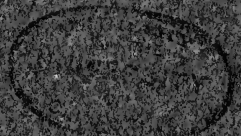
Report of Proceedings

OF THE

AMERICAN MINING CONGRESS

Eleventh Annual Session

Pittsburgh, Penn., December 2-5, 1908



Published by the American Mining Congress
At the Office of the Secretary, Denver, Colo., 1909

Report of Proceedings

of the

American Mining Congress

Eleventh Annual Session

Pittsburgh, Penn., Dec. 2-5

1908

Published by the American Mining Congress

At the Office of the Secretary, Denver, Colo., 1909

SESSIONS OF THE CONGRESS HAVE BEEN HELD AS FOLLOWS:

	DATE.	CITY.	PRESIDENT.	ADDRESS.	REMARKS.
First	July, 1897.....	Denver, Colo.....	Hon. Alva Adams.....	Pueblo, Colo.....	Temporary.
First	July, 1897.....	Denver, Colo.....	Hon. L. Bradford Prince.....	Santa Fe, N. M.....	
Second	July, 1898.....	Salt Lake, Utah.....	Hon. L. Bradford Prince.....	Santa Fe, N. M.....	
Third	July, 1899.....	Milwaukee, Wis.....	Col. B. F. Montgomery.....	Cripple Creek, Colo..	Passed to June, 1900.
Third	June, 1900.....	Milwaukee, Wis.....	Col. B. F. Montgomery.....	Cripple Creek, Colo..	
Fourth	July, 1901.....	Boise, Idaho.....	Hon. L. Bradford Prince.....	Santa Fe, N. M.....	
Fifth	Sept., 1902.....	Butte, Mont.....	E. L. Shafner.....	Cleveland, Ohio.....	
Sixth	Sept., 1903.....	Deadwood and Lead, S. D.	Hon. J. H. Richards.....	Boise, Idaho.....	
Seventh ...	Aug., 1904.....	Portland, Ore.....	Hon. J. H. Richards.....	Boise, Idaho.....	
Eighth	Nov., 1905.....	El Paso, Texas.....	Hon. J. H. Richards.....	Boise, Idaho.....	
Ninth	Oct., 1906.....	Denver, Colo.....	Hon. J. H. Richards.....	Boise, Idaho.....	
Tenth	Nov., 1907.....	Joplin, Mo.....	Hon. J. H. Richards.....	Boise, Idaho.....	
Eleventh ..	Dec. 1908.....	Pittsburgh, Pa.....	Hon. J. H. Richards.....	Boise, Idaho.....	

1908

INDEX

ADDRESSES.

COMMITTEES.

SUBJECTS OF RESOLUTIONS.

RESOLUTIONS.

Resolution	Introduced by	Page	Reported page	Disposition
14	J. W. Dawson	61		
15	David Ross	62	108	Referred back to Congress.
16	Mr. Benton	87		
17	A. H. Purdue	88	101	Adopted.
18	W. F. R. Mills	99	109	Adopted.
19	John G. Ross	100	108	(Made a part of record as a statement.)
20	Jno. C. Keighley	109		Referred to Committee on Forestry.

Resolution of thanks by Senator Dick of Ohio, Page 110.

SPEAKERS.

TITLES TO PAPERS PUBLISHED IN PART II.

OFFICIAL ROSTER

of the Officers and Committees of the American Mining Congress

1907

OFFICERS.

J. H. RICHARDS.....President
THOMAS EWING.....First Vice President
E. R. BUCKLEY.....Second Vice President
E. A. COLBURN.....Third Vice President
J. F. CALLBREATH, JR.....Secretary

DIRECTORS.

J. H. Richards.....Boise, Idaho
Thomas Ewing.....Vivian, Arizona
E. R. Buckley.....Rolla, Missouri
E. A. Colburn.....Denver, Colorado
George W. E. Dorsey.....Fremont, Nebraska
C. M. Shannon.....Los Angeles, California
John Dern.....Salt Lake City, Utah
A. L. White.....Lima, Ohio
W. F. R. Mills.....Denver, Colorado

COMMITTEES—1907.

PROGRAM.

Dr. E. R. Buckley, Rolla, Missouri; T. A. Rickard, San Francisco, California; E. Lyman White, Denver, Colorado.

TRANSPORTATION.

W. F. R. Mills, Denver, Colorado; Col. A. G. Brownlee, Idaho Springs, Colorado. J. F. Callbreath, Jr., Denver, Colorado.

WAYS AND MEANS.

John Dern, Salt Lake City, Utah; Col. Thomas Ewing, Vivian, Arizona; Col. George W. E. Dorsey, Fremont, Nebraska; F. Wallace White, Cleveland, Ohio; Judge E. A. Colburn, Denver, Colorado.

AUDITING COMMITTEE.

E. Lyman White, Denver, Colorado; E. G. Reinert, Denver, Colorado.

MINING TEMPLE BUILDING.

Governor Henry A. Buchtel, Denver, Colorado; Hon. Meyer Friedman, Denver, Colorado; Hon. J. H. Richards, Boise, Idaho.

PROTECTION AGAINST MINING FRAUDS.

C. J. Downey, Denver, Colorado; R. L. Herrick, Scranton, Pennsylvania; Hon. A. W. McIntire, Everett, Washington; Hon. H. C. Beeler, Cheyenne, Wyoming; Judge William F. Clark, Glover, Vermont.

SMELTER RATES.

E. A. Colburn, Denver, Colorado (Chairman); E. M. DeLavergne, Colorado Springs, Colorado; George W. Riter, Salt Lake City, Utah; H. S. Joseph, Salt Lake City, Utah; Dr. L. D. Godshall, Needles, California.

VERTICAL SIDE LINE LAW.

James D. Hague, New York City; John A. Church, New York City; R. A. F. Penrose, Philadelphia, Pennsylvania; Charles J. Hughes, Jr., Denver, Colorado; Hon. Thomas Kearns, Salt Lake City, Utah.

PREVENTION OF MINE ACCIDENTS.

H. Foster Bain, Urbana, Illinois; F. W. Parsons, New York. H. H. Stoeck, Scranton, Pennsylvania; B. F. Bush, St. Louis, Missouri; Herman B. Hesse, Frostburg, Maryland.

GENERAL REVISION OF MINING LAWS.

W. R. Ingalls, 505 Pearl Street, New York; J. Parke Channing, 42 Broadway, New York; J. R. Finlay, 71 Broadway, New York; John Hays Hammond, New York; Dr. James Douglas, New York.

OFFICIAL ROSTER

of the Officers and Committees of the American Mining Congress

1908

OFFICERS.

J. H. RICHARDS ..... President
THOMAS EWING ..... First Vice President
E. R. BUCKLEY ..... Second Vice President
JOHN DERN ..... Third Vice President
J. F. CALLBREATH, JR ..... Secretary

DIRECTORS.

J. H. Richards ..... Boise, Idaho
Thomas Ewing ..... Vivian, Arizona
E. R. Buckley ..... Rolla, Missouri
E. A. Colburn ..... Denver, Colorado
L. W. Powell ..... Bisbee, Arizona
John Dern ..... Salt Lake City, Utah
W. F. R. Mills ..... Denver, Colorado
Alexander Dempster ..... Pittsburg, Pennsylvania
Geo. W. E. Dorsey ..... Fremont, Nebraska

ADVISORY BOARD.

L. W. Powell ..... Bisbee, Arizona
A. W. McIntire ..... Everett, Washington
W. J. Elmendorf ..... Spokane, Washington
Duncan MacVichie ..... Salt Lake City, Utah

COMMITTEES—1908.

EXECUTIVE COMMITTEE.

E. A. Colburn, Denver, Colorado; W. F. R. Mills, Denver, Colorado; Col. Thomas Ewing, Vivian, Arizona.

PROGRAM COMMITTEE.

J. F. Callbreath, Jr., Denver, Colorado; Alexander Dempster, Pittsburgh, Pennsylvania; Dr. H. M. Payne, Morgantown, West Virginia.

COMMITTEE ON ALASKAN LAWS.

James J. Godfrey, Seattle, Washington; John H. McGraw, Seattle, Washington; Watson Allen, Seattle, Washington.

AUDITING COMMITTEE.

E. G. Reinert, Denver, Colorado; W. E. Bridgman, Denver, Colorado.

PROTECTION AGAINST MINING FRAUDS.

C. J. Downey, Denver, Colorado; Hon. John J. Lentz, Columbus, Ohio; H. J. Cantwell, St. Louis, Missouri; Hon. H. C. Beeler, Cheyenne, Wyoming; Maj. F. C. Vincent, Kansas City, Missouri.

SMELTER RATES.

E. A. Colburn, Denver, Colorado, Chairman; Geo. W. Riter, Salt Lake City, Utah; E. M. DeLa Vergne, Colorado Springs, Colorado. H. S. Joseph, Salt Lake City, Utah; Dr. L. D. Godshall, Needles, California.

VERTICAL SIDE LINE LAW.

John A. Church, New York City; Chas. J. Hughes, Jr., Denver, Colorado; R. A. F. Penrose, Philadelphia, Pennsylvania; Hon. Thomas Kearns, Salt Lake City, Utah; Geo. E. Collins, Denver, Colorado.

PREVENTION OF MINE ACCIDENTS.

Dr. H. Foster Bain, Urbana, Illinois; H. H. Stoek, Scranton, Pennsylvania; F. W. Parsons, New York; B. F. Bush, St. Louis, Missouri; Herman B. Hesse, Frostburg, Maryland.

GENERAL REVISION OF MINING LAWS.

W. R. Ingalls, 505 Pearl Street, New York; J. R. Finlay, 71 Broadway, New York; J. Parke Channing, 42 Broadway, New York; John Hays Hammond, New York; Dr. James Douglas, New York.

INVESTIGATION OF THE NATIONAL FOREST SERVICE AND ITS EFFECT UPON THE MINING INDUSTRY.

A. G. Brownlee, Denver, Colorado; George J. Bancroft, Denver, Colorado; E. A. Colburn, Denver, Colorado; William P. Daniels, Denver, Colorado; W. F. R. Mills, Denver, Colorado.

Officers for the Year 1909

PRESIDENT,

J. H. Richards.

VICE PRESIDENTS,

E. R. Buckley, John Dern,
W. F. R. Mills.

DIRECTORS,

J. H. Richards, Boise, Idaho.
Thomas Ewing, Fenner, California.
E. R. Buckley, Flat River, Missouri.
George W. E. Dorsey, Fremont, Nebraska.
W. F. R. Mills, Denver, Colorado.
John Dern, Salt Lake City, Utah.
Samuel A. Taylor, Pittsburgh, Pennsylvania.
H. Foster Bain, Urbana, Illinois.
A. G. Brownlee, Denver, Colorado.

SECRETARY,

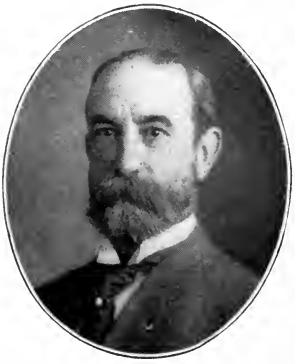
James F. Callbreath, Jr., Denver, Colorado.

EXECUTIVE COMMITTEE,

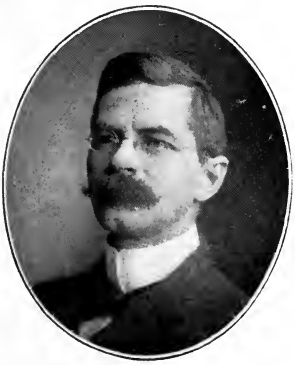
John Dern, A. G. Brownlee,
W. F. R. Mills.

OFFICERS AND DIRECTORS

HON. J. H. RICHARDS
President
Boise, Idaho



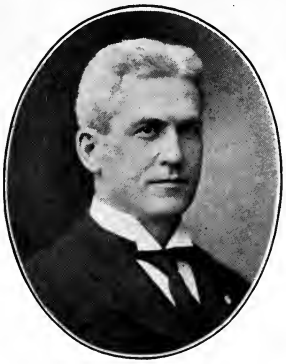
W. F. R. MILLS
Third Vice President
Denver, Colorado



JAS. F. CALLBREATH, JR.
Secretary
Denver, Colorado

DR. E. R. BUCKLEY
First Vice President
Flat River, Missouri

AMERICAN MINING CONGRESS



COL. A. G. BROWNLEE
Denver, Colorado

COL. GEO. W. E. DORSEY
Fremont, Nebraska

JOHN DERN
Second Vice President
Salt Lake City, Utah

SAMUEL A. TAYLOR
Pittsburgh, Pennsylvania

COL. THOMAS EWING
Fenner, California

REPORT OF THE PROCEEDINGS

OF THE

Eleventh Annual Session of the American Mining Congress

Held at Pittsburgh, Pa., December 2 to 5 Inclusive, 1908

WEDNESDAY, DECEMBER 2, 1908.

Morning Session.

The opening session was called to order at 10 o'clock, a. m., by Mr. Samuel A. Taylor, Chairman Local Executive Committee.

Invocation by Dr. S. B. McCormick, Chancellor of the University of Pittsburgh.

