rudimentary knowledge of English when they began work underground. Moreover, miners in this country are prone to be migratory, moving from mine to mine and from state to state by thousands. For such men the lack of uniform state legislation not only increases the probability of accidents, but also imposes on the mining industry of each state the burden of diminished efficiency resulting from each miner from without that state having to learn state regulations.

Our coal fields and mineral deposits do not respect state lines, but cross them indiscriminately. Yet one state may have an explicit set of rules governing the operation of mines within its borders, whereas the rules of an adjoining state may be indefinite or insufficient, although operators in both fields supply the same market and must necessarily compete with each other. As a result, the operators in the state having the less effective laws are enabled to produce coal at less cost and to undersell operators in the other state.

Furthermore, because of these differences in mining codes, the decisions of a state court construing a law in force is usually of slight value outside of the particular state in which the law was enacted. This practically results in each state building up a mining jurisprudence of its own, whereas if such legislation were uniform throughout the states the opinion of one court could be given

weight in passing judgment on like facts before a court in any state. Such a change would ultimately result in eliminating much costly litigation.

Another matter to which I wish to call your attention is the utter lack of any general system of valuing mining properties for purposes of taxation. Municipalities, states and the Federal Government tax mining concerns. What proportion of the total income shall be charged to working account or depreciation, what allowance shall be made for ore or minerals left underground in the process of mining, what is the value of unmined minerals, or of mines that cannot be worked at a profit—these are questions to which widely differing answers are given under the present system, or lack of system, in valuing mining properties. The enactment of uniform laws covering these matters would be an inestimable boon to the mining industry.

To lessen, if not eradicate occupational disease in the mining industry, uniform legislation in the mining states is a prime requisite. If one state enacts laws that inconvenience a miner suffering from an infectious disease and a neighboring state has not made such laws, the miner has but to cross into the state beyond to be unmolested. In this way, though the state law may be of great benefit in improving health conditions within the state, it may be the means of spreading infectious disease through other states and thus, in the lack of uniform laws, prove detrimental to the industry as a whole. Of course this result is not to be considered as showing that any one state should not take the initiative in legislation intended to protect the health of miners; it merely emphasizes the need of uniform legislation in those states in which conditions are favorable to the spread of the same disease.

The lack of a uniform system of hoisting signals in the different states is a condition that plainly demands betterment. Many miners move at frequent intervals from state to state. Lack of a uniform signal code decreases the efficiency of mining operations. Also, as mistakes in giving or noting signals may cause horrible accidents, the present lack of uniformity is a constant menace to mine safety.

Present state laws providing for the inspection of mines, quarries, oil and gas wells, mills and metallurgical works show a great lack of harmony, and some even bring about conflicts of authority with the state itself. Considerations of safety, health and efficiency do not receive the attention they demand. Some states

have no direct inspection of quarries or metal mines, in other states coal mine inspection, or the inspection of oil and gas wells still leaves much to be desired. Practices that endanger life, impair health, or waste our mineral resources continue unchecked by state authority. Too many state inspectors are not granted sufficient authority or an adequate inspection force to do properly what the law requires them to do. In some states the methods of selecting inspectors do not assure that inspection will be efficient. In fact, mine inspection is, as a whole, a matter that urgently needs improvement in the direction of more adequate inspection service, and the harmonizing of state laws relating to the qualifications, duties, powers and authority of inspectors.

In regard to the requirements of mine inspectors, I wish to make the point that there should be uniform methods of inspecting machinery. The public function that can be performed by national engineering societies in procuring such uniformity is already perceived, as is witnessed by the work of the Boiler Code Committee of the American Society of Mechanical Engineers. This society has standardized those features of boiler construction that are essential to safety, and it will probably be only a short time before each and every state accepts this code. Then we shall have uniform measurements throughout the country for the inspection of boilers.

For the inspection of mine machinery, and especially hoisting machinery, a uniform code of rules is much needed. To await the preparation of such a code by state legislatures, without outside prompting or assistance, is likely to cause indefinite but prolonged delay, for the tendency of state legislation, as I have indicated, is toward diversity rather than uniformity. But legislatures can adopt, and probably will adopt, rules that are based on the best thought of national societies and of government bureaus. For this reason I believe that uniform requirements for the inspection of machinery await merely the taking of suitable action of influential agencies.

Closely connected with the topics of uniformity in mining codes and methods of inspection is that of uniformity in statistics relating to accidents. It is well understood that even the most earnest endeavors for the protection of life and limb among miners may fail to accomplish the best results if there are no reliable records on which to base regulations. Accident records and statistics are the guides that show the progress or lack of progress

which is being made toward greater safety, and without satisfactory records this work must necessarily proceed in the dark. Some of you may be surprised to learn that the figures published on mine accidents in the United States are as yet hardly more than crude approximations, especially as regards comparisons of accidents in the different states.

For instance, in one state under the law, all mines may be subject to inspection; in another, those mines working less than three men are exempt; in others five, six, ten, eleven, or twenty men, as the case may be, must be at work before the management is required to report to the state officials.

Again, there is a wide difference in defining a reportable injury. In some states all injuries, no matter how trivial, are reported and recorded; in others no account is taken of the disability which may follow an accident that is of less than two days' duration; and in other states the time is defined as three, four, five, six, seven, or ten days. The official reports of the State Mine Inspector are the only available source of information, and these reports may not contain a complete record of accidents which the mine owner must report under the law. For example, in one state the published reports contain all injuries causing a disability of one day; in another state the law requires inclusion of all "serious" injuries. A serious injury may be one in which the time lost is 7 days, 2 weeks, 30 days, or an indefinite time, not specified. In one state a slight injury may mean the miner lost less than 10 working days, whereas in another state the time lost may be 3 days, or 30 days.

Still other matters that should receive notice are the methods for determining the injury done by metallurgical smoke, the abatement of such injury, and the disposal of mine wastes, slag, and mill tailings in such manner as to avoid damage to property rights.

Under favorable weather conditions smelter smoke laden with injurious fumes and sulphur gases is carried for miles, so that a smelter situated in one state may cause great damage to vegetation and animal life in another state. Similarly, the refuse of mines, mills or smelters in one state is dumped into a stream to the damage of property further down stream and in another state. The determination of damages and the method of providing for the abatement of the nuisance causing them should be substantially similar in different states that justice may be done to all.

Uniform Oil and Gas Legislation.

Regulations governing the care to be taken in drilling oil and gas wells and in recovering oil and gas should be the same in every oil-producing state in order to prevent waste, and there should be uniform regulations to govern the methods by which abandoned wells and dry holes are to be plugged.

No more flagrant example of the need of legislation governing operations on oil lands need be cited than the conditions which existed in Oklahoma during the development of the Cushing oil field during 1913, 1914 and 1915. The tremendous waste that took place in connection with the rapid development of this prolific field resulted in the creation of a strong public sentiment for the enactment of legislation that would reduce to a minimum such waste of oil and gas in the development of other fields in the state.

The productive lands in Oklahoma are divided into two main classes. One class includes what are known as restricted lands; these belong to Indians and are under the supervision of the Federal Government. The other class includes so-called commercial lands, which are subject only to the jurisdiction of the state. Therefore, two sets of regulations are necessary. The first took effect on commercial lands, or those not under the supervision of the Federal Government, in 1915; the regulations applying to restricted lands were approved by the Secretary of the Interior on October 20, 1915. These regulations, which are essentially identical, have been conspicuously effective throughout the state wherever sufficient inspectors have been employed to enforce them.

The regulations require that wells shall be drilled under the supervision of the inspectors and in accordance with the most approved methods, in order to prevent waste of natural gas and oil and wasteful utilization of gas. Each productive oil or gas formation that is drilled through in order to reach oil or gas in a lower formation must be protected from the infiltration of water, and the various gas sands that carry gas in different volumes and under different pressures must be isolated to the satisfaction of the inspector. Provision is also made for compelling an operator to prevent the contamination or pollution of any supply of fresh water penetrated in wells drilled for oil or gas. In drilling into or through commercial gas sands, the operator is compelled to use methods that will prevent the waste of commercial quantities, these being defined as any amount in excess of 2,000,000 cubic feet per 24 hours. The operators are not allowed by the regulations to

abandon any well for the purpose of drilling deeper unless the producing stratum is properly protected, and no well can be abandoned on Indian lands without the approval of the proper official. Particular attention is called to the detailed directions given for the effective plugging of dry holes and abandoned wells in order to prevent gas or oil escaping from one sand to another, to prevent the encroachment of water on productive sands, and to protect the fresh water supply.

On lands under the supervision of the Federal Government, the maximum penalty for violating any provision of the regulation is cancellation of the lease by the Secretary of the Interior and a fine of \$500 a day. The violator of regulations on commercial lands or those under the supervision of the state authorities is guilty of a misdemeanor and may be punished by a fine not to exceed \$5,000 or by 30 days' imprisonment, or by both such fine and imprisonment.

How Uniformity May Be Procured.

Uniform state laws are not a new thing in the United States. Almost every state in the union has at different times appointed commissioners to meet representatives from other states for the purpose of framing laws covering the more general branches of jurisprudence. The most widely known work accomplished by such commissioners is the "Negotiable Instruments Law." This statute was prepared by commissioners on uniform state laws who were appointed by the various states to codify and make uniform throughout the United States the law relating to negotiable instruments. For the most part the statute codified existing laws. It has been adopted without important amendment in the District of Columbia and forty-five states and territories.

The Uniform Sales Act, drafted by a similar commission in 1916, has likewise been enacted in many states to cover the sale of personal property. These laws were put into effect in order to facilitate the administering of justice, and are principally the outcome of the efforts of the various state and national bar associations.

Clearly, it should be possible for representatives of those most interested in the adoption of uniform mining legislation to get together and through a codification of existing state laws on mining, to draft a uniform law and recommend that the various state legislatures enact it. Such a plan was recently proposed, but not carried

out, in Oklahoma, with a view to amending the mining laws in that state. The proposed plan called a commission composed of two representatives of the miners' organization, two of the operators' association, and a representative of the Bureau of Mines, who should meet and draft a suitable mining law for submission to the state legislature. It is obvious that such a plan as this, with all interested parties behind it, would leave the legislatures almost no valid reasons for failing to adopt the law.

If representatives of miners' unions, the American Mining Congress, the American Institute of Mining Engineers, the Mining and Metallurgical Society of America, the Mine Inspectors' Institute of the United States, and the United States Bureau of Mines were to confer and then recommend to the public a uniform mining law based on a codification of present laws, this proposed law might receive as favorable a reception as did the negotiable instrument act and the sales act.

I do not mean that these representatives should endeavor to actually frame such a law in joint session, as that would be a tedious if not impossible task. The first code of legal ethics adopted in the United States—it has been adopted by the bar associations of eleven states and is the foundation for the American Bar Association's Canon of Ethics—was drafted by one man, Major Thos. Goode Jones of Montgomery, Ala.

When members of the bar and other interested parties decided that the various states would benefit through a uniform law covering negotiable instruments, they, through the commissioners on uniform state laws mentioned above, designated John J. Crawford of the New York bar to draw such an act for discussion and action by the commissioners at their regular meeting, and then the final draft was submitted to the public. Therefore, if the mining men, operators, miners, inspectors and engineers, desire a uniform mining law in the United States, they should follow the methods that have been successful in bringing about the adoption of uniform statutes now existing, and appoint a person versed in the mining laws of the various states to draft an act to codify existing legislation, so far as practicable and as of service to existing needs, and present this draft to the representatives of the various branches of the industry for revision, if needed, and adoption.

Such an act would necessarily be elastic and cover the subject only in a general way, as it would be practically impossible to draft an act that would apply to every condition throughout the United

States. However, with such a well-considered general act as a basis, it would be a simple matter for state inspectors to issue suitable regulations to cover local conditions. In fact, it is the general rule for the present state laws to cover the industry only in a general way and leave the necessary rules to the discretion of the inspector.

Summary.

Having called your attention to the ills resulting from the present lack of uniform legislation, the need of such legislation in the various branches of the mineral industry, the agencies seeking to assure it, and the ways in which it may be procured, I will briefly summarize much that I have said in pointing out what uniform mining legislation can hope to accomplish.

1. It can eliminate vexatious and costly litigation and promote the development of mining property.

2. It can bring order out of the chaos that envelops present methods of determining the value of mining properties for purposes of taxation.

3. It can prevent enormous waste of mineral resources essential to the continued prosperity of the nation.

4. It can lessen disability and death from preventable disease and stop the spread of diseases that are contagious.

5. It can reduce suffering and death from accidents and can increase safety.

6. By placing all producers on the same basis in regard to precautions necessary to guard the health and safety of employes and to prevent waste of resources, it can end the advantages, inimical to national welfare, enjoyed by some producers.

7. It can increase national efficiency immeasurably and enable the U. S. to lead the world in those things that contribute most to the glory of a nation.

There are many other benefits that can be hoped for as the result of uniform mining legislation, but those I have pointed out seem to me the most important. They indicate how wide is the field of endeavor for those who are seeking to obtain such legislation and how great is the need of all interested parties and organizations co-operating for the common good. Surely the field is enough to give opportunity for us all, and the need is strong enough to call for our best efforts.

IS UNIFORM COAL MINING LEGISLATION ADVISABLE?

Robert H. Harlan, Washington.

Naturally, I approach the subject assigned to me from the standpoint of the coal miner, and my experience has been such as to permit of but one answer to the question propounded in the title of this address.

The need for uniform coal mining legislation in this country is indeed a crying need, and it is gratifying to me to note that men influential in mining circles, actuated by a sincere desire to reduce to the minimum the extraordinary hazards that surround the mining of coal are at last awakening to the necessity for such uniform legislation.

The object of all coal mining legislation is to minimize to the irreducible minimum those natural dangers, occasioned by falling roof, by poisonous and combustible gases, and by the multitude of menacing conditions that lurk unseen in the regions of the underground and threaten the life and limb of the miner.

Too much praise cannot be given the United States Bureau of Mines for the great work they have accomplished in recent years in the interest of safety in the coal mines of the country.

Through the instrumentality of the Bureau of Mines, the inspection departments of the various coal mining states are now co-operating with each other and with the Federal Government to a degree never heretofore attained, and it is because of the spirit of co-operation and co-ordination of effort that has been already created that I regard this as being a propitious time to lay plans for uniform basic laws in the interest of safety in our coal mines.

There is much to be done and surely much that can be successfully accomplished to further reduce the accidents that yearly take such a terrible toll of lives in the mining industry of the United States.

No further argument is needed than that furnished in the reports of coal mining fatalities compiled by the Federal Bureau of Mines. The fatality rate per each 1,000 men employed is uniformly greater in the United States than in any other coal mining

country of the world with the possible exception of British Columbia. To emphasize this unpleasant fact more fully, let me point out that the average fatality rate in the United States for the ten year period from 1901 to 1910, per 1,000 men was 3.74. In France for the same period, the rate was 1.69; for the same period in Belgium, the rate was 1.02.

In the year 1914, the fatality rate per 1,000 men employed in the United States was 3.22. For the year 1914, the rate per 1,000 in Great Britain was 1.08.

These figures, gleaned from Government reports, give food for serious reflection, and in the light of the facts they establish, we may very properly ask the question: "Is there not some serious defect in our system of mine inspection or in our protective legislation governing coal mines?"

We can hardly attribute the higher fatality rate in the United States to adverse natural conditions, because coal in Europe and particularly in the mines of Great Britain is mined usually at a great depth, and under conditions at least equally as difficult and as dangerous as are to be found here.

What then is the reason? It is my candid opinion that the chief reason for the disparity manifested in the fatality reports above quoted, is because of the difference in the system of mine inspection and enforcement of mining regulations.

In Great Britain and other coal mining countries of Europe, the national government exercises direct supervision over the coal mines. The inspection of mines is a function of government. Inspectors are selected because of their competency to faithfully fulfill the duties of their office, and the entire system of mine inspection is removed from the baneful influence of party politics.

A national mining code, embracing broad principles of safety is uniformly and rigidly enforced. In contrast to this exercise of centralized national authority, with its resultant maximum of efficiency, we in the United States have 28 state governments each legislating unto itself according to its own particular process, and oft-times along lines completely out of harmony with the recognized trend of modern progressive mine safety legislation.

Each state has improvised its own system of mine inspection, and it is unfortunately true that this function of government with its grave responsibility for the safe-keeping of so many human

lives is made a football of partisan politics in a majority of the coal producing states of the Union.

In certain states where broad minded consideration has been given to the question of adequate mine safety legislation, certain operators have been placed at a competitive disadvantage, because of the lack of proper legalized safeguards in the coal mines across the boundary line of an adjoining state. A condition that puts the penalty upon the mine operator who observes humane laws in the interest of safety is indefensible.

At the last International Convention of the United Mine Workers held in Indianapolis, January, 1916, these matters were given consideration and the following resolution was adopted:

"Whereas, mining is historically a function of government, and the coal mining industry in particular is of paramount importance to the industrial life and well-being of the Nation, and

"Whereas, in the event of a crisis being precipitated wherein these United States would have to repel foreign aggression, it is obvious that the Federal Government would be compelled to immediately declare national control over the coal mining industry in the interest of the common weal, and

"Whereas, it is the opinion of this convention that this action, necessary to the common good in time of war, is equally necessary to the common good in time of peace, as we have in mind the appalling number of accidents and fatalities that occur each year in the coal mining industry, and we feel that if the industry were under federal control, under a department of mining, and subject to the provisions of a federal coal mining regulation act, with the inspection of mines removed from the influence of state politics, that these accidents could be reduced to a minimum, and

"Whereas, the present condition of affairs, wherein a great national industry is subjected to the laws and requirements of the separate states where coal is mined, results in unfair competitive relations, as the employer in a state where just and humane mining laws prevail is placed at a disadvantage when in competition with the employers from states where the welfare of the men employed in the mines has been disregarded; therefore, be it

"Resolved, that this convention urge Congress to take the necessary steps to have the coal mining industry declared interstate commerce and to be subject to the authority of the Federal Government, and we instruct the international executive board to use its efforts to crystallize public sentiment in favor of such action and

to take such steps as they may deem proper to the attainment of this desired end."

I cite the above in order that this Conference may be familiar with the attitude of my organization upon the question of uniform mining legislation.

I recognize that it is not within the province of this body to consider plans whereby the Federal Government would be able to exercise direct and complete jurisdiction over the coal mines of our country. I take it that the object sought for in this Conference is to have the various states represented here, agree upon certain broad principles of mine safety with a view to securing uniform legislation along the lines laid down by enactment of the state legislatures. However, I accept this opportunity to state that, in my judgment, the desired results could be best secured if it were possible to extend the jurisdiction of the Federal Government by constitutional amendment or otherwise, to govern the mining of coal.

I am not unmindful of the fact that most of the coal mined in the country becomes interstate commerce in transit, and by the same process of reasoning that enabled Congress to pass remedial legislation in the interest of the child slaves of the mills of the south, they could enact certain basic inspection and safety laws affecting the major portion of the nation's coal mines.

The legality of such a procedure is a matter that my organization now has under consideration, and it seems to me that if it were possible to overcome the obstacles created by virtue of the autonomy practiced by the respective states, we could then arrive by a direct route at the results sought by this meeting by the more indirect method of legislating by states.

In any event, the only individual that could have any interest in opposing practical uniform mining legislation is the individual who seeks competitive gain at the expense of the safety of his employes. Some such there are in the mining business, as in every other business, but I prefer to think the number is few indeed, consequently I apprehend but little opposition to any plans that may be formulated in this meeting in the interest of uniform mining legislation.

At the St. Louis meeting of the Mine Inspectors' Institute of the United States, the advisability and practicability of uniform mining legislation was made a matter of discussion. Mr. Beard of New York made the following pertinent statement:

"If we do not finish the subject of how far we can go in the matter of securing uniformity in mine legislation, we have left something undone

that is very important. I would suggest at the start that we disimbue our minds entirely of the thought that uniformity in certain points is impossible or impracticable."

Mr. Beard then presented the following list of questions for consideration:

"The first question is: Should mine foremen, assistant mine foremen, fire bosses and other mine officials be required to qualify by passing an examination before a duly organized examining board? While, as we all know, such examination and certification is provided for in the mining laws of many coal mining states, it is a fact to be regretted that the laws of other states make no such provision. Indeed, in some coal producing states the question of mine legislation has not been considered separately from the general code, in which the matter is given little consideration. I would suggest that it is a matter worthy of the careful consideration of this body whether or not men holding these official positions in any and all states should be required by law to qualify by showing their fitness and competency to hold such positions.

"The second question is: What should be the character and personnel of such an examining board, and what should be required of candidates desiring to take the examination for a certificate of competency? I think this is another important question worthy of careful consideration by this body. We would be able to classify conditions in mining as to outline what general requirements should be exacted of candidates for certain positions. We should consider how much technical knowledge a man should be required to possess to become mine foreman, assistant mine foreman or fire boss. Also, how much practical experience a candidate should be required to possess, and of what nature. Some will argue that no technical knowledge is necessary to make a good mine foreman, and it is for this body to determine the question.

"The third question is: What are the responsibilities of the mine foreman, assistant mine foreman and fire boss, severally, and what authority has each of these in relation to their duties in the mine? This may seem, on first thought, to be an unnecessary question for discussion. When we reflect, however, on the different conditions surrounding the work of these men, it is clear they should possess the knowledge and experience that will fit them for their particular work. In some mines the authority of the fire boss, in respect to gas, is supreme, while in other instances there is no such recognition in the law relating to the fire boss in his work. There has been much discussion in the press regarding the responsibility of the assistant mine foreman under the law. Much difference of opinion has been expressed in this regard, and it has been shown that the mine foreman and his assistant, and in some cases the fire boss, hold only nominal authority in respect to their work, which is practically under the control of the superintendent or the manager of the mine, and in order to hold their positions these officials must do as requested by their superior officers. This is also an important question.

"The fourth question is: Should the mine superintendent be required to qualify by taking an examination similar to that required of the candidates for inferior positions in mining? I need not remind you that there is no qualification required of candidates for this position in any of the coal producing states. It is true the mine superintendent often has far less practical experience than the foreman, while his superior position and his relation to the mine foreman, who is supposed to carry out his orders, are such that it would seem that the requirements for the position should be as strict as those now required by law for inferior and less responsible positions in the mine.