MR. TAYLOR: Gentlemen, you have come to our city at the invitation of the Chamber of Commerce, which represents the business interests of this city and community, a city which is proverbially known as the industrial center of America, whose pay-roll amounts to practically one million dollars per day, and whose tonnage exceeds the four greatest sea-ports of the world. It is to such an industrial hive as this that you have come at the invitation of the Chamber of Commerce. It is fitting, therefore, that your welcome should be extended by the president of the Chamber of Commerce, who also represents at this time the mayor of our city, who is obliged to be absent and, therefore, unable to meet with us at this time.

I have the honor of introducing the president of the Chamber of Commerce, Mr. Lee S. Smith. (Applause.)

MR. LEE S. SMITH: Mr. Chairman, Ladies and Gentlemen: After I had been asked to represent the Chamber of Commerce and welcome you to our city on its behalf, our mayor, the Hon. George W. Guthrie, sent me a communication asking me to represent him also, as he could not be present on this occasion; so I take great pleasure in appearing in this dual capacity.

I suppose, for some reasons, as representative of the mayor of the city, I ought in accordance with historical custom to tender to you the keys of the city, but I do not think that is proper on this occasion for a number of reasons. In the first place, we have no keys and we have no gates, and if we had we would throw them all off their hinges to admit the American Mining Congress within the walls of our city—the center of such great mining interests. And then, too, if we did close our gates against gentlemen of your ability, skill and talent, you would mine under the walls and come in anyhow. So on behalf of the mayor of the city I just simply say, you are a thousand times welcome within the borders of greater Pittsburgh.

I am not going to take up your time by enumerating the items of our greatness. You already know them. And I am not going to take up your time in extolling the mining interests and your great calling, because what I do not know of them would make a very large library, and keep you busy all the balance of your lives in studying the subject out.

You are welcome to the city. On behalf of the Chamber of Commerce of Pittsburg, I want to say just a word or two, because we have the Honorable James Francis Burke, M. C., here to extend to you an address of welcome, and we pay him for his addresses and he is always ready with them. (Laughter.) For this reason I wish to say just a word on behalf of the Chamber of Commerce of Pittsburg. In the first place, Chambers of Commerce are of very ancient lineage. We find that the first one was organized about the beginning of the fifteenth century in Marseilles, France. The movement spread over France, and finally got over into England, although that great commercial nation was very slow to take up the matter. But tracing the history of Chambers of Commerce of the past, we find that they devoted their time and attention almost altogether to the interests of their individual members, and not for the general good; so much so did this exist in France that they were suppressed on several occasions. But finally they have come to realize that they have a higher and nobler calling than simply looking after the commercial interests of the members of the Chambers, and that is to try to do something for the community, for the state and for the nation, and I assure you candidly that the Chamber of Commerce of Pittsburg, (like some of its co-laborers throughout the United States), is devoting about nine-tenths of its time to public interests of civic, state and national character, and, therefore, on behalf of this Chamber of Commerce, which has extended to you an invitation to come to our great city, I want to say to you, welcome, thrice welcome. We hope that your deliberations here will be not only beneficial to yourselves but to our city as well. (Applause.)

MR. TAYLOR: In connection with what has already been stated I wish to say that there are some things other than commercial ends attained in this city. I wish to read an original poem by Judge Joseph Buffington, of our United States Court, which was written a short time ago, and delivered at a meeting of the alumni of the University of Pittsburg, entitled, "The City of Pitt."

City of Pitt, to thee,
Set by the rivers three,
Washington won.
From France's lillies torn,
To Saxon freedom sworn,
Spot where the West was born,
We be thy sons.

Mine rich thy rugged hills,
Girdling thy thousand mills,
City wealth blest.
Teach us, Great God, to know,
That as we reap we sow;
Let not wealth bring us low,
This our behest.

In home, in church, in school
In lives where virtue rules,
These shape thy fate.
Not what is sold and bought—
In what is lived and thought—
That for which life is fought—
These make thee great.

We have asked you to come not only to the City of Pittsburg, but to the great "State of Allegheny County," as Lincoln termed it. We have also asked you to come to our state of Pennsylvania. We have not as a state much to boast of along the line of precious metals, but we

have one of the greatest iron ore mines in the United States located within our borders, as well as great coal mines. The statistics of the United States Geological Survey show that of the entire amount of coal produced in the United States from 1814 to 1907, inclusive, which was 6,865,097,567 tons, Pennsylvania produced 3,777,579,574 tons, or practically fifty-five per cent. of all the coal that has been produced in the United States in this period of time. In 1907, of the 480,363,424 tons of coal produced in the United States, Pennsylvania produced 235,747,489 tons, or practically fifty per cent. We, therefore, can refer with some pride to Pennsylvania as being a mining state. It is fitting, therefore, that you should be welcomed here by one who represents not only Allegheny County, but the State of Pennsylvania as well.

We have with us at this time a man whom Pittsburg delights to honor, and who has been sent, after a successful career in our midst as an attorney, to our National Congress to help to legislate not only for this state but for the Union. I have the pleasure of introducing to you Honorable James Francis Burke, Congressman from the 31st district of Pennsylvania. (Applause.)

CONGRESSMAN JAMES FRANCIS BURKE: As a Representative of the United States government and as a citizen of the richest and most resourceful valley in the world, I sincerely rejoice in your meeting and extend you a hearty welcome and wish you unmeasured success in your great mission.

Lesson of a Tragedy.

As if it were designed to lend a frightful significance by its cruel coincidence, a terrible tragedy has made doubly impressive the necessity and the timeliness of this convention.

The angry messenger of death has again impressed us with the fact that the miner's lamp still burns in a chamber of unmastered mysteries; and that the hidden dangers of the chamber of horrors still await to be driven out by the savage searchlight of an all conquering science in whose cause you have come together from every section of this Republic today.

From the lips of every miner, from the grave of every victim whose life has been offered as a sacrifice upon the altar of an undeveloped science, there will come to your proceedings a heartfelt benediction.

As earnest crusaders in an earnest cause it is eminently fitting that you should assemble in a community in which the very atmosphere is surcharged with a sincere interest in your work.

Duty of the Government.

A considerable portion of your proceedings will be devoted to the matter of enlisting governmental co-operation and in this I shall manifest a profound interest.

While other governments may excel us somewhat in their accomplisments in the matters to be discussed here, I still believe that no other government on earth in a given length of time has ever accomplished more in the development of its resources, the enrichment of all its people and the enlightenment of the world than this sturdy republic, which was baptized in Pensylvania a century and a quarter ago.

Criticism Unprofitable.

If there be those who believe she has been remiss in some things, let us not weary the world with frowning on the faults of yesterday, but brighten the pathway of man by picturing the more pleasing prospects of tomorrow.

Let us remember that those who turn their faces toward the sun cast all their shadows behind, while those who turn their backs upon it never place their footsteps where a shadow does not fall.

A National Bureau of Mines.

One of the pictures I feel justified in hanging in prospect before you today for unveiling within sixty days is that of a well manned and adequately equipped Bureau of Mines in the Department of the Interior of the United States government.

To the man who calls this paternalism let me say that that same cry was raised when the Bureau of Agriculture was projected, which has since developed into a Department whose work is commanding the confidence and admiration of the world.

Our mineral industry ranks second only to agriculture, its output exceeding two billion dollars annually.

Our manufactures, with $14,000,000,000 annual output, have their Department of Commerce and Labor.

Our agriculture, with its $7,500,000,000 annual production, has its Department of Agriculture, its Chief a member of the President's Cabinet, while our mineral industries with an output of over two billion dollars annually, has not even a bureau.

From 1880 to 1900 our gold production more than doubled; oil trebled; coal quadrupled and copper increased tenfold; and in the course of this production it is safe to say that the waste of material and sacrifice of life have been greater than in any other country in the world.

The Irreparable Sacrifice.

The tragic and permanent character of this sacrifice is revealed in the realization that a human life once destroyed is gone forever, and that minerals once removed from the earth are not renewed by growth as are the crops that cover the fields or the forests that crown the hills.

To prevent this waste is a matter in which the details are for individual effort, but the primary researches and fundamental experiments are the logical and proper functions of the general government.

Purposes to be Served.

There are three purposes to be served by these efforts:

First, the prevention of the sacrifice of human life.

Second, the conservation of our known resources.

Third, the discovery and development of unknown resources for the nation's enrichment.

Under the first classification we need only recall the appalling list of increasing fatalities here and the correspondingly diminishing destruction of life and property abroad, to impress upon us the need of concerted action.

Frightful Fatalities.

During 1907 over 1,000 miners lost their lives in a single month.

During the same year 3,000 miners were killed, an increase of 50 per cent. over 1906.

Our federal safety appliance and employers' liability laws were enacted as a result of the awful slaughter of railroad men, year after year, yet while for each 1,000 railroad men 2½ are killed annually, for every 1,000 miners 3½ are sacrificed. The number of miners killed or injured in 1906 reached the awful total of 7,000.

That this appalling loss of life can be diminished by government experiment and aid has been proven by both France and Belgium, where they have decreased the mortality in such cases fully two-thirds.

The states in the exercise of their police power and the federal government in its control of interstate commerce should provide and enforce the most rigid rules regarding the manufacture and sales of explosives, and wherever the word "flameless," or "safety," or kindred labels are improperly attached, or old titles given to new and more dangerous explosives, the punishment should be prompt and severe.

The same general strictness should be required in labeling explosives as are required in labeling poisons.

Under the second classification it is a notorious fact that the percentage of light, heat and power derived from the present manner of converting our resources into commercial value are infinitesimal compared with what might be derived through scientific methods. The possibilities in this regard in the matter of electricity, the consumption of coal and lignites are too vast to permit of detailed discussion by me.

Under the third classification, there is the possibility of the ultimate discovery of vanadium, the most precious and valued of all alloys in the making of steel. When we import it we pay to the enterprising gentlemen who have discovered it in other countries $10,000 per ton. For want of knowledge we do not produce it, but many believe we shall at no distant future date.

Radium, the rarest of all minerals, a government of small area but of a scientific turn of mind has developed, and today when we make known our needs of it, we must beg practically every atom of it from Austria, which has also a virtual monopoly of its associate mineral, uranium.

We have discovered in this country many of the same minerals and geological characteristics that mark the vicinity of these precious minerals in Austria, and it is believed by many that with a bureau continuously investigating the properties and potentialities of these minerals and the elements surrounding them the discovery of the more precious ones will follow.

Your great work is still in its infancy, but in the prosecution of your researches and experiments I know of no surer way of insuring success in solving the perplexing problems that now baffle the miners of the land, to prevent the destruction of human life, to conserve the known resources of the nation and promote the development of new elements of enrichment than to be animated and inspired by that spirit of undaunted courage and never-ending hope which has marked the whole enchanting story of that prince of the world's great adventurers—the American miner.

The word "fail" never found a lodging place in his lexicon, whether he was leading the hosts of civilization from where the waves sobbed on the shores of the Atlantic to where the winds moaned their miserere in the wilderness of the Alleghanies; whether he was breasting the current of the Mississippi or blazing the white man's pathway through virgin forests to the lead mines of Illinois, Missouri, Iowa and Wisconsin; whether he was trailing across the plains to the Rockies or from the snowstorms of the mountains to the sun-kissed hills and valleys of the Golden Gate, where his dreams at last came true; where his sacrifices and successes, his tribulations and his triumphs made fiction commonplace in the presence of fact; baffled the poet and compelled the world to recognize a new standard of values in manhood as well as money.

With such an example to inspire there need be no fear of failure by those who follow in his footsteps.

MR. TAYLOR: Before turning over the gavel to your honored president, I wish to state to those who have the advance programs that they will find upon them a list of the various committees in connection with the Congress, and if there is anything which you desire, which you do not know where to secure or find out about, if you will make your wants known to some member of these committees, he will endeavor to supply your needs.

I now turn the gavel over to your president, a man who needs no words of introduction from me, Honorable J. H. Richards of Boise, Idaho. (Applause.)

PRESIDENT RICHARDS: It seems that the committee on program have arranged that I should, in a measure at least, respond to the generous welcome which has been extended to the delegates and mem-

bers of this session of the American Mining Congress. You can readily understand the embarrassment that one in my position would feel in coming after the gentleman whom you have just heard; but in all sincerity I will say that I am willing to come after such men because I naturally fall into that slot.