"The fifth question is: Is it possible to form any general classification of mines with respect to dust, gas and ventilation, with a view to

enforcing more strict regulations in regard to the accumulation of dust in the workings and its treatment; the more thorough and frequent inspection of mines generating gas, and the more efficient ventilation of the working places by making certain specifications relating to the building of stoppings, brattices, doors and overcasts, so that the current of air entering the mine will be made to sweep the entire working face? The law should also specify clearly that the air current must not only be measured in the main intake and return, and at the mouth of each air split, but also at the inside crosscuts, to ascertain that the air current is doing the work intended."

After considerable discussion, the Institute adopted the following resolution:

"Resolved, That it is the sense of the Mine Inspectors' Institute that, in order to secure the greatest degree of safety in the operation of coal mines, it is absolutely essential for all men holding positions of authority in respect to underground operations should be required to qualify for such positions by passing an examination that will show their fitness and competency to conduct the operations in a safe manner."

At a meeting in Washington, D. C., last year, called by the Director of the Federal Bureau of Mines, composed of mine inspectors of the United States and others interested in the standardization of mining reports and mine statistics, favorable consideration was given to the need of uniform mining legislation and it was unanimously agreed that the Federal Bureau of Mines should draft a standard set of rules and regulations for coal mines, similar to that prepared by the Bureau relating to metal mines and published as Bulletin No. 75. To the best of my knowledge, this bulletin has not been published. So the trend is in the right direction and the time seems at hand to take such action in this conference as will insure tangible results in the way of uniform mining laws.

I feel that the suggestions made by Mr. Beard at the St. Louis meeting of mine inspectors are worthy of special note and point the way to practical reforms that might be incorporated in a uniform mining code.

I realize that in attempting to outline any plan whereby certain principles in the interest of safety might be suggested as a basis for a uniform mining code, I am opening a wide field for controversy. However, I am going to suggest for your consideration the following propositions:

1. The advisability of a uniform examination of coal miners with a view to ascertaining their competency, in harmony with the Illinois law.

2. The advisability of an examination of mine officials as suggested by Mr. Beard.

(Note: See mining laws of Oklahoma.)

3. The advisability of removing as far as possible mine inspection from the influence of state politics, requiring state mine inspectors to

pass adequate examination tests and clothing the office of mine inspector with proper police power as outlined by the Iowa law.

4. The advisability of a general classification of mines, with respect to dust, gas and ventilation, with a view to enforcing strict regulations regarding the proper humidity of dusty mines, and other suggestions of Mr. Beard quoted above.

5. The advisability of legislation providing that timber be plentifully supplied, to which the miner may have ready access, with a view to lessening the alarming death rate occasioned by falls of roof.

In this connection it might be well to point out that between 40 and 50 per cent of mine fatalities in the United States are caused by fall of roof, and it is my judgment that this condition could be ameliorated if proper mine timbers were plentifully furnished the miners in all instances, and strict regulations enforced compelling proper timbering of all working places.

6. The advisability of uniform legislation with a view to increasing the safeguards around electric wires, etc. Almost a hundred men and boys are killed annually in the United States because of coming in contact with electric current.

* (Note: See mining laws of Oklahoma.)

7. Advisability of uniform legislation regulating age when boys may enter the mines.

8. Advisability of uniform legislation dealing with places of egress, escape shafts, air shafts, traveling ways, etc.

9. Advisability of uniform legislation establishing minimum of air supply per person employed and per mule, horse or other animal used within mine, and providing for proper distribution of ventilation.

10. Advisability of uniform legislation providing for adequate supply of first aid and mine rescue appliances at each mine.

11. Advisability of uniform legislation providing for standardization of mining reports throughout the country, in harmony with plan to be outlined by United States Bureau of Mines.

I venture these suggestions in the hope that they may be of some practical assistance to the Conference in working out a general plan in the interest of greater safety in the mines of our country.

The problems that must be met and overcome in a work of this character are obviously many, but the great good that can be accomplished in preventing as far as is humanly possible a recurrence of the terrible holocausts that from time to time spread misery and desolation throughout our mining regions, is a work worthy of our best minds.

The men whom I have the honor to represent have their lives invested in the mines of the nation; the welfare and happiness of thousands of miners' homes depend upon the care exercised in keeping these mines safe, so it seems needless for me to state to this body that we stand ready and willing to cooperate in any and all movements that honestly seek to lessen the hazard of coal mining.

Thousands of human lives are bound up in this question of adequate coal mining legislation, and in the face of the facts developed in the fatality reports published by the Bureau of Mines

and the comparison with similar reports from other coal mining countries, who can gainsay but what we have been negligent of our priceless human resources, and in the great work to which this meeting is dedicated, our honor as an enlightened nation, jealous of the welfare of our people, is at stake.

In behalf of the United Mine Workers, I want to thank this body for the services they are rendering the mining communities of our country, and it is but fitting that I add our token of grateful appreciation to the United States Bureau of Mines and the many other progressive forces that are so unselfishly and assiduously working to reduce the dangers incident to the mining of coal in the United States.

THE FEDERAL GOVERNMENT AND THE CALIFORNIA OIL CLAIMANTS.

By Louis Titus, California.

Mr. Chairman and Gentlemen of the Convention: In 1897 Congress passed a law throwing open the public oil lands of the United States to entry under the placer mining laws of the United States. Now that law was hardly appropriate for oil, but nevertheless Congress did pass that law making the oil lands subject, as I have said, to the general placer mining laws.

The trouble with the placer mining laws, as applied to oil claims, is simply this: That before you can have a valid mining location you must make a discovery of mineral. The gold miner wishing to take a placer mine, takes a pan and perhaps washes a few colors of gold, nothing of any particular value, but if he has color he makes a discovery. After he has filed his location, he has a vested right in that claim to the property; it belongs to him, and so long as he does his work upon that property it is property just as much as any other property is property. But in the case of oil it is slightly different. It lies beneath the surface of the earth a thousand feet and possibly five thousand feet below the surface of the earth, and in many cases no such thing as a discovery is possible until after the expenditure of a great many thousand dollars.

Nevertheless, although the law in that respect was inappropriate, the petroleum lands of the United States were taken up under the placer mining laws, and people filed their locations, they drilled, and in the course of time, having made their discoveries, they got their patents to the land. The question that was raised was what were a man's rights when he went upon this land and filed his notice of location without having made a discovery, and during the time when he was drilling for oil. Finally through decisions of the courts, not by statute law, but through decisions of the courts it was established that the man in possession had a right to retain his possessions and to keep off intruders so long as he was using such diligence as he reasonably could towards discovering the oil, and had a right to remain in possession and had a right to eject a trespasser, if need be, and finally, of course upon the discovery of

oil he had a right to procure a patent, and that claim, such as it was, was a valid claim, and the courts even held it was a right that he could transfer and sell to other parties.

Now, that was an invitation by the United States Government to the citizens of the United States to go up onto public domains and explore for oil, and the citizens responding to that invitation did go upon the public domain and did explore for oil. And with the law in that condition, and with this work going on upon public lands of the United States, on September 29, 1909, the President of the United States made what was known as the first withdrawal of oil lands.

Now, that withdrawal was simply this: Here was a law of Congress, mind you, passed by both Houses of Congress and signed by the President, that had been in existence since 1897 applying to all the public lands in the United States. Yet the President of the United States, in 1909, said "This law is repealed as to three million acres of the public domain; or, the President of the United States, repeals this law, and it shall not apply to three million acres of lands of the public domain." Well, that was a startling thing. Nobody ever thought before that the President of the United States could repeal the law. It had never occurred to anybody that the President of the United States could repeal the law. The President had a chance to veto the law, but when it became a law we always supposed he was through, and he could not repeal the laws of the United States. But that is exactly what he did.

Now, that seems so absurd, so ridiculous, so incomprehensible, that the miners all over the United States with one voice said, "He can't do it, the order which he has made is invalid, he can't repeal the laws which Congress has passed." And when the question came into court as to whether the President had a right to do this, the Federal judges of Wyoming and one of the Federal judges of California both decided that the order was invalid, the President had no such right.

President Taft himself, who was an eminent lawyer, doubted his own right to make such an order without a special act of Congress, and he sent a message to Congress in which he expressed a doubt that he had any right to make such an order, and asked Congress to pass a special law giving him that authority, which was afterwards done. Attorney General Wickersham advised the President he had no such authority to make that order, and yet after the case got into the Supreme Court of the United States the

Supreme Court of the United States decided that the order was valid, and the President had a right to make it. It is true it was by the divided vote of five to three, and the change of one vote would have made it a tie, which would have made the order invalid, because the lower courts decided the order was invalid, so there were ten Federal judges that had a chance at that order as to whether it was valid or invalid, and five of them decided that it was invalid and five of them decided it was valid.

Now, when the judges don't know what the law is, and when the lawyers don't know what the law is, how will the poor oil operators, out in the California desert, know what the law is? But anyway, some men acting upon the advice of their counsel, believing thoroughly that that order was invalid, believing that the President had no right to do what he had done, and believing that the law which Congress had passed in 1897 was still in full force and effect, went upon the public domain even after the withdrawal, and located land under the law as they believed the law was, and as Congress had passed it.

There were not many such cases, very, very few. I don't suppose in all the trouble we have had in California that there have been ten; I am quite sure there will be less than ten cases of that kind, but there were some cases of men who went upon the public domain after the withdrawal, but they went there in the best of faith, they went there upon the advice of counsel that the President had no right to make such a law.

Now, it has been said, in circulars and in the press and in legal argument made to the court, that these men had defied the order, that they wilfully and maliciously, if you please, defied the order of the President of the United States. Well, as a matter of fact, they were simply doing what Congress had invited them to do. Now, it turned out that they were mistaken in their legal position because the Supreme Court said they were mistaken, and so far as the rights of those men are concerned, the men who went there after the withdrawal, that is a question which Congress will have to settle, whether it will do anything for them or not, because legally, of course, they have no right whatever.

However, I want to call your attention to a clause in the order of withdrawal. President Taft wrote right into this order of withdrawal, "All claims existing and valid on this date shall proceed to entry in the usual manner." That clause has sometimes been over-

looked. "All claims existing and valid on this date may proceed to entry in the usual manner."

Now, what did he mean by that? What was an oil man who was in possession of a claim, who already had his location, who was already doing such work as he could, what was he to do then? Was he not entitled to think his rights were protected? That the order had no application to him? That is what it said on its face. Now, it is argued by the Government attorneys that the statement meant that it applied only to claims upon which there had been a discovery made. Now, it is hardly possible that such could have been the intention of the President, because after discovery was made the rights were vested, and neither the President nor Congress itself could take away rights after they once became vested. So he must have meant claims that were valid in the sense I have before stated, claims that were valid in the sense that you had a right to stay there, a right to continue in the occupancy, and explore and to discover oil if you could, and get a patent. That is the reasonable interpretation of that order, and the court, so far as they have interpreted it at all, have so interpreted it. There has only been one judicial determination of that order, which was by Judge Bledsoe, in California, and he held that was the meaning of that clause. So that as far as the man in possession was concerned, the order of withdrawal meant nothing to him. He didn't suppose that that could void his rights at all. And so he went on mining, trying to find oil, and the California cases and some cases in Wyoming have approved it.

Now, this saving clause that these claims might proceed to entry in the usual manner, I wish to call your particular attention to that, that these valid and existing claims were not to be affected by the withdrawal, but they might proceed to entry in the usual manner. Now, the usual manner was for a man to do such work as he could do. This was out in the desert. There was no water to be had. There were some small supplies of water there, but the evidence in the cases which have already been tried shows conclusively, and the courts have so held, that water was almost impossible to be had by a great number of operators in 1909 and early in 1910. It means that a man would have had to have gone 40 miles away and brought in water, an expenditure of some three or four hundred thousand dollars, but the locator with 160 acres of land couldn't make any such expenditure as that, and it was not reasonable that he should be required to make any such expendi-

ture as that. All that he could do, as a practical thing, was to build his derrick, put his house up for his men to work in getting ready to drill, then wait till somebody brought in water that he could use for drilling, because there were projects under way for bringing in water, and they sometimes thereafter did materialize and water was brought in.

So that in 1910 there was a considerable amount of water, and large drilling went on.

Now, I want to cite you just one case which has been decided in the courts already, and I won't go outside of the opinion of the judge for the curious and almost incomprehensible state of the law as it exists now. In the Midway-Northern case, which was decided not so very long ago, there were many interesting points. On one particular quarter section of land, it was shown these men had been in possession something like two years before the first order of withdrawal. They had their house on the ground, they had a complete standard derrick, an improvement costing several thousand dollars, but they couldn't get water and couldn't go on drilling, although doing some slight work that could be done there, but on September 27, 1909, they had all those improvements there. They couldn't work because they didn't have water to drill with. In 1910, the very next year, within just a few months, they made arrangements to get water. They got the water and they proceeded to drill, and they had oil in May of 1910. That was a perfect claim. President Taft had said that they might proceed to entry in the usual manner and that they should finally get their patent. That was a perfect claim, nothing the matter with it, an absolute title, and on June 25, 1910, a month later, Congress passed what is known as the Pickett bill, which said that the rights of any person, any claimant for oil land, who at the date of any withdrawal heretofore made shall not be affected by that withdrawal, if at the date of the withdrawal he was in diligent prosecution of work leading to discovery if he has continued that work with diligence until he made the discovery.

Well, now, diligence is always a relative thing. Diligence ordinarily means that you shall only do such things as a reasonable man would do. It doesn't require you to do something superhuman, something impossible. At least, that is what we have always thought reasonable diligence meant. And yet the judge in deciding this case decided all these facts just as I have related them to you, decided that the Pickett bill required them to be diligently at work

looking to the discovery of oil at the date of the withdrawal, and that the work must be continued thereafter every day, and that no excuse or delay would be tolerated. The language of the judge was this: "The law requires them to have been at work, and the fact that water was impractical or even impossible to procure, is no excuse."

So that here we have the case of a man who had a perfect claim, his title was absolutely perfect, he discovered oil, and yet Congress, a month after he has discovered oil, passed the law which swept all his rights away, and that man has been decided by the court not to have any title to that land—more than that, all the money he spent on improvements are adjudged to belong to the United States Government, the well, the machinery, the derrick, everything belongs to the United States Government, he gets nothing for it.

Now, that is the condition that confronts people today, and that is the condition that we need relief against. And this case is so plain and so manifest that every time we have a chance to get before a committee of Congress, we have practically got the unanimous vote in our favor. We haven't been able to pass it through the Senate, but we hope to do better this time.

I didn't mean to take quite so long, but there is just one other feature of this that I want to refer to, and I refer to it with a good deal of timidity, perhaps, because there is some sentiment about the United States Navy. The Navy appeals to us all. We are all for the Navy, and it has been the worst thing that we have had to contend against, the question of the Naval Reserve.

Now, mind you, this withdrawal was in 1909, the Pickett bill was in 1910. Oil wells were all over this property by 1912, and in December, 1912, three years after the first withdrawal, five years after much of this land had been occupied and improved, the President created the Naval Reserve. Somebody drew a red line around 13,000 acres on the map, and said, "This is the Naval Reserve." And now because the Navy is a sacred thing we are asked to lie down and say, "Let the Navy take all of this land."

Now, even if the Navy needs oil, it would apparently be the reasonable thing to do for the Navy to buy it. The Navy might need a shipbuilding yard. That would be no reason why they should go somewhere and confiscate one. If they need a shipbuilding yard they can build one or buy one. So, if they need this oil reserve they can buy it. Of course the President tomorrow under

the authority of the law now, because Congress has passed a law giving him authority to do so, can create as many naval reserves as he chooses, and the Governor has told you that there are 3,000,000 acres of this oil land, classified as oil land by the Geological Department, all of which could be made into a naval reserve tomorrow if there was any need to do so, which of course there is not, because there is an abundance of oil for the Navy for years to come when the figures are analyzed.

But now just think of the situation here. Take a case of two men side by side in the field in California, both there before withdrawal, both working in good faith, had discovered oil, and they were there believing their titles were good on the 12th of December, 1912, when this red line was drawn and the Naval Reserve created. Now, isn't it absurd to think that the man on one side of that line should be protected in his rights afterwards, and the man on the other side should have all his property confiscated because he couldn't know where that red line was going to be placed?

As I say, the thing is so manifest on the face of it, that every time we have had a chance to present these facts to the committee in Congress we have practically secured a unanimous vote.

Now, I thank you for letting me open up this discussion in this way. The chairman of this committee is much more familiar with all these things than I am, and I think he can discuss this argument much better than I can do, and I turn it over to him.

THE RELATION OF THE FEDERAL GOVERNMENT TO WESTERN OIL PRODUCTION.

Hon. James N. Gillett of California.

Mr. Chairman and Gentlemen: About the year 1908, the United States Government commenced to study the oil situation in the west as it affected the public lands in that section of the country. Those in authority, and those who had been investigating the subject, arrived at the conclusion that something ought to be done by the National Government to conserve the oil resources of the country, and to keep such a control over them as to prevent monopoly, waste and over-production. So in September, 1909, on the 27th of that month, President Taft made a temporary withdrawal order withdrawing from entry oil lands in California and Wyoming. It covered a large territory, including many thousands of acres of patented as well as government lands. It was done in aid of future legislation.

In this order of withdrawal it was provided that those who had valid claims or locations existing at the date of withdrawal might proceed to entry in the usual manner. At that time there was in the State of California many oil claimants who had gone into the mountains of that state upon government land, had filed their notices of location, and had proceeded to develop the property, but had not yet discovered oil though they had expended large sums of money in their efforts to do so.

The Government since that time has continued to make withdrawals until today it has withdrawn from entry over three million acres of public lands distributed in California, Wyoming, Colorado, Utah and Montana, and I think some in Arizona.

There has been an effort for two years by Congress to pass some law by which this large tract of valuable land might be opened and become useful to the people, but so far nothing has been accomplished. It is intended that the Government shall have full control of the oil lands, not only those which have been withdrawn, but those which will be hereafter discovered, because it has been the policy for the last few years as soon as known oil fields have been found, and the geologists of the United States Government are sent

west looking for such fields, to withdraw them from entry, so we may safely assume that from now on whenever any public land is discovered to contain petroleum that it will be immediately withdrawn from entry. So as far as the west is concerned from now on the development of oil fields and the production of oil upon public land is going to be under the control of the Federal Government, and this for the purpose of providing a supply of oil for the Navy, to prevent waste of oil lands, and to prevent monopoly. We hope that all this may be properly accomplished.

It is true that in the past a great deal of waste has occurred in valuable oil lands by reason of the negligent manner in which the wells have been drilled; some have been abandoned so that water would get into the oil sand and destroy large areas. There has been also at times an over-production which has produced a great loss in oil and to those engaged in oil operations. An oil field would be discovered, locations would be made, wells would be drilled and then immediately there would start a race on the part of everyone interested to get the oil out as rapidly as possible, and the man who gets his well down first can drain the oil of his neighbor, and wells were drilled right along the boundary lines except in instances where those owning the property would agree that they should be drilled further apart. This had a bad effect on the oil business of the State of California and in the west, and it is hoped that the oil leasing bill which is now pending will remedy this. An oil leasing bill, proposed by Secretary Lane, was introduced in the House by Congressman Ferris, of Oklahoma, and is known as the Ferris Bill.

This bill provides that a permit may be given by the Interior Department to anybody who wishes to prospect for oil. If he seeks to prospect for oil within 10 miles of a known oil well, the permit may only cover 640 acres; if he seeks to explore for oil in a territory more than 10 miles from a known oil well, then it may embrace 2,560 acres. He then posts his notice upon this claim, marks its boundaries, which must be in a compact form, and within six months of the time the permit is granted he must commence to drill for oil, and must drill a well at least 500 feet deep within a year. If he succeeds in discovering oil, then he is to receive a patent for one-fourth of the land included within his permit. It becomes his property and he can do with it as he pleases, excepting under such regulations as the Government may establish. Now all the rest

of the land within the zone or within this field that is then known to be oil land the Government intends to lease in competition bidding to the one who will pay the highest royalty, not less than ten per cent.

In issuing these permits and granting these leases the Government will get full control of the oil field. It has the right to direct how wells shall be drilled and where they shall be drilled. It will protect, as far as protection can be made possible, water from escaping into the oil sand, and it will control to a large extent the production.

Now, the government also intends to use some of its oil for the Navy, which will consume a great deal, some two million barrels a year, of one of the most valuable and indispensable products that we have in this country. But other nations are burning oil, and our Government is going to do the same thing. This will mean that the Government will probably have to in certain places build refineries and control pipe lines.

It is expected by the establishing of refineries and the building of pipe lines, to control the oil fields, to protect small operators against monopoly, to preserve the oil within the land, and to use it as it is needed, and not to take it out and put it in expensive tanks, but to use the earth itself as a reservoir in which to confine the oil during the time that the Government will not need it. This will mean an enormous saving to the Government and to those who own the oil lands, and will save the great expense in the construction of tanks to contain the oil. So it seems to many who have studied this question and given it thought the Government control of the oil fields in the west and the enforcement of proper regulations will tend to and will conserve the Nation's oil supply. Of course in the east there are no public lands, but in the west we have got great fields yet undeveloped and possibly other great fields that will be found.

Now, this oil leasing bill called the Ferris Bill passed the House at the last session, and failed of passage in the Senate. In the present session it passed the House again and is now pending in the Senate, and the plan is, or was, just before Congress adjourned, to take the matter up for consideration during the month of December, and the probabilities are at this session of Congress we will have an oil leasing bill, which will turn over to the Government all the oil lands in the west excepting those which are owned by private

parties, or excepting those upon which people have locations prior to the withdrawal, which are valid claims.

Now, in connection with this leasing bill there has been considerable discussion growing out of the claims of certain people in California and Wyoming who went upon the Government lands, as they had a right to go under the placer mining laws, and made locations prior to any order of withdrawal. This matter is now before the Senate and is being considered in the oil leasing bill, in fact, the bill as it passed the House contains certain provisions that a person who entered upon public land and discovered oil might receive a lease from the Government, a preferential lease for the land upon which the discovery was made.