We have had demonstrated to us here this morning that this section of our great country not ony produces the greatest industrial development the world has ever seen, but is producing the greatest men the nation has ever beheld also, and they extend to us the ideas which propel us on, and the ideas that rule this nation today and set in action those forces that accomplish the purposes of men, and as we gather here from the north and the south and the east and the west, we come to this great industrial center with a message of good. We hope by the exchange of ideas here, by the great mining experts of the nation that we may be able to set in motion those intelligent forces which will lift the pall of mourning from the broken hearts of the miners' homes, and let in the light of hope that intelligence and science can reveal to them and give them confidence in coal mining in the future. It is these ideas which propel us on, and make the measure of good that we would do in this world. We come here from all over this broad land to sit for a few hours at the feet of these great giants of industry at Pittsburg. They are constructive geniuses that we find here. Put a man from Pittsburg anywhere in this great country and he goes to work to construct an empire. Bring your Kuhns out into the great valleys and deserts of Idaho, and there they replace the wild animals which have for ages occupied those deserts with happy childhood, homes, temples of worship, and temples of learning by reclaiming the desert. Drop other men from Pittsburg out into the State of Idaho, and they develop the great mines like the Trade Dollar; and not satisfied with that victory they harness the great Snake river to the wheels of industry and lift a part of the burden of toil from the shoulders of the miners. Not satisfied with that, such men as your Guffeys and Barnsdels from this great state go to building railroads and interurban lines. So they are sent to that empire that is being builded out there. And when I listened to the Chancellor of the University of Pittsburg—and he and I were young men together, and to a large extent our hopes were cast in the same mold—I find that he is called back here from the great West to construct and demonstrate to this state the highest fruitage of civilization, yea, the crowning glory of the civilization of this nation, a great university. It will not be ten years under his direction until that will be heralded as one of the greatest institutions of learning in this broad land.

Wherever you follow a man from this section of industry you will find the constructive forces which will speak well for his commonwealth.

These are great thoughts, and they are worthy of our consideration because they enter into the very well-being of our nation. We might dwell on these things a long time, but it is better perhaps that we progress. However, I am reminded that I am also called upon to respond, perhaps, in behalf of the lady delegates to this Congress. We have been taught from the dawn of our national life that we all stand on a perfect equality before the law. Out in that young State of Idaho we have estabished that perfect equality. There the husband and wife stand hand in hand, side by side, facing the conflict of the future on a perfect equality. And we believe the time is coming when you will recognize that the mother thought is a cleansing thought at least in municipal affairs. (Applause.) They have that influence in our country, and I do not hesitate to say here today that that little city of Boise is largely governed by the mothers of that city, and today it is the best sewered, the best paved, the best sidewalked, the best watered, the best shaded and the cleanest city of its size between the two oceans. It is the effect of this larger housekeeping that the womanhood of the West have upon our growth and progress there.

We come here as men interested in national affairs. I have no doubt that this nation will meet any emergency that it may be called upon to solve, but we do believe that on these great questions of mining, as was expressed here, the unsolved mystery, (cause of mine explosions) that our nation will meet it when it understands that the mining men of this nation demand assistance at the hands of the government. It always has co-operated with the constructive builders of this country and it always will when it knows that its help is needed. The miner is always the pioneer. He is the man that started the trails of civilzation across these great western deserts, opened up the great territory of Alaska; it is the miner who lays the legal foundation of progress and industry in our country. Then when the miner calls upon the government to co-operate with him in solving the great national questions, the government will respond if the mining men of this country will but get together in a national organization and let the government at Washington know that the miners of this country need the aid of the government. The government always has responded and it always will respond and we just heard from this platform a few minutes ago that Congress will grant the request that this organization has been making for years, and give us a bureau of mining.

I have faith in our government, because I have faith in the manhood of my country. When the manhood demands that those who represent us at Washington co-operate with us, they will respond in kind.

I was talking with one of your leading mining operators here the other day, and he was afraid of government interference, but I said, "Do you not recognize, sir, that since this great disaster has come over this community which, if it had happened in war would have put this whole nation in mourning, that legislation will come whether you demand it or not, and it is about time that the leading mining men of this great land get together and let Congress know the character of laws that we need to advance the mining industry and place it on a plane worthy of its importance?" He said, "Yes, I recognize that."

And that is the message we bring to you here, from the West. The West is being converted into a vast empire by the men from Pennsylvania and Ohio and Indiana. We come back here and tell you that we need to nationalize these thoughts, and not have them too local.

So in response to this generous welcome and the gracious words that have been spoken to us, I wish you to feel that we come here with a message that will help you, as well as the wonderful instruction which we receive when we come into this great city, will help us. Wise co-operation, co-ordination and conservation must be the key note to American future industrial development. Intelligence must guide it, and in order that we may have the laws which should always be the expression of the highest wisdom of the people, that we may have that and have it rest upon the needs of the mining industry, it is necessary that the miners let Congress know the character of laws that will best serve this country and this industry; and then let the courts interpret those laws in the light of the conditions to which they are intended to apply, and victory will come.

I do not know how to express the gratitude which we feel for the greeting that the people of Pittsburg have given to us. I know no better way to express it than by the work that we do here, to show them the sincerity that we feel in the mission, that we feel this great national organization has to perform in bringing to mining the best that can be brought out of the mine and out of the miner. (Applause.)

The committee on program have arranged a number of responses. I will read the names as they are given on the program.

PRESIDENT RICHARDS: I omit Dr. Alderson, by his request.

DR. VICTOR C. ALDERSON, President Colorado School of Mines, Golden, Colorado: My dear Judge, I want to say a word.

PRESIDENT RICHARDS: Dr. Alderson, come to the platform and say it. This Congress is always glad to hear from Dr. Alderson of Colorado.

DR. ALDERSON: It is not very often that I am anxious to say a word, but I am at this moment. I want to say just one word for Colorado, because, while we feel under the greatest obligation to your congressman for his assistance in passing this bill, I feel that I must correct his facts in regard to the production of tungsten and uranium and vanadium. (Applause.) My friends from Colorado knew the moment they heard those facts expressed that I had entirely recovered. If the manufacturers of steel in Pennsylvania want tungsten, they can get it in Colorado by the ton. If they want uranium and vanadium they can get it in Colorado in commercial quantities. It may be interesting for the gentlemen to know further that our investigations there along the lines of these rare metals is an investigation surpassed by none others in the whole wide world along these lines. During a trip through Europe last summer I found that the investigations made by our people in Colorado concerning uranium and vanadium and tungsten were so complete that they were looking to us for the most advanced and up-to-date information and experimentation. (Applause.)

We love to think of Pennsylvania, however, and we like to compliment her by saying that we have a Pittsburg of the West, a form of compliment that certainly is sincere. We love to think that in the northwestern part of our state there is an undeveloped empire, and we love to compare the deposits of coal found there with the great deposit in Pennsylvania, and we love to say "second only to Pennsylvania." We love to think, in the same line, when we were digging for oil, we turn to Pennsylvania for the latest improvements. We like to think that ours is at least a "seven-metal" state, gold, silver, copper, lead, zinc, coal, iron, making it a state that can be recognized as representatively and distinctly mining in all its forms, so that when we reply here and answer for Colorado we feel that we are justified in taking that broad view of mining as a whole, the whole grand industry, that lies at the foundation of all of our life and of all of our prosperity, the basis of industry in Pittsburg and Pennsylvania, an industry without which we could not exist. (Applause.)

CONGRESSMAN BURKE: Dr. Alderson, Mr. Chairman, Ladies and Gentlemen: Just a word. I see here my friend Congressman Chaney, who led the fight for the bureau of mines and mining. I hope Dr. Alderson is not under misapprehension as to what I said. I agree with every word that my friend says with reference to the progressiveness of Colorado, and I only wish that every other state in the union were doing as much, and my contention is that now for the first time in the history of this government, the United States government which has been asked to participate in these developments, has taken a hand and proposes to assist the various state governments of the United States in accomplishing what Colorado has already so admirably accomplished within the limits of her borders. So far as tungsten is concerned, of course they are producing tungsten, and we are using tungsten, and because we are using it we are adding to the glory and the wealth of Colorado as well as Pennsylvania, so that proves that with a combination like Pennsylvania and Colorado you can beat the world. (Applause.)

But let me say this, that so far as vanadium is concerned, we are importing it, and so far as uranium is concerned, it was developed primarily, as the Doctor will tell you, in other countries, and that inspired the miners of Colorado and the scientists of Colorado, leaders of thought and action such as my friend is on this platform today, to do what they are doing in Colorado and other western states, and I say, God speed them.

But in addition to that I wish to say that with my assistance and with the assistance of other gentlemen on the floor of Congress inter-

ested in this work, we propose to give the helping hand of the Federal government to you in doing in your state what you have no power to do beyond the limits of your state, because Colorado has no jurisdiction in Pennsylvania, Pennsylvania no jurisdiction in Alamaba or Calitornia, so that you are confined within the limits of your borders, under the constitutions of these states. The power given to the Federal government is only to bring about a universal harmony in the association of these great things, and I am anxious to see the Federal government aid in bringing about that harmony, in the accomplishment of the one great purpose in which my friend from Colorado and I myself are equally interested. (Applause.)

PRESIDENT RICHARDS: A miner likes this free exchange of thought. If there is any individual on earth who expresses himself freely out in the western country it is the American miner. Even a mule can understand him. (Laughter.)

We have next on the program Hon. John C. Chaney, Congressman, Sullivan, Indiana.

HON. JOHN C. CHANEY OF INDIANA: Mr. Chairman, Ladies and Gentlemen: I have been already mentioned as one who led the fight for the establisment of a bureau of mines and mining in the lower house of Congress, and for the appropriation of $150,000 by which the government testing plant in Pittsburg was authorized. And I am very glad to say that I have been very much interested in the establishment of a bureau distinctly in the interest of the mining industry of the United States.

I certainly agree with Congressman Burke in his statement that the government itself may be of some assistance in the great development of the United States, and yet not become paternalistic. It is not necessary that the government shall have charge or shall own any of the great enterprises of the United States in order to be of assistance in their progress. (Applause.) It is, therefore, proper and very pertinent indeed that the government should lend its aid in every direction which can be conducive to the best interests of the people of the United States in whatever branch of effort they may be engaged. It can supplement the states in what they seek to do in these lines.

I live in a part of the United States where there is a great deal of coal mining. We have in Indiana seven veins of bituminous coal. We also have the block-coal. The thinnest one of these seven veins is four feet nine inches thick. The thickest of these veins is eight feet in thickness. Up to a very few years ago we did not pursue very scientific methods of coal mining, but the state itself has taken up the work and has done a very great deal of good. We occasionally have had some of these terrible disasters in our mining enterprises which have caused everyone to look for a remedy and to try to ascertain what is the cause of such great catastrophes.

There is not so much gas or fire damp or dust in the mines of Indiana that we should be particularly interested more than others. These dangers come, however, to all of the various coal mines of the country, and demand our attention. We can all speak with pride of the development of the various states of the Union, and I am glad to hear that Colorado has found that we have many of those minerals which we have had, as Mr. Burke has stated, to import from other countries. We live in a land favored in all useful and valuable natural resources.

I believe that in the United States we will find everything that will be needed for the great development of the people of the country, and all we need to do is to find and develop them. This bureau of mines and mining, in my judgment, will enable us not only to conserve the natural resources in the mineral productions of the United States, but it will also enable us to ascertain how to develop them with safety. Human life is above all other things of the first consideration. I do not know but what this great disaster out at Marianna, Pennsylvania, a few

days ago, has come at an opportune time, if it had to come. It causes every one of us to feel in serious earnest about this great question of how mining can be done safely, and to endeavor to prevent the terrible catastrophes which have occurred in coal mining. I am sure this convention can do no better service than to pay some attention to the scientific and practical study of these terrible disasters.

Over in West Virginia some time ago, I believe something like 350 men lost their lives in a few moments, from a cause which has never yet been absolutely ascertained; and I believe it would be difficult to ascertain with the information which we now have what was the cause of this great Marianna disaster. But at all events the American people have that earnestness and enthusiasm in what they undertake, and have that scientific turn of mind which will cause them to study these questions and endeavor to ascertain what the causes are, and thereby to prevent such disasters in the future.

I would not undertake to say anything to this convention of men today about mining, for I am not a practical miner. I never dug but one wagon load of coal in my life, and I knocked more skin off of the knuckles of my hands doing that job than coal miners would in a lifetime. So my experience has not been so pleasant in that direction. At all events not of the scientific kind.

I think we are entitled to a mines and mining bureau, within the interior department. Some of those in Congress are anxious that it shall be a department of the government which will have a cabinet officer who shall sit at once in the councils of the President. But you know how such things have to develop. I believe eventually it will result in that, but we can do a great deal of good through a mines and mining bureau, as we did in the agricultural bureau when it was originally created. The agriculturalist, you know, sings the song of the seasons, and we can sing the song of the development of the earth's riches underneath the surface.

I want to say to you that not only did the large majority of the members of the House of Representatives vote for this bill to establish the mines and mining bureau, but their sentiment is all in the right direction. I belong to a party that put into its platform assurances that the Senate of the United States would pass that bill at the coming session of Congress. And I see one of the Senators here, Mr. Dick of Ohio, and I am sure that he will promise us now that this will be done.

I very much appreciate the attendance here this morning. I am interested in what you shall do here. I am glad to have a chance to take a part in this great convention with you, and I hope I may be of some service, and I hope also to learn much more than I now know about the needs and business of mining. I thank you. (Applause.)

DR. H. FOSTER BAIN, State Geologist, Urbana, Illinois: I am very glad to say a word for Illinois this morning, and I might say that since oil has been discovered in our state and so many Pittsburg people have moved over there it is almost like coming home to come here to talk about mining. Our state has been very fortunate, particularly in the character of men who have developed our resources. When oil and gas were discovered a few years ago in Illinois, the oil fraternity took hold of the proposition promptly, and I want to say that I do not know whether it was due to the character of the state and our past history, or what it was, but the development has taken place with as little of false promotion as any quick development I have ever known. It has been done with the same friendly spirit of co-operation which characterizes our whole mineral industry, and while we might brag a good deal about the size of our industry and the variety of things we produce, we are much more pleased to speak of the spirit of co-operation which has so far characterized our whole development.