In California, prior to the time of the first withdrawal, which was on September 27, 1909, a great many people had gone into our mountain districts, our oil districts, and located lands under the placer mining law, a law which was always a misfit law, and a hard one to follow. This country into which they went was an arid country, a barren country, intensely hot in summer, and with but little water. They proceeded the best they could to develop their different locations under the existing conditions and when this order was made, without any notice that it was to be made, it found many of them there on the land, some drilling, some building roads, some bringing in water, some doing this work and some doing that, but such work as was necessary to discover oil. Now several thousand acres of this kind of land is involved. When the order of withdrawal was made, some continued to go on with their development, others became alarmed, stopped work and sought counsel and advice. The result has been that a great deal of doubt exists as to just what their rights are. Some claim they are entitled to a patent, the Government insists they are only entitled to a lease, and this is a question which is a very vital question to the oil operators in the states of California and Wyoming.

The people that I have called your attention to, before this order of withdrawal was made, had spent millions of dollars in the development of these oil fields. There is one company there called the Honolulu Consolidated Oil Company, which spent over three millions of dollars, built over forty miles of fine oil road, brought water from a long distance, and had power houses, miles of telephone lines and gas lines built in the development of their property, and have no patent as yet, and their right to a patent is being contested. Others have made not so extensive improvements, but all

have done work that was necessary leading to the discovery of oil, and all were acting in good faith.

In 1912, about three or four years after these people had been upon the land and developing it, and fighting law suits, and doing the best they could to hold on to their rights, and many becoming bankrupt, the Government conceived the idea of using oil for the Navy, and it became important then that there should be set aside certain lands for Naval Reserves, and representatives of the Geological Survey went into California for the purpose of locating such reserves. They selected a tract containing 38,000 acres of land. There were two or three wells only in this large territory. This land was claimed by the geologist who made the survey to be perfectly adapted for the purposes of a Naval Reserve. It was estimated by that geologist to contain three hundred million barrels, or probably twice that amount of oil. The Secretary of the Interior in September, 1912, made an order setting aside this particular piece of land as a Naval Reserve and it is known as Naval Reserve No. One. Now adjoining this piece of land was another tract where all of the work I have mentioned had been going on, or a large part of it. Three months later, in December of 1912, it was decided to establish another Naval Reserve, and over night a reserve was established on this tract containing 30,720 acres of land, which is known as Naval Reserve No. Two.

One-half of this land is owned by the Southern Pacific Railroad Company, it having received patents therefor as early as 1896. Several thousand acres more were patented to others who had located it for different purposes. There are six or seven thousand more acres of land that have been either patented or clear-listed, or will be patented or clear-listed, so there are about five or six thousand acres in this reserve that is in dispute between the Government and those who have been occupying and claiming the land and have discovered oil thereon.

I want to state here that these people who are in possession were there from three to four years before ever a Naval Reserve was thought of. Nearly all of them had discovered oil. None of them had received patents and their rights are now being threatened. Millions of dollars have been spent by them upon this particular tract. Wells are all over it. It is impossible to conserve the oil in this reserve for the reason that the wells that are now there and will be drilled by those who own their land will drain most of it. Suits have been commenced by the Government against these people

claiming that they have no right to the lands, that they were negligent in their development of it, that is that they didn't use diligence in their development. Receivers have been appointed, and have taken charge of their properties, and the stockholders, consisting of merchants, farmers and business men, stand to lose all of the money which they have invested.

Naval Reserve No. 3 is in Wyoming. It consists of about 9,520 acres of land. It is claimed that this reserve is a very valuable reserve. I think the Geological Survey estimates that it contains about 30,000,000 barrels of oil. It has been stated that this reserve is as valuable and as rich in oil as the Tea Pot Dome and it is estimated that it contains over 30,000 barrels to the acre. And this particular reserve, geologists have stated to me, contains at least 300,000,000 barrels of oil.

Now, these are the three reserves that the Government has already withdrawn for the uses of the Navy. The Naval Reserve No. One with 38,000 acres in which practically there is no private ownership at all. Naval Reserve No. Two, where people have been spending thousands and thousands and millions of dollars long before a reserve ever was thought of who have not yet received a patent, and are now being held up, and Naval Reserve No. Three, in Wyoming, which is free, I understand, from private claims.

Now, while the Navy should have all the oil that it needs to properly operate its ships so that we may have vessels as speedy as those of any other nation, it seems to the people of Wyoming and particularly of California, that it is not necessary for the Navy in securing this oil to reach out and take from its citizens property which they have developed in good faith during all these years, and upon which they have spent their fortunes. The Government is not going to run short on oil. The three reserves that it has would run it for a great many years, but the Government has already, as I stated in the beginning, withdrawn over three million acres of petroleum land out of which it can create as many more reserves as it may desire. So the Government need not be apprehensive of the oil which it needs now in the future for its Navy if the people who are in California get either a patent or a lease for the land which they have occupied and which they have claimed for so long.

Now the Senate Public Lands Committee amended the House bill and provided that those who had entered upon land prior to the withdrawal thereof, and had done substantial work upon the land and discovered oil should receive a patent. It also provides

that another class should receive leases, and this amendment we hope that the Senate will put through either in the form in which it is prepared or in some other form so that it will protect the citizens who in good faith occupied Government land under the placer mining laws of this country, before a withdrawal order was made, or before a Naval Reserve was created. We think we can arrange this matter with the Government working in co-operation with it, and also to enact a law which will conserve the oil of the west, because it is one of our greatest resources. We don't want it wasted. We want it used to the best advantage. We want our oil resources placed in the hands of those who will in good faith go on and develop them, and we hope the legislation which is now pending will be so drawn that this will be brought about; and that the Government may co-operate and work with the people in the west, and that it may have a controlling influence and supervision over the work to be done. We realize the great importance of this product for the present and for the future. We do not desire to have it wasted. We would like to see it under proper regulation. The Government is now going to take charge of it, and we hope that its charge will be fair, will be reasonable and will be just, and in bringing about this change the greatest thing it seems to me to do is that those who have equities and fair equities shall be protected, and this we believe Congress will do.

There is shown a spirit on the part of the members of the Public Lands Committee in the Senate and the Public Lands Committee in the House to take care of those who have honest claims. There are some objections, and always are some objections to every movement that goes before Congress in which any party in the west is asking for anything, but I believe that when it is fully understood, and when the country understands the situation, that there will be no serious objections to the Government taking charge of the oil fields of the west, properly developing them, controlling and regulating them, and at the same time doing justice to those who before this change was brought about were there upon the land in good faith and had spent large sums of money in developing the different properties which they now are claiming.

UNCLE SAM AND WESTERN PUBLIC LAND QUESTION

How the Nation Tries to Insert Itself into Western Affairs by
Means of Its Ownership of Lands and What the
West Thinks of It All.

By Hon. F. H. Short, Fresno, California.

Mr. Toastmaster and Ladies and Gentlemen: Of course, I trust that you are not anticipating that the delivery will be up to the sample that has been cited. I desire to say, however, that if any one of you thinks I am consuming too much time and desires to interrupt me in the same way (laughter) and with the same consideration the previous speaker was interrupted, don't hesitate. (Laughter.)

In this little colloquy about time I was reminded that I have talked frequently in front of distinguished speakers. You know, if you have a real speaker of distinction, you always hold him to the last, and in order that he may not arrive too soon you have other speakers to fill in the interval before he comes. However, by the time I get through with an intelligent and elaborate elucidation of the land laws of the western states, it will be full time for Colonel Pope to arrive.

This argument about time reminded me about what I have often thought of when the speaker was before me at a banquet. It is a story of the fellow that was going through the country. I believe there are a number of educated, scholarly looking gentlemen present tonight, and he was an educated, scholarly looking gentleman. A farmer was out feeding his hogs and he was calling them in the good old-fashioned way and distributing good, old, hard corn for them to eat in the good old-fashioned way. And the professor and scientist, as professors and scientists are inclined to do, looked on him with a troubled and worried face. He said to him: "My friend, don't you know if you boil the corn before you feed it to the hogs they would get fat in half the time?"

The farmer said: "You don't really mean, do you, that they would get fat in half the time?"

"Yes," he said; "we have made perfectly good and scientific tests, and if you will boil the corn thoroughly and feed it to the hogs that way they will get fat in half the time."

The old man studied the question a little bit, and then he started throwing out the good, old, hard corn to the hogs, and after a while he said: "Oh, anyhow, what's time to a hog?" (Laughter.)

I want to say to you, ladies and gentlemen, that, having a very distinguished speaker that you will all stay to hear, time is irrelevant to me. (Laughter.)

The subject that I am supposed to discuss is the relation of the United States Government to the western lands. Preliminary to that I want to illustrate what seems to me to be a square deal. A few years ago, and a few years only, the idea was developed that all of the soil and resources of this country belonged to all of the people of the country and should be retained for the benefit of all. That sounded pretty good to me and at first I was inclined to wonder if I wasn't in on that deal. (Laughter.) The remaining resources of the nation belonged to all of the people of the nation, there being a hundred million Americans, of course if it belonged to all of them and we should get a hundred million dollars a year I would get a dollar. However, with some experience in the realization of political hopes—not referring to the unkindly remarks about California, of course (laughter)—but with some experience in the realization of political hopes and the promises of political returns and political dividends, I have grown so unbelieving that I never put my money anywhere except on the pay roll, and that no matter how munificent the resources of a nation may be, if they are handled by some of the people for the benefit of all of the people, some of the people get them before they get to any of the rest of the people. (Laughter.) I never have worked up very great excitement about any of the soil or resources west of the Missouri River getting east of the river, unless by taxation or flood. As an illustration of the situation I would cite the following: If the remaining resources of the United States are going to be really used for the benefit of the whole nation, there are only about ten million of us, men, women and children, in that portion of Uncle Sam's establishment that we had fondly believed was ours, as the other portion had been yours. If that part is going to be for the benefit of the whole nation, we will have to go through considerable labor and travel and through a good deal of trouble with ten millions of people to contribute a

great deal out of their resources for the benefit of the other ninety millions of Americans.

So just to illustrate that situation I have invented what is called The Parable of the Four Sons. My friend, Colonel Roosevelt, named it, thanks to him. It runs this way: if the remaining resources of the Nation now belong to all of the people of the Nation, there was a time when all the resources of the Nation belonged to all the people of the Nation. You could not get away from that, could you? But Uncle Sam, being the father of four sons, and so that we may have our history and geography straight, we will call them East and North and South and West; and Uncle Sam, being a good father, generous to a fault, proceeded to distribute to his three elder sons, East and North and South, all of that portion of the estate that pertained to them or their children. Whether he did it wisely or unwisely we don't know; but that he did it no one can deny. And that portion of the estate that fell to the younger brother, West, was not supposed to be worth a very great deal, being mostly deserts and mountains and wilderness. But West was quite an industrious young fellow, inclined to exploration and development; and he began to demonstrate that by taking those wonderful rivers that head in these real mountains and traverse real valleys into the world's most majestic sea—by the development of power and distribution of water it began to look as if the inheritance of the younger brother, West, was pretty near one-quarter of the estate, and it was about this time that a great idea of regeneration and moral uplift seized the minds of East and North and South. (Laughter and applause.) And the more they thought about it the worse they felt about it, and finally they went to Uncle Sam and said, "Father, in the distribution of that portion of your estate which you have distributed to us and to our children you have sinned against heaven and in the sight of all men and have greatly impaired the family estate. The only recompense that we can suggest and the only antonement is that you take, seize and hold that portion that was supposed to belong to the younger brother for the benefit of the whole Sam family." (Laughter.)