In our section, as you perhaps know, both our miners and our operators are thoroughly organized. They have tested each other's strength

so many times that they have come to the conclusion that the best thing to do is to work together. Indeed, I think we have perhaps the most complete system of working together that miners and operators have anywhere in America. We are developing that same spirit all through our mineral industry, and it is a thing of which we are proud.

I might say something about the great size of our output. We have some 75,000 coal miners. We produce some fifty million tons of coal. We are second only to Pennsylvania and Ohio in the total mineral production. We produced last year about twenty-five million barrels of oil, and this year we will run something over thirty million barrels; it may run up as high as forty million barrels. All such statistics as these invite retaliation and I am inclined to be modest, particularly with my friend from Colorado present. When he stood here waiting for Congressman Burke to get through I was reminded of the case of a minister who was called in to preach the funeral sermon of a man of whom he knew nothing. Being anxious to learn something concerning the character of the deceased so that he might say appropriate things, he called the man's son out and said: "Were you present when your father died?" the son said he was and the minister asked him what the last words of his father were. The boy replied: "There were no last words, because mother was there to the last." So I hardly dare venture say anything more. (Applause.)

PROFESSOR CHARLES J. NORWOOD, Chief of Department of Mines, Lexington, Kentucky:

Kentucky is here, and wishes to say that she is glad of the opportunity of being here. I must say that we have no vanadium or tungsten. Kentucky, I believe, has the reputation of being boastful when it is away from home, but I am not going to say that we have tungsten or vanadium. And I am not going to say that we have not got them either. I know we have some radium—I saw some the day before I left.

Those of us who have the good fortune to live in Kentucky of late years have come to think of two phases of the state, old Kentucky and new Kentucky. Old Kentucky represents to us the homestead, the place where the wandering son is fond of returning to and being welcomed by the lovely women to the beautiful home; and the new Kentucky which represents the industrial desires, the industrial ambition, and I may say, the industrial progress of the state. When I left home I was told by old Kentucky to invite you all to come there and inspect our industries. I was told by new Kentucky to be sure to hustle about and get some capital to come down there and help us develop the state. In behalf of both phases of our state I thank you for the welcome that has been accorded to her delegate, and invite you to come there next year and we will endeavor to show our appreciation of your hospitality. (Applause.)

PRESIDENT RICHARDS: We have with us the first life member of the American Mining Congress, a man who has had a very large part in laying the foundations of its future importance, Dr. E. R. Buckley of Flat River, Missouri.

DR. E. R. BUCKLEY, OF MISSOURI: Ladies and gentlemen, it is such a very common occurrence for me to respond in behalf of Missouri that I think it is becoming very much of a joke, especially to those who have attended these sessions from year to year.

Missouri, of course, is my adopted home, and if anyone has a father-in-law or a mother-in-law that they think more of than I do of Missouri, why I shall be very glad to meet them.

I do not think that it is necessary for me to praise or extol the virtues of that greatest empire of the west. It is not necessary for me to tell you that Pittsburg and Pennsylvania have had a large share in the development of our wonderful mineral resources. It is unnecessary for me to say that perhaps some of the citizens of this great state of Pennsylvania have been richly rewarded for their investments in the state of Missouri, and that some of them may have been wondrously disap-

pointed. There is no mining state in the union that does not disappoint some people as well as reward some. Missouri, as you know, is one of the greatest producers of lead and zinc in the United States. I want to state more specifically, that there is no state in this union of states that has a larger production of lead or a larger production of zinc than the state of Missouri. She ranks first today in the production of both. Her resources in this regard exceed those of any other state in the union, and probably will for years to come. We are very glad to receive the people of Pennsylvania, the people of Pittsburg, into our state, and we shall be very glad to have them bring their capital with them. We can provide a place for both. We are both lead lined and zinc coated, and we will neither rust nor tarnish, and you will be perfectly safe within the borders of our state.

I wish at this time to mention one object of the American Mining Congress which I think has not been sufficiently amplified at this session so far. I wish to say that several years ago this American Mining Congress took the position that there is perhaps as much danger, that there are perhaps as many widows and orphans, as a result of fraudulent mining promotion in the United States as result from the fire damp that lurks in the coal mines of Pennsylvania; and this American Mining Congress has taken the stand once, twice, thrice, at every session she has taken a stand in opposition to all methods of fraudulent mine promotion in the United States or elsewhere. (Applause.) And we expect that the United States will co-operate with the honest, industrious, conscientious mine owners and operators of these United States in stamping out that most vicious of crimes which now afflicts our country.

I wish to say to the people of Pittsburg and to the people of Pennsylvania that we are very glad to be here. My own state, and more especially the city of Joplin, had the pleasure of entertaining the Mining Congress a year ago. We received a benefit, we received a reward, and I trust that the people who reside in Pittsburg and in Pennsylvania will derive from this session as great profit and as great benefit as did we in Missouri from the meeting a year ago. (Applause.)

DR. CHAS. N. GOULD, Director Oklahoma Geological Survey, Norman, Oklahoma:

Ladies and gentlemen, I represent the baby. We are only a year old down our way, and consequently we have not very much past, but we have a tremendous future. We are just beginning to find out what we have, and we may perhaps be excused if like all babies we are a little proud of our possessions. With your indulgence, in the very few minutes that I shall speak, I shall try to enumerate some of the resources of this, the youngest state in the union.

It is unnecessary to speak of agriculture. We can raise everything that is raised between Minnesota and the gulf, or between Maine and California, better corn than Iowa, better wheat than Minnesota, better cotton than Mississippi. But it is not generally known that the state of Oklahoma possesses as large a variety of minerals, in as large quantities, as perhaps any other state in the union, not that Oklahoma possesses everything, but she has a very large number of valuable minerals.

Our coal fields are just beginning to be developed. We only produced three million tons last year, but we have in the state something like eight or ten billions of tons of coal undeveloped. Last year we led the United States in the production of oil, forty-four million barrels, I believe, and the development is rapidly increasing. Our natural gas resources are practically inexhaustible. We have no means of knowing how much natural gas is contained in the state. Dozens, scores, hundreds of wells are reported to produce all the way up to forty or fifty million cubic feet a day. Our showing of natural gas is such that it is sold in many of the cities of Oklahoma for manufacturing purposes at two and three cents per thousand cubic feet. So it will be seen that Oklahoma possesses a very large amount of valuable fuel.

Our asphalt deposits are very extensive, perhaps as large as those of any state in the union. The western part of Oklahoma has enough salt water, a saturated solution of salt brine, going to waste to make a hundred car loads of salt a day, and not a gallon of it is being manufactured. We have one hundred and twenty-five billion tons of gypsum, enough to keep a hundred mills, each manufacturing one hundred tons per day, busy for thirty-five thousand years. (Laughter and applause.) And if the gypsum were all manufactured and placed in cars and the cars were strung end to end in a train, that train would reach around the world twenty-four hundred times at the equator, so we think we have gypsum enough for local demand.

The only metals we are producing now are lead and zinc. We have no means of estimating the amounts of these metals, but from all researches that have been made we are safe in making the statement that within a few years Oklahoma will at least rival Missouri in the production of lead and zinc. Of glass sand, of granite, of Portland cement rock, marble, sandstone, clays, shales, things of that kind, all of high grade, we have inexhaustible quantities. And then we have iron novaculyte, tripoli. volcanic ash, perhaps a little of gold and silver and a little copper. At the present time not one-half of one per cent of Oklahoma's mineral resources are developed.

Oklahoma is now sometimes called the Pennsylvania of the West. I wish I could be reincarnated a hundred years hence. I would like to come back, I would like to see if my prediction is not true, that, in a hundred years from now, a certain little state at the head of the Ohio river will be known as the Oklahoma of the East! I thank you. (Laughter and applause.)

HON. H. H. LANG, Mayor Cobalt, Ontario: Mr. President, ladies and gentlemen: I have looked over the program, and if I mistake not I am the only Canadian taking part in your congress. I might say that for this reason and for others I consider that I am doubly and trebly honored in coming here from a sister nation to take part in a congress made up of men that I am sure represent the best material that your nation can produce.

Before going further I wish to thank the officers of your congress for the invitation to take part in its deliberations. When I first received the invitation I had hoped that I would be able to select some expert mining man or men from our Canadian Institute, of which I am a member. I am a layman, however, though I have had some practical experience in mining, particularly in the Cobalt district. Now, I am, as I say, very pleased indeed to be with you, and to give you some idea of what we are doing in the north.

As you understand, Cobalt is situated about 720 miles north of where you are sitting. I did expect on coming south here to find warm weather, but I find that the weather here is colder than at Cobalt when I left. I had some difficulty in getting here this morning. When we were within about two miles of our destination our engine ran off the track, or at least jumped the rails, and that delayed us for a little while. However, we got in; but I do not know whether the majority of your citizens have the idea that you have only one building in this city, but they seemed determined that we should go to the Carnegie institute and we went there, and we found that we had to come back, and then when we got to the last corner they were still bound that we should go back to the other building. (Laughter.) However, we got here.

I will not take up much of your time, but I will proceed to give you some idea of what we are doing at Cobalt. In the year 1903 the discovery of silver was made in what is now practically the townsite of Cobalt. In 1904 the shipments from the Cobalt camp mines working at that time were 191.55 tons. In 1905 they were 2,336; and in 1906 they were 5,836.59 tons; and in 1907, to the end of the year, 14,851.34. For the first nine months of this year there have been produced of silver, 12,-

223,834 ounces. To the end of 1907 our returns for the silver from that district were $11,085,695. Now, I might say that for the last year the silver production of Cobalt was about one-fifth of the total production of the world. The total production of the world was approximately 185,035,000 ounces. You people of course are perhaps more familiar with your own statistics in regard to your output, but we have it at about 56,825,000 ounces, and the output of Cobalt in practically its fourth year is about 9,000,000 ounces. The mining done in that district so far has been to a large extent very crude. A great many of the mines now, however, are getting down to what might be called practical mining. I might tell you, however, that about the deepest shaft that we have is four hundred and ten feet. We have several formations there, and the mining engineers have their own ideas of what we are going to find in depth. We have to go along for some time yet, as it were, in the dark, before we will have very much knowledge about it.

But I may say this, that up until ten years ago in Canada agriculture was the chief industry of the nation. We have now come to the conclusion that mining is going to be one of the foremost industries of the country, and perhaps like yourselves we will have to come to realize that. Such bodies as this mining congress and our Canadian Mining Institute will conclude that the sooner we get down to a commercial, systematic way of mining the better it will be for all concerned.

I will not take your time further, but I assure you that I feel highly honored to be here to take part with you in this great mining congress. I thank you very much for this privilege. (Applause.)

PRESIDENT RICHARDS: We are going to reserve for you, as we think, a treat immediately after the noon hour, in the shape of an address by one of the great men of the state of Ohio, who represents that state in the United States Senate, and is chairman of the Committee on Mines and Mining, and has in charge the bill for the creation of the bureau of mines. I know that everyone here would like to hear that gentleman after lunch. At the present time the secretary has some notices which he desires to give before adjournment.

SECRETARY CALLBREATH: Under the by-laws the president must announce the committee on credentials at the opening session. The committee as appointed consists of Mr. J. W. Wardrop of Pennsylvania, Mr. E. J. Walters of Boise, Idaho, and Mr. J. W. Malcolmson of Kansas City.

The committee on resolutions, which is the most important committee in the body, is selected by the delegations from each of the several states. The names are to be announced before the convention at the opening of the afternoon session. It is therefore requested that every delegation will convene during the noon hour and select its member of the committee on resolutions.

Thereupon a recess was taken until two o'clock p. m.

WEDNESDAY, DECEMBER 2, 1908.

Afternoon Session.

The Congress was called to order by the president.

The membership of the committee on resolutions was thereupon announced as follows:

Committee on Resolutions.

Alabama	Edward H. Cox
Alaska	J. L. Steele
Arizona	W. L. Clark
Arkansas	A. W. Estes
California	J. Ross Clark
Colorado	W. F. R. Mills

Delaware.....Dr. C. L. Reese
District of Columbia.....George P. Merrill
Florida.....F. C. Clapp
Georgia.....Meldrum Thompson
Idaho.....A. A. Meggett
Illinois.....H. Foster Bain
Indiana.....John McFadyen
Iowa.....Dr. Samuel Calvin
Kansas.....Dr. Erasmus Haworth
Kentucky.....C. J. Norwood
Massachusetts.....Donald D. Mitchell
Maryland.....C. H. Smith
Michigan.....F. M. Stanton
Missouri.....Dr. E. R. Buckley
Montana.....C. H. Bowman
New Jersey.....Henry B. Kummel
New York.....W. R. Ingalls
North Carolina.....Frank R. Hewitt
Pennsylvania.....George Whyel
Nevada.....Jos. H. Hutchinson
Ohio.....J. B. Zerbe
Ontario.....H. H. Lang
Oklahoma.....Dr. C. N. Gould
Oregon.....E. A. Sessions
South Dakota.....Howard Worth
Texas.....H. F. Happer
Utah.....J. Will Knight
Virginia.....E. A. Schubert
Washington.....G. Smith
West Virginia.....John B. Ross
Wisconsin.....E. C. Holden
Wyoming.....Wm. Benton

SECRETARY CALLBREATH: The committee on resolutions will meet in a room in the basement of this hall, which will be ample for that purpose. It is understood that the committee on resolutions elect its own officers. I would suggest that the first meeting of the committee be held directly following this session.