Mr. Welch, the other day, yesterday, I think it was, in a very excellent address before the Oil Section, said that science was a progressive matter, but that law was unprogressive. Well, now, it may be that that is so, and if we think it over, it has got to be so. I think it is nearly four thousand years since Moses wrote the Ten Commandments. I am not testifying as a witness, but testifying to

my best information and belief (laughter), and I am perfectly prepared to admit that the scientific methods and mechanical devices by which the ten commandments were constructed would not be up to date now—not at all. There has been a good deal of progress involved in the printing of the ten commandments; but is there any progress, either to or away from the ten commandments? Isn't it pretty near true that they are the substance of all the law? And if my friends would ever get wise to the idea that unless truth, which is supposed to be eternal, is progressive, that law and justice cannot in that sense be progressive at all. If you are going to progress away from the commandment, "Thou shalt not steal," which way would you progress? You see, there is no progress in right and wrong.

And so it was that when the public lands of this nation were set apart one hundred and twenty years ago under a declaration by the United States Government that it would hold them and dispose of them as soon as might be done to actual settlers, and erect over the lands thus disposed of new states that should be equal with the original states in all respects whatsoever, there was written into the law of this country a commandment, and just as the people of Illinois and all the states that lie about Illinois never paid Uncle Sam anything when they wanted to build a road, because it was necessary to the development of our common country, and they never paid anything when it was necessary to build railroads or utilize the water resources of the state over the public lands, just so it is true that that policy should be continued and the soil and resources of the United States should be dedicated forever to citizenship and to homes and to the development of the resources of the nation and the people, so that we shall have one great, equal and common country in every part of the country. (Applause.)

Now, in the west those of us who have studied this subject believe in conservation in a common sense way. There is no suggestion but what intelligence should be used in preserving the forests. Any civilized people ought to take good care of their soil and adopt all advanced methods of protecting and improving it. Our minerals, coal and oil, ought to be produced and mined in such a way as to endure the longest possible time. All of these things are sane and sensible. But I have heard addresses in which it was asserted that at the present rate of consumption and increase that coal would be consumed in seventy-five or a hundred years—all of it.

Then I heard a man testify a few months later—one of the scientific geologists—that there was enough coal surveyed in Alaska, south of the Arctic Circle, to last the world at the present rate of consumption for two thousand years, and there probably was as much more north of the Arctic Circle. And I saw a statement from Lieutenant Schackleford that in discovering the South Pole they traveled for many weeks over pretty near perpetual solid coal. So that I imagine, with the growing ingenuity and growing knowledge and science of mankind, that we need not worry about our children or our children's children taking care of themselves, but that they will take care of themselves just as the preceding generations have taken care of themselves.

If you were to ask me what I thought was true conservation, I would tell you that I thought it began when Benjamin Franklin drew the first lightning from the clouds and stole a little of their thunder as well. That marked the beginning of electricity. In California, while we are consuming some of our oils and our coals, we are not worrying very much about their destruction or exhaustion, because by utilizing the streams that flow on the high mountains in the west, by reservoiring them against waste and letting them come down at our will and harnessed in power, we can produce in that state all of the power that is necessary to heat and light all of our homes, to carry on all of our commerce and do all of our manufacturing, all of the time, and that power is not consumed as is coal and oil and wood, but it runs on and on and will endure as long as flowers bloom and rivers run. Therefore, I say to you, an American audience, that I think it is time that we should begin to look quietly and sanely at these matters. As the people of the United States work out their common problems, as the people of Illinois and adjacent states work out their problems, so can the people of the western states, having staked their all upon the issue and being the sons and daughters of the men of the east, I believe they can work out and will work out their problems in the same honest and intelligent way. All we ask is that the trust long ago confided in Uncle Sam shall be carried out in spirit and in letter, so that we may have, not unequal states, not states in which government is injected into that state through the public lands. We of the west never object to anything that the United States Government may do under its constitutional grant of power, because they could do that in Illinois; but when through the ownership of the public lands they seek to levy upon other states, when they seek to impose laws and regula-

tions upon us through those lands, we say that this is an inseparable union of equal and indestructible states and we demand equal treatment—no more and no less. (Applause.)

My friends, before concluding I want to say just a few words to you, not as easterners, not as westerners, but as American citizens. It may be that there is some criticism just now and I noticed some criticism of California in a very bright Chicago paper—and when I say a bright Chicago paper, of course it is necessarily one of the brightest papers in the world. (Laughter.) Now, we have our shortcomings. You will admit that. And you have yours. We will admit that. (Laughter.) And with those admissions we ought to get along pretty well. I have talked to you briefly as a western man. I want to say these few general things that I have said to you and I am going to leave your education as to the refinements and technicalities of the public land laws to some later occasion when I am the last speaker. (Laughter.) At this time I want to say to you further because I think we are facing some very serious and important problems in America: We all like to talk of prosperity, and I am sure I do not like to bring up any ideas of adversity; but I do not think we ought to or could afford to quarrel on sectional issues and divide upon internal problems. This is the only constitutional government, of law, that exists in the world that has ruled any considerable number of people for any considerable length of time; and with the gathering forces of destruction, and with the menace from the outside world, it may be, it may well be, that whether it be on the Atlantic or on the Pacific, we must fight as men have seldom fought before for the preservation of constitutional government, civil liberty and free institutions in this world. It may be so. Let me say to you that while you hear a great deal of talk in campaigns about how rich we have grown and how soft and indulgent and given over to luxury the American people are, I think it is all on the surface. I like to remember that we had our origin as a distinctive race some thousands of years ago, away back beneath the oak forests of Germany and Brittany and while as a race we have yielded sometimes to the domination of king or priestly rule, while we have erred in one direction or another, we have always risen safely superior to every obstacle, and that all in all we as a race are the most liberty-loving, the most resistless, progressive, freest, best race of men that has peopled the earth in all the tides of time. (Applause.)

GOVERNMENT OWNED PATENTS.

By F. G. Cottrell, Washington, D. C.

During last year the Bureau of Mines has been brought very squarely to face the problem of what to do about patentable inventions developed in the Government's own service. I do not, however, wish here to discuss in detail the present policy of this particular bureau, that being a matter for the director to deal with in person, but speaking as an individual rather than as a member of the Bureau of Mines staff, there are some general questions suggested by the idea of government ownership of industrial patents which seem to me well worthy of the thoughtful consideration of this body and I am taking your time today more particularly in the hope of turning attention to the need of a broad enough working plan to fit all branches of the Government service wherein it may prove desirable to deal with these matters.

The taking of patents by the Government, like many other similar functions, has within it the possibility of very valuable public service if wisely administered, but on the other hand could do much mischief, both inside the service and out, if initiated and developed without a truly comprehensive and sympathetic understanding of its relation to the whole spirit, history and working of our present patent system.

It must be remembered that this latter was in its fundamentals conceived when the organization of industry was on a very different basis and scale from what it is today and the relation of the inventor and his work to the fruits thereof far simpler and easier to understand and define than at present with the ever growing complexity of our economic mechanism.

In this day of widespread interest in the regulation of natural monopolies it is certainly both fitting and necessary that we give due attention to our patent system as the earliest and in many ways the most striking instance of the recognition and regulation of monopolies by our national Government. In fact, patents may appear at first sight as purely artificial rather than natural monopolies. This is not, however, an entirely tenable view.

The *first* basic reason for granting patents on invention is to substitute a definite and regulated form of monopoly under the law

for a broader and entirely unregulated one which the patentee might otherwise secure by retaining his secret. Even today many manufacturers prefer to rely upon this secrecy in many instances rather than take out patents.

The *second* basic reason for issuing patents is to encourage and stimulate invention.

The *third* reason for patent protection is to give adequate opportunity and encouragement for intensive commercial development of the invention which is almost invariably necessary to make it generally available on its own merits to the ultimate consumer.

In the case of inventions made in Government laboratories the first of the above reasons for patents has no significance as it is within the Government's own hands to determine the matter of publicity irrespective of patent.

The second reason for patents—stimulation of invention—might have a meaning in the Government service on the ground of recognition and prestige even though no direct pecuniary reward came to the individual inventor over and above his regular salary.

But it is by all odds the third reason, the necessity of fostering under patent protection the early commercial development of most new inventions, that would seem chiefly to justify the taking out and administering of government patents in carefully investigated and approved cases.

The chief danger to be avoided, if the system of taking patents became general in the service, is probably the multiplication of cases and the patenting of trivial details for which a dangerous precedent has already been set by the patent departments of the commercial interests who, due to their rivalry and close competition, perhaps have a greater excuse for this than would the Government. Still even in the production of present publications, Government employes are often charged with taking too great an interest in turning out a given number of pages, and it is easy to imagine that any such tendency which may exist would make itself still more obvious and wasteful of time and energy of all concerned, if applied to the field of patent applications.

These are matters, of course, upon which it is impossible to legislate in detail, but in working out any comprehensive system care will have to be taken to so clearly fix responsibility for the exercise of judgment in these particulars, that it can not be escaped or ignored.

Even among some of those in the government service who would be most directly concerned with such patents, should the system be generally adopted, there seems to be a considerable lack of appreciation of the amount and importance of the administrative work necessary, not only to render patents of the greatest possible public utility, but even to prevent them from becoming an actual drag on the wheels of progress.

The taking of patents by Government employes and the adjustment of questions arising therefrom is no new subject, but so far it has not received the general study it deserves but like Topsy has "just growed."

There is at present no legislation, nor executive order fixing a general policy or procedure with regard to patents by Government employes, and thus each department, or in some cases each bureau, has dealt with the matter piecemeal and often very incidentally in its own way and usually with only its own specific needs in mind when immediate necessity arose; with the consequence that a wide range of policy and point of view is to be found in practice. Thus, in certain divisions of the service the employes are prohibited from taking out patents at all; in others, if they take them out they must be "dedicated to the public," i. e., thrown open absolutely and unrestrictively to public use from the outset. In others, again, the employe may retain title to the patent and make personal profit therefrom in the open market, save for a free license to the Government for its own uses. In some bureaus this free license is further restricted to the particular bureau, the patentee being at liberty to profit individually from the use of his invention by other branches of the service, if he can.

Even in the same division of the service, the requirements on the individual will vary, depending upon the character of the invention and the nature of the service for which he was specifically employed. For example, it has been decided that if a soldier or line officer invents, say an improvement to a cartridge belt, he is individually entitled to patent to it and can deal with the Government on the matter as could an entire outsider because the improvement of accouterment was no part of his regular duties, but if an ordnance officer gets out a new gun carriage it is in the line of his regular duty and belongs to the Government.