I desire also to announce that the photographer is very anxious to make a picture of this assemblage, and he has requested you to assemble in front of the building for that purpose at the close of this meeting.

There will be a meeting of the National Association of State Mining Schools tomorrow morning at nine o'clock in Parlor L of Hotel Henry. All representatives of mining schools who are here are requested to be in attendance.

PRESIDENT RICHARDS: We will now proceed with the program.

We had with us this morning, and I hope he is here now, Hon. A. B. Fleming, of Fairmont, West Virginia. He is ex-Lieutenant Governor of West Virginia, and I understand has an ownership in a mine that has passed through a disaster similar to the one which has recently taken place in your midst, and I know you will all be glad to hear from him if he is present at this time.

HON. A. B. FLEMING, OF WEST VIRGINIA: With your permission, I will keep my place here.

PRESIDENT RICHARDS: I know they would all like to look into your pleasant face.

MR. FLEMING: Thank you, but you embarrass me. The reason I so much dislike to come forward is that it looks as if I were expected to say something.

PRESIDENT RICHARDS: If you were a lawyer we would expect modesty, but not being a lawyer, we do not expect it. (Laughter.)

MR. FLEMING: I did not know I would be called upon until I saw my name on the program after I entered this hall. Nevertheless, not presuming to make an address or speech, as I am down representing the great state of West Virginia, I must say something with reference to her progress and her mineral resources. West Virginia is one of the newest and youngest of the states, born amid the throes of civil war in great distress, and was looked upon with a great deal of prejudice for a great many years. She did not for twenty-five years have credit for what she had, either in mineral resources or people, within her borders. For a long time it was not known how much coal we had. It was certainly not known how much oil and gas we possessed, and it took a long while to convince the people of this country that the coal of West Virginia would burn. (Laughter.) We had a great fight to introduce the coal to the consumers in this country. Our more favored competitors—well, we were scarcely competitors those days, way back twenty-five years ago—in Pennsylvania with the same vein of coal that we have, up at the head of the Monongahela river, this beautiful stream which empties into the Ohio just here, thought that they had all that was good, at least that we did not have it; they certainly felt that our coal was not equal to theirs, and disparaged us. Their coal this side of the state line sold for some ten times as much by the acre as the coal on our side of the line. This condition existed until within twenty or twenty-five years ago. I do not blame our neighbors; I am only speaking of this condition for the purpose of showing what a hard time we had in introducing our coal. At that time we had only one trunk line railroad, and there was so little coal to ship on that railroad that they did not like to stop their trains to pull out the coal cars. They preferred to look for through freight. West Virginia until recent years has had to rely upon the pluck and energy of her own people to get out what they had and to prove to the world the value of what they had.

I am told that it is an actual fact that when the oil operators traced the oil belt down from New York into Pennsylvania and over here to Mt. Morris on the line between Virginia and West Virginia, that they drilled all along on the Pennsylvania side, and he was a dare-devil who first drilled on the West Virginia side. (Laughter.) Our oil production increased from 119,000 barrels in 1888 until last year we produced a little over ten million barrels, worth $15,000,000. Until recently we had but little or no gas in West Virginia—natural gas. (Laughter.) In 1888 the gas produced in our state is reported to have been worth $120,000; in 1898, $1,304,000. That is a tolerably rapid increase. Last year we produced 121,200,000,000 feet of gas, worth $15,000,000; and another thing I desire to say to the credit of West Virginia is, that nearly one-half of all this gas is used within the limits of West Virginia, at a cost to the consumer of $4,000,000, while the remaining half—a little more than half —is piped out of the state to the great cities of this country on the lakes and east of us. Many of Pennsylvania's largest factories, including the Carnegie works, are fed from the gas fields of West Virginia. The gas piped to points without the state sold last year for $10,000,000. Of course that included the cost of transportation. The abundance of cheap gas shows West Virginia to be a most favored place for manufacturing.

As to coal, we were second in the production of coal two years ago. Last year we lost our standing by one, Illinois having passed us, and we were third. I do not know what the figures are for this year. We are second, and have been for a number of years, in the production of coke. The coal mined in 1883 amounted to 10,000,000 tons. We now have single corporations in our state which mine something near that quantity. In 1907 we mined 48,000,000 tons of coal, and have scarcely touched our coal fields.

We have, geologically speaking, sixteen thousand square miles of coal in West Virginia. I do not think I am mistaken in saying that this is the largest area of coal in any state of the union. We have in

addition to that one vein upon another; in many parts of the state, three workable veins, running from three feet to fourteen feet in thickness. Our coal supply would seem to be almost inexhaustible.

"West Virginia," I take this from the advance sheet of the geological survey, and I give you my authority for fear you would not believe me, and if I did not have some authority for it I would not believe it myself—"West Virginia's mineral product sold last year for $92,000,000." We have but a small state, and it seems to me that we are doing very well when we produce $92,000,000 per year in mineral resources.

This being the case, gentlemen, West Virginia is largely interested in the work of this Congress. No state in the union perhaps is more interested.

We have had our share of accidents, perhaps more than our share, and yet I believe we have as careful and as good a set of operators and employees as there are anywhere. It has been said that our mining laws are lax, but I deny it. They need improvement, I admit, but they are up-to-date and as good, I believe, as they have in any state in the union. Nevertheless, we have had these accidents. Our president referred to the fact that I have been interested in mines that have suffered from an accident, the worst perhaps that this country has ever seen. I will say that the Monongah mines, about which you have read, because of that accident, were the best of forty that the Fairmont Coal Company had. If the explosion had occurred in any other of their mines there would not have been so much surprise because these two mines, Monongah 6 and 8, were the newest, were laid out, planned, ventilated and operated without any reference to cost so far as safety was concerned, yet we had that awful explosion, in which 361 people lost their lives, and today we do not know what caused it. It was an explosion. What atmospheric condition, what natural or unnatural condition existed there that caused an explosion in what we supposed to be a mine as safe as it could be made with money and with care, we do not know. We used to think that ventilation was the great thing. If there was any fault in that respect in those mines it was because the ventilation was too great; for I really believe that there is such a thing as too much ventilation in a mine. We have been studying, and we have had one of the most eminent geologists in the country employed to determine how to make these mines safer. I do not know but what I am going too much into detail, but your president suggested that I should say something about that explosion.

PRESIDENT RICHARDS: You have the floor.

MR. FLEMING: It is very difficult to wet a mine with water. Water and dust won't mix, as you know, any more than oil and water. We are now making the experiment of putting steam jets into the intake of the air. This dampens the atmosphere of the mine, which we think will make our mines safer.

PRESIDENT RICHARDS: I know that every gentleman here is interested in that far-off mineral region known as Alaska. Alaska has a delegate here, and I am sure you would like to hear a response from Mr. J. L. Steele on behalf of Alaska.

MR. J. L. STEELE, OF ALASKA: Ladies and gentlemen, I am very glad to meet again with the American Mining Congress, and I have just a few words to say on behalf of Alaska. Very few people know the mineral resources of that great land, and very few people know the size of that great domain.

Come with me a few moments, if you will, and let me describe to you briefly the size of that country. Following its sea coast from end to end, following each line, it will be found that there is more than 26,000 miles, or more than would reach around the world with a lap of nearly a thousand miles. It comprises 650,000 square miles, more than two times the size of the state of Texas, and nearly as large as the portion of the

United States lying east of the Mississippi river. Place a map of Alaska over a map of the united states, drawn on the same scale, and its most northerly point will be about St. Paul, Minnesota, its southerly point near New Orleans, while its eastern boundary would be at Savannah, Georgia, and the most westerly point will be west of Los Angeles, California. In this vast country, of which so little is known, there lie the great mineral storehouses of the world.

Take, for instance, one district, if you will. Place your dividers upon the summit of Mount Wrangel. Stretch them out until they cover according to the scale, a distance of forty-five miles; strike a circle from that central point and you have within the boundaries of that circle the greatest, the largest, the most wealthy copper district in the known world. One single company is spending more than $6,000,000 for the purpose of building a road into that copper country, for the purpose of carrying out their own ore, and probably very little other.

Alaska stands not only high in the production of copper, but in its copper resources. This territory which I have mentioned is only one portion; there are many other places that produce a great deal, or will in the future. But unless I am mistaken it stands second in the gold production of the United States. I believe Colorado is first, Alaska second and California third.

While we are small in population we are looking forward to a time when we will have legislation whereby we can have some word to say in regard to the laws that we are endeavoring to live under. We are looking forward to a time when these things will be made facts, as well as a thought of the dim future. We also look to the American Mining Congress to assist us in bringing about such legislation, and I want to say right here before I forget it that, on behalf of Alaska, I want to thank now the American Mining Congress for the interest which it has taken in the past, and I want to say again that among the dearest words that I ever heard spoken were spoken by Mr. George Roberts, at that time director of the mint in Portland, Oregon, when he said, "I have just returned from Alaska. I know an orphan when I see one, and I hope the American Mining Congress will be a foster mother of that orphan," and let me say I want to thank the American Mining Congress because she was, and assisted us largely, more largely than any other source, in getting the Congress of the United States to allow Alaska a delegate to her halls of Congress.

While we are large gold producers from the placer mines, we also have the greatest quartz mines and the greatest quartz mills in the world. We have the most economical quartz mine, I believe, working the lowest grade ore of any place in the world, and at a profit, the Trimble mine, employing from four to eight thousand men, according to the season of the year. They have one thousand, two hundred and sixty stamps dropping twenty-four hours each day nearly every day in the year, I think the largest stamp mill in the world.

Up and down the coast, when it comes to scenery, there are places people should visit, instead of going across the water to Switzerland; they should see their own country. You may go for more than a thousand miles through the mountains rising sheer very often five thousand to seven thousand feet. We invite you to come to Alaska. I thank you.

PRESIDENT RICHARDS: I am sure we will all like to hear Mr. Joseph H. Hutchinson, of Nevada.

MR. JOSEPH H. HUTCHINSON, OF NEVADA: Mr. President and Members of the Mining Congress. I am reminded by the speakers who have preceded me of an incident which occurred some time ago. I was a delegate at one time to a convention in Salt Lak City, Utah. They appointed guides to show us that most beautiful city, and my companion upon a sight-seeing tour was Patrick Henry Winston, attorney general of the state of Washington. We wound up in front of that magnificent

temple, and the guide after explaining the early history of the pioneers of Salt Lake, pointed up at the figure on top of the temple and said: "That is the figure of our angel Maroni. You will notice that he has in his hand a horn; and immediately in front of the temple is the grave of Brigham Young. We believe in the final day that our angel Maroni will blow his horn and one of the reasons why Brigham Young's grave has been placed so near the temple is that he will be the first to hear the horn." Mr. Winston said: "Why, that does not differ so much from my belief that the angel Gabriel will blow his horn; and as far as I am concerned, I do not care who blows his horn, as long as somebody blows it." (Laughter.) And I think perhaps that I follow in the footsteps of my predecessors and proceed to blow my horn.

While we do not want to say anything about the "baby state," Nevada was not always a baby state. There was a time when the greatest president of this Republic needed to have the precious metals so that the spread of human freedom would make it possible for us to have a united nation; and Nevada's silver made it possible when Lincoln brought it into the union to save the union. (Applause.)

And so I propose in my own humble way before this convention closes to call attention to the fact that the man who was spoken of by the congressman this morning as the pioneer of adventurers has finally wound up in Death Valley in the vicinity of Goldfield, whence I came, and that without this money of ultimate redemption in gold that your gas and your oil and all would amount to naught, and we propose to show you that Nevada produces the gold and the lead from its quartz mines (not from its placers), and that the future of this country turns on Nevada, and we want you to know that while we have been a Cinderella we are going to ask you to give us the golden slipper from the American Mining Congress. (Applause.)

PRESIDENT RICHARDS: We have with us Dr. A. H. Purdue, the State Geologist, Fayetteville, Arkansas, whom I know you would like to hear from in response for that state.

DOCTOR PURDUE: It was only at a very late hour that I learned that I was on this program at all, and being one of those peculiar persons who for twenty years or more has endeavored to work himself up to a scientific attitude of mind cannot paint the mineral resources of Arkansas, as they deserve to be painted, but in a very few words will endeavor to give you a little idea of what we have down in that state. There are very few states in the union that have a greater variety of mineral resources than the State of Arkansas, and there are very few states in the union in which the mineral resources are so poorly developed as they are in that state.

We have in the northern part of the state a large area that produces, or some time will produce, lead and zinc, and especially zinc. The development of the zinc of Arkansas has only just begun. What the future will have to say for it we can only tell after the development comes. But it is certain that Arkansas, in the course of time, and I hope in the near future, will be one of the leading zinc-producing states of the United States. We have in this same area of northern Arkansas hundreds of square miles of as fine marble as there is anywhere in the country. And we have unbounded amounts of as fine glass sand as can be produced anywhere in the world. Then we have in the Arkansas valley a considerable area of coal, not so big as the West Virginia area, still it is considerable, and it is of a fine quality. We have also in the Arkansas valley the beginning of the production of natural gas—only the beginning. We used in the city of Fort Smith last year about 3,000,000,000 cubic feet of gas. We could produce a great deal more if we had any immediate demand for it. The vicinity immediately around Little Rock promises to be a gas-producing locality within the near future, as there are several individuals there from the state of Pennsylvania seeking the gas. Of course, inasmuch as they are from Pennsylvania we have all

reason to believe that they are going to find gas. All of the Arkansas valley in all probability will be a gas-producer before very many years.

We have large amounts of bauxite or "boxite," as it is called in the trade, that are only beginning to be worked. We have very fine deposits for the manufacture of Portland cement. Probably no state in the union surpasses Arkansas in its clays. It is said by one of the leading authorities of the United States in clays, a man who has given this subject special attention, that Arkansas should be the leading clay-producing state of the United States. This, for three reasons. First, we have all varieties of clays from the coarsest to the finest. Second, we have the fuel at hand with which to manufacture these clays, and, third, the climatic conditions of Arkansas are such as to be greatly to the advantage of the manufacture of clay products. They should be manufactured there much cheaper than they are manufactured in St. Louis, because of the favorable climatic conditions which prevail in Arkansas throughout the year.

These, gentlemen, are just a few of the facts relating to the mineral resources of Arkansas, and I will not consume your time further than to tell you that after you have looked about over the country elsewhere for places to invest your money and are discouraged, come down to Arkansas. (Applause.)

PRESIDENT RICHARDS: The secretary calls my attention to the reports of the committees for this afternoon. The custom has been for resolutions to be introduced, read by the secretary, and without debate referred to the Committee on Resolutions for its action.

We have the following standing committees to report: Report of Committee on Alaskan Mining Laws, Honorable James J. Godfrey, Seattle, Washington.

SECRETARY CALLBREATH: The Seattle delegation has not yet arrived.

PRESIDENT RICHARDS: Report of Committee on Vertical Side Line Law, Dr. John A. Church, New York City.

THE SECRETARY: I would say that the death of Dr. J. D. Hague, of New York City, during the last summer made vacant the chairmanship of this committee. Dr. John A. Church was very recently made the chairman of that committee, so recently that no report can be expected at this time.

PRESIDENT RICHARDS: Report of Committee on Prevention of Mine Accidents, Dr. H. Foster Bain, Urbana, Illinois.

DOCTOR BAIN: The secretary of the committee will make the report.

The report is as follows:

Report of the Committee on Prevention of Mine Accidents.

Soon after adjournment of the last session of the American Mining Congress a series of unusually disastrous explosions in the coal mines of West Virginia, Alabama and Pennsylvania called the attention of the general public as well as of the mining fraternity to the subject of accidents as it has never been called before. Consequently, much attention has been given to the subject during the past year both in the public and in the technical press and a large amount of experimental work has been carried on by individuals and by corporations since the close of the last session of Congress. These accidents probably also hastened the establishment of a Government Testing Station, and assisted in the securing of an appropriation for the investigation of mine accidents in the United States by the Technologic Branch of the United States Geological Survey.

As a result of the widespread publicity given to the subject of accidents through the public and the technical press, and through various mining organizations, together with the organization of a testing station and the development of a distinct organization to investigate accidents by the Technologic Branch of the United States Geological Survey, it

was unnecessary for your committee to attempt to carry on work along the lines for which it was originally appointed as the work would have paralleled that already being done by others.

As it is entirely probable that this work both public and private will continue, we recommend the discharge of the committee, and in so doing would make the following comments:

We believe that the prevention of accidents depends upon (1) a realization of the relative importance of the various known causes to which accidents can be attributed, so that suitable preventive measures can be adopted to minimize as far as possible the accidents due to these known causes. Under normal conditions in coal mining from 50 to 60 per cent. of the accidents are due to falls of rock and coal, about 16 per cent. to explosions of gas and dust and an almost equal number or about 14 per cent. to mine cars. Owing to the large number killed at one time by explosions, this cause of accident has attracted more than its due share of attention, and while not wishing to minimize in any way the importance of the attempts made to lessen the dangers due to gas and dust, we most earnestly urge that more attention be given to the great cause of mine fatalities which is every where present, namely, falls of slate, coal and rock. (2) The scientific investigation of the problems connected with mining both theoretical and practical and which are now only partially understood should continue. The most important of these are probably the choice, handling, and use of explosives; problems connected with explosive gases and dust in coal mines; better supervision and more careful timbering to prevent the great loss of life and the accidents due to falls of rock and coal.

The training of vast numbers of emigrants from southeastern Europe who are so rapidly replacing the former mining population and who come to us with no knowledge of mining is one of the serious problems affecting the accident condition in this country.

Attention is called to the efforts that have been made in the anthracite field to improve the condition of the mine workers through courses of lectures upon mining subjects by means of night schools carried on under the auspices of the anthracite mining companies.

The conditions under which American mines are operated must be kept distinctly in mind and the vast differences between European and American conditions must be remembered in comparing the statistics of accidents abroad and in American mines.

We believe that the mine laws now on the statute books if enforced and respected by employer and employe alike are sufficient in many cases to greatly reduce the number of accidents. There are, no doubt, instances where the laws can be modified to advantage to conform to present knowledge and conditions, but these modifications should be made by persons familiar with the conditions under which American mines must be operated, and who also understand the theory and practice of such new forces as electricity, compressed air, etc., that now play so important and necessary a part in mining. A greater uniformity in the mine laws of the different states where the conditions are similar would be advantageous.

We believe that experience in one state should be allowed full credit in another for a person applying for a certificate as mine foreman, manager, etc., provided he can satisfy the requirements of examination as provided for in the state in which the application is made.

We would also call attention to the fact that several persons are injured for every one killed, and we believe that a very useful work can be carried on in assisting those injured about the mines through the use of intelligent first aid measures. The various devices used in case of rescue work after an accident will undoubtedly be tested at the Government Testing Station as has been done abroad, and as the result of these tests become known it is to be expected that more adequate means for rescue in case of explosion, fire, etc., will be installed at many of the

mines. The circumstances requiring such apparatus are, however, fortunately comparatively rare, while every day men are being injured more or less severely about the mines. The rendering of efficient first aid to such men while awaiting the arrival of a physician may mean in many cases the saving of life or the prevention of permanent deformity. We would, therefore, especially call attention to the very thorough first aid organizations which have been developed in the anthracite mines of Pennsylvania.

Mr. H. V. Hesse, whose name appears as a member of the committee, found it impracticable to accept his appointment as a member of the committee. Respectfully submitted,

H. FOSTER BAIN, Chairman.

PRESIDENT RICHARDS: Heretofore, upon the making of reports of these committees, if anyone wants to discuss the matter it is always open for discussion or suggestion. What is your pleasure as to the report which has just been made?

DOCTOR BUCKLEY: I move you that the report be accepted, and, as requested, the committee be discharged.

PRESIDENT RICHARDS: You have heard the motion; all in favor of it—

SENATOR CHARLES DICK, of Ohio: I would move to amend in that the report be printed with the proceedings of the convention.

PRESIDENT RICHARDS: Under the by-laws of the organization that necessarily follows. Are you ready for the question?

(The question was called for.)

THE PRESIDENT: All in favor of that motion—

WILLIAM P. DANIELS OF COLORADO: I do not know that I am sufficiently familiar with the subject that has been given consideration by the committee to express an opinion in contravention of their recommendation, but on first thought I am inclined to doubt as to whether it will be wise for this Congress to dispense with a committee of that kind. I certainly should like to hear a little further from some of the gentlemen better acquainted with the subject than I before I vote to discharge the committee. I am very glad to vote to accept the report, but, as I say, Mr. President, lack of information makes me inclined to think this Congress ought to continue that committee, either with its present membership or some other.

DOCTOR BUCKLEY: Mr. Chairman, I think I might state for the benefit of Mr. Daniels that the United States Geological Survey is now carrying on those investigations with much greater detail and with much greater efficiency than can any committee appointed by this Mining Congress, and that as soon as the United States government takes up any field of investigation in the manner in which they have taken up this subject, this Congress may very well let loose of it and let them have full charge of it.

SECRETARY CALLBREATH: I would like to state in behalf of that committee that its work was very influential in securing the appropriation which has enabled the United States government to conduct these investigations.

MR. DANIELS: And Mr. President, if I may be permitted again, it is because of the influence that that committee has had and because there is such action on the part of the government that I believe we ought to continue the committee or a committee, at least, with that matter in charge. I believe it is quite possible—quite probable—that there may be opportunities for a committee of that character to again exercise a very great deal of influence on these very experiments by the government, and certainly this American Mining Congress can have no better means of obtaining information than through a committee of that kind, who will give it particular attention and report to us.

MR. HAWORTH, OF KANSAS: I certainly agree with Mr. Daniels. The great burden of the talk which we have had here this morning is

that one of the main functions of this Mining Congress is to try to better the conditions regarding mine accidents. Now, right on the face of that fact and the talk on this subject, for us to dismiss the only committee we have in that connection at all, it seems to me certainly would be a mistake. I do not know and I do not care whether it was in the minds of the members of this Congress at the time the committe was created to have them do experimental work. They do not have to do experimental work during the coming year, or during the coming four or five years, but it does seem to me that one of the great fields of labor that we might engage in is to have a standing committee on this subject and let them do whatever comes up to be done, and for my part I think it would be a very great mistake if we are at any time within the next five or ten years without a standing committee on that subject, and I hope that we may keep a committee of that kind during all the future time that we exist as a Mining Congress.

PRESIDENT RICHARDS: Any further discussion? If not the question is to accept this report and discharge the committee. Are you ready for the question?

MR. DANIELS: I move to amend the motion by striking out that part which provides for the discharge of the committee.

The motion was seconded.

PRESIDENT RICHARDS: It has been moved and seconded that the motion made be amended by striking out the latter part of the original motion, which provides the discharge of that committee. Are you ready for the amendment? The motion is now on the amendment.

The motion was put and prevailed.

PRESIDENT RICHARDS: The question now comes on the original motion as amended.

Such motion was put and prevailed.

PRESIDENT RICHARDS: The next is the report of the Committee on Protection against Mining Frauds, Mr. C. J. Downey, Denver, Colorado.

SECRETARY CALLBREATH read the report of the committee, which is as follows:

To the Members of the American Mining Congress and the Delegates of the Eleventh Annual Session:

At the ninth annual session of the American Mining Congress, held at Denver, Colorado, provision was made for a committee of five to consider means of preventing the fabrication of fraudulent mining schemes. At that session, the Congress adopted a measure very similar to a law on the statute books of California and recommended its passage by the legislatures of the several states. This law was designed to punish misrepresentations in letters and prospectuses issued for the purpose of aiding the sale of corporation shares, and it was adopted the following winter by various states in the East and West. The delegates at Denver, however, considered that the effect of this measure was limited to punishing misdeeds after they were committed, and that it was within the province of the American Mining Congress to suggest methods of a preventative nature, designed not only to deter men from indulging in false finance, but to aid stockbuyers in protecting themselves. It was with this idea that the committee of five was provided for.

That committee was composed of Charles J. Downey, of Denver, chairman; Henry C. Beeler, of Cheyenne, Wyoming; R. L. Herrick, of Scranton, Pa.; A. W. McIntire, of Everett, Wash., and William F. Clark, of Glover, Vt. It reported at length to the tenth annual session of the Congress, at Joplin, Missouri, last fall, and this report will be found in full in the proceedings of the Joplin session. In brief, it recommended the adoption of a law by the several legislatures, more especially those of the West, requiring the filing of extensive information of a vital nature by all corporations falling under the description of those sought to be reached. It was designed to take cognizance of the prospect character always present, in a greater or less degree, in mining property, and by

reference to the notion of prospect value, to make its use dependent upon the proper certification of facts to the secretary of state; also to take cognizance of the stock prospectus and to provide what measure of information should be set forth therein.

The committee also recommended the universal adoption of the cumulative voting privilege for minority stockholders and suggested other means of educating the investing public with respect to the best means of protecting itself against unworthy mining stock offerings.

Lastly, the committee recommended that a standing committee of five be provided for, to be appointed from year to year by the president, this committee to contain at least three lawyers and to be known as the Committee on Corporation Legislation.

The report was unanimously adopted, and the present committee was subsequently named.

As the important recommendations of the Joplin session concerned the presentation of proposed legislation to the general assemblies of the states, and as none of these has met since the recommendation was made, by the very nature of the situation the legislative suggestion of the former committee stands where it did, it being the expectation that the matter will be brought before the lawmakers of the states at their sessions this winter.