Similarly in the case of anyone employed in the civil service for the specific purpose of research along a particular line, anything developed therein is at the command of the Government, at

least as far as this country is concerned. But in such cases the question of foreign rights is still open, and while these may for the present be considered a legitimate and theoretically very natural form of bonus to go to the individual in recognition of special initiative, still to those who have had experience with developments of foreign patents, the question will arise whether after all they are not apt to prove more of a snare and a burden than an asset.

These illustrations merely represent a very few of the many questions arising with regard to the relation of the Government to its own employes in the matter of patents.

On the larger and more important side, viz., that dealing with its relation to the industries and the public at large, the matter is apt to be even more complicated as time goes on, so that the foremost need at present would seem to be the definite location of responsibility for the study and gradual development of a comprehensive and consistent system of administration of this whole subject of patents within the Government's own service.

This guiding and unifying element between the different department should be permanent in its character and organization, as the work must constantly develop and maintain a thoroughly up-to-date and helpful relation to the industries. The fundamental aim of Government patents need be in no sense that of destructive competition with private enterprise, but, on the contrary, should be to aid, encourage and stabilize the latter by supplying some of the connecting links for whose early development it might be particularly hard to secure private backing, even though the final result was of recognized public benefit.

The whole policy underlying the issuance of licenses must be conceived and executed in a broad and intelligent manner with a full understanding of the complexities of modern industry and trade. In its various ramifications it is a subject somewhat resembling and fully as complicated as railroad and other public utility regulation. The Government is already responsible for the general guidance of our whole system of patent law and is of necessity being called upon steadily to make more and more detailed study and pronouncement, either legislative or judicial, concerning the detailed working of the system in both industry and trade. It certainly seems that if the Government itself had also the experience of dealing with the working of these laws from the side of the assignee of patent rights, it might insure a more thought-

ful and sympathetic understanding of the entire subject from both sides than is now always possible to secure.

The question as to just where responsibility for this general oversight and guidance of business administration of government patents could best be vested is an extremely important issue. The scientific and technical aspects of the work should, of course, be left to the individual departments and bureaus as at present, but experience shows that few, if any, of these as at present constituted, have the organization, or take the interest in the details of patent administration in general to insure adequate attention to the subject along the lines above indicated for the public good.

The two alternatives which most naturally suggest themselves are perhaps the creation of a separate commission, similar to the Interstate Commerce Commission and the Civil Service Commission on the one hand, or the enlargement of the functions of the Patent Office itself on the other.

The first has the advantage of giving the new work a perfectly fresh start, but has the generally recognized disadvantage of creating one more isolated administrative unit to be kept in coordination with the rest of the executive machinery. If the work were placed under the Patent Office, it would presumably mean, eventually, the establishment of a separate division of patent administration which would be quite distinct from the present work of the office, but it would have the advantage of assuring as far as possible that the new work would go forward along constructive lines fully in harmony with the original spirit and intent of the patent system as a whole and might be expected to have a healthy and helpful influence on the other work of the Patent Office in bringing home to its official family in a very practical way the live problems met with in the industries through the administration of patents after they leave the office.

CONSERVATION: ITS PURPOSE; ITS EFFECT.

Hon. Frank H. Short, Fresno, Cal.

Mr. Chairman and Gentlemen: In connection with the subject that is before us for discussion this afternoon I must admit that I am a partisan. I hope, however, I have understanding enough to be a reasonable partisan and not an offensive partisan, as the term is used in political matters.

For about twenty years now I have been with considerable activity and industry representing a good many men who have been endeavoring to develop the resources of the western states under the laws of the United States and the western states. At times this has been found both difficult and troublesome, and although we were not engaged in doing anything that was not being done in the open and under the law, and although we were engaged in the construction of canals, appropriation of water, and for the irrigation of land and the erection of reservoirs and canals and aqueducts for the development of hydro-electric power and in the location and development of mines and oil lands and oil claims, nevertheless I have frequently found myself in public gatherings accused of being a wicked enemy of the people, desiring to accomplish something wholly wrong, undesirable and wholly inimical to the public interest. This character of attack and argument was pretty active for a while. However, that never bothered me very much. If a thing is not true and if you go about your business in a legitimate way, false rumors and false agitations wear themselves out. Unhappily, however, I have seen false agitations and false rumors last long enough to kill off a good many people. But those of us who are wearable, durable and indestructible come out all right in the end.

Mining, in the west, is practically synonymous with mining on the public land. This for the reason that before much of the lands of the west was disposed of by the United States it was provided by law that the mineral lands, and later including the oil lands, could not be disposed of except under the mineral laws. That meant upon the discovery and development of minerals justify-

ing the patenting of the land by the Government to those who had developed the same.

Many of you people of the east never think of land title troubles in connection with mining. However, that is about two-thirds of what the western miner has to think about, and whether he thinks about it or not, he usually finds himself sooner or later in trouble.

For a good long time the Government of the United States regarded itself as a trustee for the disposition of the public lands to actual settlers and to those who developed its mineral character. In fact at the time the public lands were ceded by the original thirteen states to the Federal Government, it was provided by statute that they were transferred to the United States in trust, to be disposed of to actual settlers, and that over these lands, then extending as far west as the Mississippi River, there should be erected new states equal in power, dignity and authority, in all respects whatsoever, with the original thirteen states. The trust thus created was for a century carried out by the United States with unchanging fidelity—sometimes, it may be, with undue generosity—but for all of this time it was carried out in the original spirit.

Later, and not very long ago, there was the development of a new idea, or an application of a world-old one, under the title of "Conservation." This is the subject, I believe, that I am to discuss this afternoon. Perhaps I am inclined at times to give a somewhat strict construction to the constitution and laws of our country. However, I have always understood that a subject is given to a speaker as a license and not a limitation. Therefore, in talking of conservation, I will be permitted to talk of anything I want to discuss, for the reason that conservation is an all-inclusive subject. In fact, it has extended and grown and ramified until if you talk of any phase of the public lands or the acquisition of the same or upon any public question from the Cunningham claims in Alaska to Better Babies, you are discussing conservation in its present understood sense.

However, as I first learned to understand the subject, conservation meant the saving and holding and better protection of the resources of the country. Especially with respect to the preservation of the timber, the soils and the river flows and water supplies.

I have never known a subject that divided itself as clearly as conservation does. Up to a certain point we all agree. Beyond that point we all disagree.

We of the west have no quarrel with conservation in the sense that it means the better protection of the soil or the timber or the water supply or the mineral resources. With all of these purposes we are entirely and necessarily in complete accord. And we have always desired to co-operate with such a policy.

But conservation so grew and crowded itself upon other things that Jonah's gourd was nothing at all in comparison with the final growth of conservation in the west.

I recall being present at one of the enormous gatherings that marked the high tide of conservation, and I there heard my altruistic friend, Mr. Gifford Pinchot, assert and demonstrate with a set of figures that in about seventy-five or eighty years, at the present rate of consumption, the world's available supply of coal would be exhausted. This by a process of assuming a mathematical percentage of increase at the same ratio that was then going on (by which ratio of increase, of course, you could burn up the world in a few centuries). However, we were assured, as a matter of mathematical and logical deduction, that the world's supply of coal, and, presumably, other fuels, would be exhausted within approximately the period of time stated. Not being very strong on statistics at the time, I was necessarily much afflicted with fear and cold feet on account of this statement.

Not only was the coal to be burned up and disappear, but the forests such as remained were soon to be destroyed, and a cold, arid, desolate world was spread out before our bewildered and wondering minds.

However, only a few months later I was present when a governmental geologist testified before a committee of Congress as to the conditions in Alaska. He said that the geological department had surveyed enough coal south of the Arctic circle in Alaska to supply the world with coal, at the present rate of consumption, for 2,000 years, and that he assumed that there was as much coal north of the arctic circle.

Some years later, in reading the report of Lieut. Schackleton's trip to the South Pole, I found that he had reported that he had traveled for many days over what appeared to be solid coal formations. I therefore changed my mind and decided not to try to

monopolize the world's supply of coal—at least, without further verification of Mr. Pinchot's estimates.

No doubt, however, there were many good men and women in the country who did not hear this geologist or any other geologist, testify, and who have felt ashamed to put a shovel of coal on the fire to keep their children warm for fear they were depriving their grand children of a needed fuel supply.

This sense of fear, this impending destruction, this exhaustion of coal, this impoverishment of the soil, this exhaustion of mines and of oils and of the resources of living, were so exaggerated, were so exploited in the magazines and were so headlined in the papers that for a time conservation was the greatest political theme of the country.

If a politician was not particularly strong in any other direction, he gained strength by aligning himself with the spirit of conservation. While conservation still has its useful and its strong and its wholesome features, it is not available at this date, I believe, as an argument to persuade people to vote for a wholly useless candidate simply because he dreams of conservation by night and heralds it abroad by day.

The considerations just outlined were the elementary ones in the beginning of conservation. A little later, however, under the banner of "conservation" there was developed the theory and policy that the United States Government, by its ownership of the public lands, should place its authority, control and restraint over the development of the resources of the western states in connection with the use of rights of way over the public lands.

Congress never gave direct sanction to this policy. It simply passed laws of a general nature, authorizing departments, either of the interior or of agriculture, to permit, under rules and regulations, the uses of rights of way over the public lands. While these rules and regulations were supposed to have been designed only to protect the interests of the United States in the use and occupation of its lands, they were shortly after their enactment and are now used as the basis of nearly every conceivable kind of restraint, charge, regulation and control.

The authority is assumed wholly to deny such right or use at all except in the discretion of the departmental head. Also to impose almost every character of governmental authority and restraint over the industry necessarily occupying and using such rights of way. Including, amongst other things, the necessity of getting

departmental permission to dispose of electric power by physical connection with others, although such connection occurs off of the public lands.

Also providing that the Government of the United States might take over and develop an entire power project within a state, not only on the public lands, but off of the same, and regardless of how little of the public lands are used and of how extensive and expensive the development off of the public lands may be.

Therefore, even if you are under the laws of a State entitled to develop a power or other product over the public lands, you could not do so at all except with the approval of the head of one of the departments, and then only under such terms, either restrictive or governmental, as the department might impose, and this includes the charge, regardless of the value of the right of way over the public lands, varying from ten cents per horsepower per year at the end of ten years increasing annually until the maximum of one dollar is reached.

There is a clause in the Constitution of the United States that gives the Federal Government authority to levy excise taxes. But the framers of the Constitution very clearly provided that this tax should be uniform throughout the United States.

If, however, the Government, in connection with the use of a trivial right of way, imposed a charge measured by the quantity of electricity developed, it could correspondingly impose any desired charge for water flowing in canals over the public lands, or a charge per ton per mile for freight transported over a railroad, and if it could itself take over and operate an industry within a state, then in all of the public land states the provisions as to equal taxation under the Constitution would be effectually repealed, and each and all of these states would be, in connection with the raising of revenues, upon an inequality with all of the other states.

The United States cannot be sued (at least it is assumed that it cannot), and therefore rights of way over the public lands cannot be acquired as over privately owned lands. Nevertheless, through these lands you will observe the United States Government is endeavoring to acquire under contracts and by processes equivalent to eminent domain, the possession and ownership of extensive power developments in all of the public land states and which it could possibly not acquire in the non-public land states unless in

connection with permitting the use of the waters of navigable streams for power or other preferred uses.

All of these matters of constitutional equality of opportunity, and of revenue, and of eminent domain, have been thought to be the very highest and most important functions of government, and probably one of the greatest mistakes ever made by any English-speaking people was the effort on the part of our English ancestors and relatives to impose taxation without representation upon the American colonists. The charges and taxes proposed to be imposed on the colonists were not large nor of themselves important, but in the minds of our Anglo-Saxon ancestors it was unequal without representation, and therefore unjust.

By every standard of equality, by every desire for unit, and upon the plainest principles of justice and the general welfare, we all ought to oppose these unequal policies with all the strength that we possess.

The excuse for the charge on western industries was that it was expensive to supervise the forests and the public lands, and therefore additional revenue should be provided. Parenthetically I wish to observe, however, that I am not complaining of the salaries of forest rangers. I have always regarded a forest ranger as a patriot. If we are fixing wages for other people to pay, we American citizens are a pretty liberal people, but when it comes to fixing the wages we are to pay out ourselves, we are fairly economical. We pay the forest rangers, and I believe they usually get about \$75.00 a month. But the ranger has the privilege of furnishing his own pony, and also the United States furnishes for his use all of the green grass in the reservation, and an abundance of river water, and the finest scenery in the world, all of which is as free to the ranger as the air and the air is also free for him I believe.

If a ranger can find a suitable wife who does not adhere to society, and who loves nature and the inexpensive wearing apparel of an Indian squaw, he is free to marry, but he and his wife are forever removed from all social ambition and desire for wealth or other hurtful ambitions.

However, while rangers are cheap enough on the range, a great many buildings must be built and erected, and they must be filled with patriotic bureau heads and other government functionaries in Washington, and the aggregate expense is quite sufficient to consume any excess of the aggregate revenue. So there would be no dividend for the average citizen—at least not right away.

I have heard it suggested in committees of Congress that one dollar per horsepower per year was not much of a charge. Since, however, a fair wholesaling price for electric power would be twenty dollars per horsepower per annum where supplied at the power house, it is equivalent to a tax of five per cent on the gross income, and even if you got fifty dollars per horsepower, it would be two per cent and the present income tax on the exemptions is one per cent and probably the average citizen would feel somewhat imposed upon if his present income tax were increased from one per cent to six per cent per annum.

This charge is not in actual operation so much of an imposition upon the power companies and their stockholders as on the consumers of power. In nearly all the public land states the business of developing and distributing electric power is public service and is strictly regulated by law, and under commissions provided for that purpose the rates and charges are fixed. And this being so, whatever tax is paid to the Federal Government is necessarily added to the charge which the power companies earn from the public, and, correspondingly, the consumer pays the tax.

The discriminating individuals who framed the constitution of the United States provided that the Federal Government should have the power to levy excise and certain other taxes, but with discrimination they said that the same "must be uniform" throughout the United States. However, what would I care for this constitutional limitation if I owned the public lands within a state and could impose arbitrarily upon any industry using the same any desired tax or charge and if I could also take over by authority of the public lands and own and run the power business within a state, the limitation would amount to but precious little it seems to me. If these regulations can be maintained and sustained as constitutional and just, then in the thirteen western states of this Union equal taxation by the United States is forever suspended.

I do not believe that any thoughtful American citizen wants this. I believe the people of the east want the people of the west to operate and live under equal laws and in equal states and have and exercise equal rights; and it is only those that have been misadvised and misinformed and that misunderstand the policy that have approved the same.

The purpose of the constitution of the United States was to create equal citizens, and as an essential condition of equal citizen-

ship it was necessary to create equal states. If the states are unequal, or if one state cannot be developed under the same laws as another state, or with the same exemptions from charges and impositions, then the states are unequal, and it follows therefore that if the states are unequal, the equality of American citizenship is destroyed.

In a decision of the Supreme Court of the United States, written by Judge Brewer, it was said that the powers of the Federal Government in every state should be the same, no greater and no less. This is exactly what we contend for—no greater and no less. Even if the Federal Government under the constitution had the power to change its policy and could deny development of resources over the public land or could impose large and arbitrary charges in connection therewith, or could impose restraints or exact powers of government that it could not otherwise exercise everywhere, it should not attempt to do so.

The very essence of our institutions, the very basis of our citizenship, is equality, and this equality should be preserved, whether the constitution would permit it to be violated or not. But if it is held that this equality cannot be violated, then the apprehension will be removed.

These considerations seem very simple, elementary and undeniable. But my friends of conservation absolutely decline to consider them. They constantly insist that they are going to help us by helping themselves to authority, to revenue, to income and to control over government. The greatest vice of the situation is that it applies only to about one-third of the remaining territory of the United States and to only about one-tenth of its population. If it applied to all of the territory and to all of the citizens of the United States, it would very readily adjust itself. But where the condition is unequal, where the majority is in interest opposed to the minority, inequality and sectionalism develop and infinite harm can be done.

If "the remaining resources of the nation belong to all of the people of the nation," then in the beginning the resources of the nation belonged to all the people of the nation, and it seems rather inopportune and unjust, after the distribution of its common assets to four-fifths of the states that the proportion remaining to the other fifth should be taken and retained for the benefit of all.

In Utah, for instance, there is only about twenty per cent or less of all the land in the state that is vested in private ownership,

and therefore eighty per cent of the soil in Utah is now and will be, until the United States Government disposes of its land if it ever does, exempt from the power of taxation in that state. This eighty percent can never be made to pay any income in support of the government of the state or of the counties of the state or of the municipalities or the common schools of the state. And yet we are assured that this policy is for the benefit of the western states and the western people.

In this connection I have illustrated the situation by a parable that Col. Roosevelt has referred to as the parable of the four sons. But I am going to make an address at the banquet tonight, and of course as the banquet will cost money and as this is a free show, it would not be right for me to give you the benefit of everything here and say nothing new there. The seats at the banquet, I believe, are five dollars. However, in addition to my address there will be one by Col. Pope and also others to speak, and there will be also five or six courses served, but you will not hear the parable of the four brothers unless you pay five dollars. (Laughter.)

One of the most hurtful developments in connection with this new public land policy is the uncertainty that it developed. When the United States Government was simply acting as an arbiter as to which of two or more applicants it would assign the land, there was little difficulty and but little complaint, but now when a citizen is claiming title, either as to agricultural or mineral land, the United States comes in claiming the land itself. The official who is to decide the case is an officer of the Government. We therefore find this as a good deal like trying a defendant charged with crime before a district attorney and expect to get a verdict of acquittal. The Government generally wins when there is any plausible reason or excuse for deciding in its favor, and I sometimes think the reasons assigned are not very plausible.

Many of the western states have not increased in population for the last ten or fifteen years in a proportionate way. And a large percent of this retardation of growth is because no American citizen could know whether, if he went to the public lands and undertook their development under the law either for their acquisition as agricultural lands or as mineral lands or for the development of water resources for hydro-electric power, his rights would be respected or not, or whether his title would be confirmed.

In California and in some of the other western states a very serious phase of this matter has occurred in connection with the

development of oil. These oil lands were subject to be taken up only under the mineral laws. But as no absolute rights existed until discovery of mineral or oil, and since it took unavoidably sometimes several years to make a discovery of oil on the claim, the title of the locator was insecure.

Under this state and condition of things there were presidential orders of withdrawal and an intervening act of Congress, so that many American citizens who at enormous expense have developed the oil mineral lands find their titles denied and their possession disputed, and although they have developed the property openly and in good faith and are in possession, they have been sued by the Government. Receivers are in charge of their property and many of them are facing bankruptcy, all because of the uncertainties and changes and conflicting administration of the law.

Those who have developed these oil mineral lands have proceeded under the advice of counsel. For instance, upon the question of the validity of the withdrawal made by the president, ten federal judges have passed upon the question, five holding that the withdrawals were invalid and five holding that they were valid. Since, however, five out of eight judges of the Supreme Court of the United States thought the withdrawals were valid, the decision went against the oil locators, and it is now actually being attempted to forfeit their properties, take over their improvements and charge them with the oil that they have taken from the lands, although, as decided by the courts, the Government and its officials have stood by knowing what was being done, the improvements being made, the lands developed and the oil produced, and never gave any notice of their intention to forfeit the same.

Congress is now considering legislation that it is hoped will somewhat relieve the situation, and, strange to relate, from uninformed sources vigorous attacks have been leveled against this humane and reasonable request for relief legislation. But inasmuch as the courts, while holding the title to the oil land defective in a legal sense, have uniformly held their good faith and their good intentions and the honesty of their motives, there can be little doubt that the relief sought will be granted.

I am morally certain that every miner in the United States when informed of the conditions upon the oil lands will approve of the passage by Congress of just and reasonable laws in this connection. I was pleased to see in the remarks of Franklin D. Roosevelt, speaking for the Navy, that he does not favor confiscation.

While he does favor an adequate supply of oil for the Navy, there is no official conflict between its policy and the confirmation of the just rights of those who have developed these lands.

We are all, of course, in favor of an adequate navy and of everything that is needed for its efficiency and success. But to state the matter in very round figures, three million acres of oil lands have been withdrawn. It is stated by the Geological Department that they have been withdrawn because it is believed that they contain valuable deposits of petroleum. Assuming even that the Geological Department is ninety per cent wrong and that only ten per cent of these three million acres contain petroleum, there is not more than thirty thousand acres of disputed developed oil lands altogether.

Assuming that there is so little as three hundred thousand acres of productive oil land undeveloped and they are to be appropriated by the Government for the use of the Navy, if there was only one oil well on each five acres of land—and you could put on double that number, and if these wells produced only an average of fifty barrels per day—and they would probably produce twice as much—you would have a daily production of three million barrels, this production would be sufficient to supply the needs of the Navy, even when it is fully developed up to anticipated standards, for a year out of the production of two days.

It is, therefore, not only wholly wrong, but wholly unnecessary to talk about robbing the miners who have developed the public lands in the interest of the Navy. Happily, there is a permanent supply of fuel oil for the Navy for indefinite years to come, regardless of any disputed lands or whether they shall be retained by the Government or assigned to those who have developed them at great hazard and expense.

In conclusion, allow me to say that the people of the western States are seeking only a square deal, no more and no less. What we desire is absolute equality. We talk much about liberty and justice, but without equality there can be no liberty and unequal justice is not justice at all, and inequality is incompatible with the very first and most fundamental ideas of American citizenship.

But we do believe that the western states and the pioneers who have settled them are entitled to be as free and as respected as those who developed the east and the central and southern portion

of this country. We believe in this and we hope and believe that you agree with us.

It has been an enormous task to develop the west even so far as now developed. We who have seen its deserts and its fertile plains and its great mountains are its loyal friends. I wish that every American could have seen the same and could get the spirit of the west in his veins.

We who are seeking to develop this great and necessary portion of the nation do not desire to stop to consider whether we are in the east or the west or the north or the south. The problem is simply one great American problem to be worked out consistent with the idea of a common country, consistent with the idea of absolute equality of states, absolute equality of citizenship, absolute equality of opportunity and absolute equality of right. (Applause.)

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