No member of the committee has proposed anything additional to what has already been done, as it is evidently felt that some disposition should be made of the recommendations already pending. In the nature of the case, therefore, a meeting of the committee, during the present year, was hardly necessary, and the chairman contents himself with suggesting, without authority from the committee as a whole, that the president of the American Mining Congress select a member from each state where there is no subsidiary branch of the organization, to offer the proposed measure for the consideration of the local legislature, leaving it to the subsidiary branches, where they exist, to submit the measure to the lawmakers of their districts. The corporation laws of the several states are not uniform; therefore, it is not possible to present a uniform law to them with the assurance that it will accord with local judgment.

Respectfully submitted,

CHARLES J. DOWNEY, Chairman.

PRESIDENT RICHARDS: What is your pleasure with the report? If there is no objection—

MR. DANIELS: In case this report is accepted now will there be an opportunity to bring up any matter in connection with it later on?

PRESIDENT RICHARDS: Certainly; you may present a resolution at any time.

MR. DANIELS: I am not ready just now to do so, but I want to later.

PRESIDENT RICHARDS: It will be on file for that use by this body. If there is no objection it will be filed with the secretary.

The next report is the report of the Committee on General Revision of Mining Laws, Dr. W. R. Ingalls, New York City.

MR. W. R. INGALLS, OF NEW YORK: Mr. President, I regret that this committee has nothing to report but progress. It has been giving its consideration to the subject during the year, but the subject is one that requires a great deal of time, and I anticipate that it will be several years before the committee will be able to make a final report. It has been suggested to me, however, by our esteemed secretary that the meeting would be interested in a few words of explanation as to the purposes of the committee, and if you will excuse me for taking your time, I will make such an explanation.

This committee was appointed at the meeting of the Mining Congress at Denver two years ago, its purpose being to prepare a modern law governing metalliferous mining with a view to its adoption by the American Mining Congress and recommendation to the various states of the Union

for its passage as a uniform law, replacing existing laws which in the best cases are more or less imperfect and out of date. The advantages of a uniform law among all the states are so obvious that no discussion of them is necessary.

It is well to explain, however, that the work of the committe pertains only to the laws regulating quarrying and mining from the standpoint of public safety, which regulation comes within the police powers of the states, and in no way extends to the laws which determine the titles to mining lands and the ownership of mines. The investigations of the committee were limited to quarrying and metalliferous mining because conditions governing coal mining are so special in character that they can be met properly only by special laws.

As a first step the committee addressed letters to the governors of all the states to find out what laws they had. The replies to these letters developed that many of the states in which mining is done have no laws at all pertaining to the subject. Other states have elaborate laws governing coal mining but not applying to metalliferous mining. Some states have fragmentary laws, that is to say, laws aiming to prevent some limited classes of accidents, the enactment of which has been prompted by the occurrence of some accidents of that sort. It appears that Colorado, Missouri, Montana and New York are the only states which have formulated general mining laws of broad scope. It is particularly noteworthy that states in which the mining industry is so important as California and Michigan have no such laws.

In Idaho Mr. Robert M. Bell, the State Mining Inspector, has been for years endeavoring to secure the passage of a general law. It appears that the laws of that state have clauses governing only a few special cases.

Summarizing briefly the present status of this matter, the following states have laws which apply to collieries only: Alabama, Illinois, Iowa, Michigan, Ohio, Pennsylvania and West Virginia. The following states have a general law applying to metalliferous mining: Colorado, Missouri, Montana and New York. The following states have special laws pertaining to metalliferous mining, but with few provisions as to safety: Arizona, Idaho, Michigan, Nevada, New Mexico, North Carolina, Oregon, Idaho and Wyoming.

Most of the other states have no laws, although underground mining is or has been conducted in many of them. Tennessee has an elaborate law as to the inspection of mines, but it contains few provisions as to safety. Michigan also has a law providing for mine inspection. The other states either have no law or have provisions governing the subject so incorporated in other laws as to be not readily available and consequently remain generally unknown.

The elaborate factory laws of many states contain some provisions that apply in mining and metallurgical work, but only to surface operations in so far as mining is concerned.

The committee has during the year prepared a digest of the more important laws, and is causing them to be published with the hope that they will draw out discussion and suggestions as to the provisions that should be incorporated in a complete modern law.

Consequently, Mr. President, the committee is able to report only progress, and to ask that it be continued.

PRESIDENT RICHARDS: Is there any discussion or suggestion on the report just made? If there is no objection, the committee will be continued as requested. Hearing none, it will be so ordered.

Report of committee on smelter rates, Honorable E. A. Colburn, Denver, Colorado.

The report of this committee was read by Secretary Callbreath, and is as follows:

REPORT OF THE COMMITTEE ON THE MUTUAL RELATIONS AND GRIEVANCES OF ORE PRODUCERS AND CUSTOM SMELTERS.

To the President and Members of the American Mining Congress:

This report is intended to recite the progress made by your committee, and should be considered as supplementary to the report submitted to the Congress a year ago.

The work of the committee has been in the interests of ore producers in the regions between the Rocky Mountains and the Pacific Coast, whose ores are valuable for one or more of the four metals; gold, silver, copper and lead. In the former report, your committee urged mine owners to join one another in independent enterprises for the treatment of ores, and with this idea in mind it has been the aim of your committee to gather and disseminate accurate information bearing on the commercial side of smelting and refining, rather than to act as professional advisers to each dissatisfied ore producer having only his own interests in mind and wishing only to drive a better bargain for himself with the smelting concerns already in the field.

Although many owners of gold mines are able to work their ores by wet processes, and although many of the large copper mining companies have smelting works of their own, the majority of ore producers are obliged to sell the output of their mines to so-called custom smelters. Because of the unsettled conditions of the country's finances and the slump in the prices of all metals, and because of set-backs to existing smelting concerns through litigation brought by hostile farming communities, the conditions prevailing in the smelting industry during the year just past were far from normal, and the relations between ore producers and ore buyers were strained more than ever before. When the slump in metal prices began, the smelting companies found themselves carrying an overstock of metals which the market would not absorb. In order, therefore, to avoid piling up additional metal stocks, the ore buyers sought a means of curtailing ore shipments. Being obligated to receive all of the ores shipped from mines whose output had been contracted for in advance, the curtailment fell on producers who had no contracts, and from these the ore buyers would accept no ores except on terms so unsatisfactory to the producers as to be a matter of general public comment. This attitude of the ore buyers, whether justified or not, gave impetus to the movement for independent smelters, and resulted in wider investigation and discussion of the commercial side of smelting.

We are pleased to record the rebuilding of the Golden Cycle gold mill at Colorado City, and the completion and blowing in of two new independent smelting plants, the Panhandle smelter at Ponderay, Idaho, and the Tintic lead and copper smelter at Silver City, Utah. Other independent enterprises have been held in abeyance by the late financial disturbances.

The successful operation of a smelting plant calls for a number of conditions:

1. Ample capital.
2. Competent operating talent.
3. Location conducive to economy of operation.
4. Satisfactory transportation facilities and fair freight rates on ores, fuels and smelter products.

While the first three of these essentials are usually within the control of mine operators, the fourth is a matter calling for careful consideration and tactful treatment. Many ore producers appearing before your committee have presented evidence intended to sustain the charge that railroad freight rates from mining districts are made in such a way as to favor the old smelting regime. It is pointed out that the American Smelting and Refining Company maintains a traffic department, at whose

head is a corps of competent, experienced, high-salaried traffic men; and it is claimed that these officials have a large hand in the making of such freight rates on ore and bullion as are published by the railroad companies, and that these freight rates are made in a way to favor the large company rather than the smaller competing concerns. However, the matter of freight rates on ore is a separate problem for each state and for each mining district. Wherever any state legislation is needed to prevent unjust discrimination, the communities affected should organize to obtain redress. Too frequently, it happens that the parties clamoring for reform measures are undisciplined and unorganized, and are torn by petty jealousies and personal interests; and unless the reform movement is backed by deep feeling and headed by a disciplined organization, it will be of no avail as against a foe well organized and strongly intrenched. Following the suggestions made by your committee in its report of last year, mine operators associations have been formed in some states and many district organizations have been formed. These organizations have not only done good work in modifying and regulating local conditions, but are lending much assistance towards obtaining needed national legislation. We recommend that the mine operators in each mining state form and maintain permanent state organizations along lines on which the various mining interests of the state can be harmonized.

First place in the custom smelting industry is still held by the American Smelting and Refining Company, which, with its allied concerns, is commonly called "the smelting trust." Several years ago, this company had a virtual monopoly of the custom smelting business, and because of this it could buy ores on its own terms, from which there was no appeal. That this company has found the smelting business immensely profitable is not denied; the simple arithmetic of dividing the probable number of tons of ore treated by this concern into its total net earnings, is enough to show an ample if not more than ample profit on the ores bought.

Rumors have gained currency during the year of a foothold gained by "Standard Oil Interests" in the American Smelting and Refining Company, some rumors even crediting these interests with virtual control. These rumors, taken in connection with the control already held by the American Smelting and Refining Company in many large mines, have been disquieting to many small ore producers. In the judgment of your committee, however, these rumors, even if true, should create no new alarm, since the reputed business methods of the alleged new interests are not essentially different from those of the old regime. In western parlance, the men at the head of the smelting trust have always wanted "four aces before the draw," and have generally refused to "sit in any game" where they had no advantage at the outset. These men have been ore buyers, not miners; and whenever pretending to develop mines, as a rule they have merely been buyers of ore already developed—buying from parties willing to sell the ore in the ground for less than its real value in order to save the time and the trouble of mining the ore and delivering it.

No field of human industry calls for more pluck and good judgment than the development of metal mines, and for this reason the large prizes in metal mining will always be distributed among the daring. And since the smelting industry hinges so closely on the development of metal mines, no concern can hope to monopolize the field permanently. The main safeguard lies in fair treatment at the hands of transportation companies. With fair freight rates on all ore and supplies shipped to a smelter, and on the bullion, etc., shipped away; with no discrimination in favor of the large smelting concerns and against the smaller ones, the independent smelter should always be able to hold its own.

In conclusion, we desire to express our thanks to those mining operators who have given us their assistance, and to those familiar with the inside history of smelting who have generously contributed from their

store of information. We recommend that a new and stronger committee be appointed to continue the work of this committee, and that the new committee be so constituted as to cover a larger area and give representation to important mining states not at present represented on the committee. Respectfully submitted,

E. A. COLBURN, Chairman,
GEO. W. RITER,
L. D. GODSHALL,
H. S. JOSEPH,
E. M. DE LA VERGNE.

PRESIDENT RICHARDS: What is your pleasure with the report and recommendations as read?

MR. STEELE, OF ALASKA: I would move you, sir, that this report be accepted and filed.

The motion was seconded and prevailed unanimously.

PRESIDENT RICHARDS: The next is the report of the Committee on Investigation of the National Forest Service and its Effects upon the Mining Industry, Colonel A. G. Brownlee, Denver, Colorado.

COLONEL A. G. BROWNLEE, OF COLORADO: Mr. President, Ladies and Gentlemen: The National Forest Service Committee is one of recent appointment. About two months ago, during a convention of mining men in Colorado, a letter was received from Mr. Pinchot, the Forester of the National Service, requesting that a committee be appointed to act in conjunction with a committee to be appointed by President Richards of the American Mining Congress, to confer with the national officers in regard to complaints which were being received by the Forest Service. At that time a committee of three resident operators of Denver was appointed. About thirty days later Mr. Richards, the president of the American Mining Congress, added two other names to the committee, which is now composed as follows: A. G. Brownlee, E. A. Colburn, Geo. J. Bancroft, Wm. P. Daniels and W. F. R. Mills.

The committee has had several meetings in Denver, studying the rules and regulations of the Forest Service in connection with the mining laws of the country. This question is one of such great importance that the committee recognized that it must gather a great deal of information in regard to specific abuses, and through the medium of the press they sent out a call asking that such reports be sent to the committee in order that they might be properly considered. A number of complaints have been presented and the committee is now at work upon them. It will probably require some time before all the specific cases of complaint will be received, assorted and considered, so as to determine the hardships and injury which it is alleged is being placed upon the mining industry by the National Forest Service.

We have been in conference with the officers of the Forest Service in Colorado, and they have extended to us all the help they can in considering the question.

As the reports are received, they are getting the consideration of the committee. Naturally, it will be some time before a sufficient number will have been received to enable the committee to determine along what lines any injury is being done. The Forest Service acknowledges that it is deluged with complaints, many of which it claims to have investigated, some of which they say are well founded, and most of them unfounded. Naturally, the committee appointed by the Congress is going to consider the complaints very carefully in connection with the laws, and it will be some time before it will be ready to render a report to this Congress, which will be of any real service. I know it was generally understood by the forest officers that a conference was to be had at this Congress with the forest officers in connection with this work. The committee is not even prepared for them, because it has not enough information at the present time.

Mr. Riley, the gentleman in charge of the forestry office in Denver, called on me a few days ago and asked that he be furnished copies of all the complaints so far received. It would be almost impossible to furnish those, and if we are to furnish the Forestry Service with the complaints which the committee has received, I think, on the other hand, that the Forestry Service should also furnish the committee with the complaints it has received.

The committee is now present at this meeting of the Congress, with the exception of one member, and it is going to hold a meeting tonight in the Henry Hotel. If anybody has any information in regard to hardships, injuries or abuses which the Forest Service has placed upon the mining industry in any way, the committee would be glad to hear from these gentlemen, and if possible have the complaints reduced to writing, in specific form. It is facts that we want. We have had a great many arguments presented, but those are things which the committee cannot consistently entertain. We want to get the facts so that we will find out where the injury lies. The Forest Service is a new thing in our land. Mr. Pinchot recognizes the complaints which are coming in as statements of facts that are troubling him a great deal, and the matter is going to be taken up and investigated thoroughly, so that when we are prepared to report, we will also be prepared to go before the Forest service and discuss matters intelligently. Until that is done, it would be unwise to make any recommendations in the matter. (Applause.)

PRESIDENT RICHARDS: I think we have reason to feel grateful to these standing committees for the diligence they have shown in the work placed in their keeping, and the care which they have exercised.

MR. ROCKWELL, OF IDAHO: I rise for information. Would it be proper to ask of this committee which has just reported a question? It refers to the matter of purchasing mining timber from the government through its agents of the Forest Reserves.

In my territory the Forestry Service is charging an excessive price to mines for timber. It is a price equivalent to from $10.00 to $15.00 per thousand, board measure, while it charges the saw mills from $1.50 to $2.50 per thousand, board measure. The Forest Reserve in my territory has compelled us in felling our timber to cut the logs on a basis of six inches at the small end. Much of the Douglas fir, which grows in large quantities in the State of Idaho, tapers so gradually that on a recent purchase of mining timber about 25 per cent. of that timber tapering away from the butt, running from 8 to 22 feet in length, carried the proscription of the Forest Reserve as to six inch small end. Now a six inch piece of mining timber is all right for fence posts for a sheep pasture, but there are none of us who want to put any of it in a drift in swelling ground. Notwithstanding that fact, the government charges one cent per lineal foot, 5 to 7 times as much as timber for commercial purposes, and threatens to increase the charge! It is a very important matter, it seems to me, and one that should be taken up by this Congress, through the committee which is now in consultation with the Forest Reserve officers. On this very important matter of the aggression of its agents toward the prospector, it has within the last season, come to me very forcibly that here is also a position the Forest Reserve is placing the mining operators in that should be given immediate attention. And so I would like to inquire if it is proper to load this committee, already engaged in a very useful and important work, with instructions to receive specific information as to grievances such as I have spoken of. And I should like to hear from any other operator in the Congress who has had similar experiences in the purchase of timber on the Forest Reserve. (Applause.)

COLONEL BROWNLEE: We have received some complaints along the lines that the gentleman has just mentioned, and we believe that it might be unwise to delay action in connection with the use of timber on mineral claims. If timber is being sold in the manner which the speaker

has just spoken of, we would be glad to have a conference with him in regard to it.

Some members of our committee have thought it wise to introduce a resolution at this Congress asking that the Forest Service refrain from cutting any timber on mineral claims that have been located, whether they are patented or unpatented. We are in receipt of complaints that timber is being sold by forestry officers from claims that are being worked by bonafide locators, the miner thus being denied the right to use timber which properly belongs to him and which he should have to properly develop his claim. We would be pleased if the gentleman who has just spoken will meet with the committee tonight, and assist in preparing proper resolutions asking for temporary restraint of the alleged abuses until the complete investigation is made by the committee. The question of the wisdom of selling any timber from mineral lands, in or near forest reserves, is a serious one that should be carefully considered, and perhaps it might be wise if this Congress made some recommendation in regard to this important matter.

GEORGE J. BANCROFT, OF COLORADO: I would like to ask the gentleman from Idaho, so that the information may come before the Congress as a whole, whether or not the Forest Reserve officers have done any forestry in Idaho, in tree planting, or in cultivation of the forests, which warrants them in keeping this charge on mining timber?

MR. ROCKWELL: I will say to the gentleman, not as far as I know. That is, they have not done so in the Sawtooth Reserve, which is in the country where I am operating. They are extraordinarily officious, quite drastic, severe, and have put us to a lot of trouble in getting any timber at all. I will say, however, that after taking their own time in inspecting, scaling and stamping the timber you are finally able to get your logs cut. Every tree is stamped before it is allowed to be cut. To a very large extent, we have literally been robbed and are being robbed today, and they admit it. Think of paying a cent per lineal foot for mining timber, on the theory that while they charge a price of $1.50 to $2.50, board measure, per thousand to saw mills, the mines, theoretically, are supposed to require the best timber in the reserve, which is the reason they give for charging us an excessive figure. They select the timber themselves, and yet 25 per cent. of the total selected is a kind of timber that would make reasonable fence posts for a sheep pasture, but not a foot of it would be worth anything under any circumstances for mining use, except for wedges. Well, gentlemen, we do not like to pay a cent a foot for wedge lumber. (Applause.)

PRESIDENT RICHARDS: I had a telegram from Mr. Pinchot wanting to know if it would be possible for our committee and myself to meet him and the Service in Washington after this session. I told him I could not answer until I had seen Mr. Brownlee at Pittsburg, and possibly, at the convenience of Mr. Brownlee, we had better notify him by wire our conclusion in the matter.

Is there any further discussion on this question?

H. F. FULTON, OF OHIO: I have been up against these Forest Reserve propositions myself this season. I made a visit to Washington in May, and talked some with the Forest Reserve people, and I found this situation down there. I think they are feeling their way. As nearly as I could discover they seemed to have no specific law under which they act. They were simply making the most strenuous possible effort to husband every foot of timber that could be husbanded, regardless of the rights of others. I happened to get into the management of a proposition that had cut some timber a year ago this fall, to the extent of 50,000 or 60,000 feet, upon their own claims, claims upon which they had done work for the past six years, which to my mind gives them an ownership of those claims, every year's work being made a payment on that property when you want to get it patented. You are required to do so many years' work.

I find that the Forest Reserve officers were feeling around to find out just about how much the mining interests would stand. I believe that if a committee from this Congress will meet with the Forest Reserve in Washington and go over the entire ground and show them where they are mistaken in many of their decisions, that there will be no trouble in reaching an arrangement that will be satisfactory to all.

I took this matter up with an attorney, who at one time was connected with the Forest Reserve, and he assured me that many of the requirements they put upon the miners were not supported by law, and that the necessary thing to do was to get together with the Forest Reserve people and influence them, and bring them down off their perch. They were feeling a little bit cocky in regard to the Forest Reserve, and their rights, and as the gentleman from Idaho has said, there is so much red tape that you cannot accomplish much. I asked for a permit to cut a new road through some timber a few weeks ago. The permit was granted me and the statement was made that in three or four or six weeks perhaps some agent of the Forest Reserve would go with my men up there, and he would mark trees we might cut up. I expected to have all that done before we got the usual three feet of snow, but the red tape has made it necessary for me to put that matter off until next spring. My suggestions to this Congress would be in the line with what the president has said just now, that if he and this committee will meet the Forest Reserve officers in Washington and state their grievances, and you know the situation and you do not need to get very much information, state the grievances and come right down pat with those people and say that you want your rights and you will get them; and you won't get them until you do. (Applause.)

MR. J. W. KNIGHT, OF PROVO, UTAH: I wish to say just a word on the question of the Forest Reserve interfering somewhat with the mining industry of our different states.

I find in Utah where we are patenting a great many claims that these patents are unnecessarily delayed until the government sees fit to send us a man to go and inspect our ground to see if it is mineral ground.

Now, as a general rule, what does a forester know about mineral ground? Upon what theory can they ride over our ground and determine intelligently whether we should be permitted to go to patent or not? Why, we may have already spent over $500.00 worth of work on the claim and are all ready to go to patent with them. Besides, we are paying $5.00 an acre, the highest price asked by the government for this class of land, and yet we are delayed by the forester, but if we do not get the inspection done the year we undertake to patent, we are obliged to do the assessment work on the claims for another year, being thus put to a great deal of expense.

It is a great hindrance to the mining industry of the western country where the mountains are covered with timber, and it is necessary to see a forester in order to patent ground. I think that something should be done in this line as well as concerning the use of the timber.

Even to lay a pipe line from an air compressor to a tunnel some distance away, we have to be delayed until some one comes and makes an inspection which has caused delays that have been very expensive.

I think something should be done to avoid all this "red tape" about such small matters.

DOCTOR JOHN BROWN, OF NEW JERSEY: Mr. President, Ladies and Gentlemen: I am not very familiar with the question of forest reserves in the western country and its relation to mining timber, but I know some things that I wish to call to the attention of this Congress and to the attention of the committee, that is to confer with the gentlemen of the western states about this matter and with the gentlemen of the Forestry Service. It was stated by one of the gentlemen preceding me (I do not remember just which state he came from, but he asked the question whether the government and the Forestry Service had done

anything towards reforesting in the western states on lands where they sold the mining timber) that timber is sold to them for mining purposes at prices perhaps ten times as high as it is for saw mill purposes. Now I wish to state, as far as my experience goes in forestry, that whether the timber and lumber are cut for saw mill purposes or for mining purposes, the reforesting will cost just as much, and that does not explain the difference in price between timber cut for mining purposes and that cut for saw mill purposes. I recognize that mining timber should be of the first-class, and strongest timber that could be possibly gotten, yet I think a difference in price of ten times over saw mill timber is absolutely excessive, and it will be a very good thing if this Congress and if this committee reaches a determination and a decision with the Forestry Service which will equalize this difference. (Applause.)

MR. STEELE: I come from the land of snow and Esquimaux (Alaska), and I am operating in the largest forest reserve under the American flag. We have a grievance up our way, though perhaps not as great as that of my friend from Idaho. I do not think our condition is quite as bad. For instance, we consider in our locality that to a certain extent we are public benefactors. We have been led to believe that the forest reserve people are there to assist and to promote in every way possible the mining industry. I wish to mention one matter which we are doing, and that is we maintain a salt water wharf. We charge no wharfage whatever to anyone, all of our neighbors use the wharf as freely as we do ourselves, except that they must remove their goods when they come in our way. Our forest reserve man comes to notify me each year, as we have to rebuild every year on account of conditions there, that we must make an estimate of the amount of growing timber that we want to cut before we are allowed to go in. If we do not make that eseimate our timber will cost us probably double what it would cost us if we got in our estimate beforehand. We also make an estimate of the amount of timber that we have to cut for road building. Fortunately, I let him go and make the estimate; I did not ask about it at all until we got it cut; if we had we would not have gotten the timber yet. Our mine timber costs us more of course than our wharfage timber. But we maintain that so long as we are public benefactors, maintaining a wharf at our own expense to assist not only ourselves but to help our neighbors, that we should be charged nothing whatever. We think that we should be allowed that timber free. We are doing a great deal more for the public good in that country than Uncle Sam is for the mining industry. We are paying money into Uncle Sam's treasury every day in the way of licenses and every other way that they can collect it, and I can say to you now that we are pretty sore on this deal. (Applause.)

MR. JOHN R. WOOD, OF COLORADO: I thought as the gentleman from Alaska was speaking that if there are as many forestry agents around in Alaska as there are in some portions of Colarado that there would have been a process served upon him before his road was done. (Laughter.) Now, there is no one, I take it, more desirous of preserving the timber than the miner. He knows the need of good timber. And he knows the care that is required to preserve the timber, and we are all anxious for the proper conservation of the timber resources of our mining districts. But we also are well posted, as is shown here, as to the difficulties which are beginning to hamper us. We are being shackled on all sides and we are finding it almost impossible to get relief when we should have relief. We feel, as has been suggested by the gentleman, I believe, from Ohio, that while there is an honest desire at Washington to get at the justice of these things, it is impossible, as it seems to some of us, that justice can be done to us in the metalliferous region at least, except by withdrawing such regions from the forest reserves. (Applause.) It may be that before we get through with this session this matter will be brought to you in the form of a resolution, or some suggestion asking the committee to present this matter at Washington. We

wish you would talk it over among yourselves. We wish you would get it in your mind whether or no this would be the proper settlement of these difficulties, so that if the matter does come on in some such form we may take it up and put it through speedily. (Applause.)

MR. ROCKWELL: I wish to say to this Congress that we in Idaho have had a great deal of difficulty with the timber question. We have been arrested and hounded and chased. My distinguished friend from Boise, that great jurist, Judge Beatty, of the Federal bench, and also a friend of our president here, after his famous ruling in those timber cases in the Coeur d' Alene and in the central part of the state, said to me personally in response to a visit which I made to him, after the government agent had been in our country checking up our timber which we had cut on government land without permission before the reserves were established: "I rendered my decision on the basis that you were mining on government land for precious metals which the government desired to have mined, and for which it had granted you the patent. The government knows that you cannot mine precious metals without timbering your drifts and stopes. It is impossible to open a mine, ordinarily, without the aid of timber. Timber grows on government lands almost exclusively, therefore I maintained in my decision that all timbers cut on government land for use underground in mining should belong by right and by law to the mine owner, and that Uncle Sam ought to cheerfully contribute the amount of timber required for the mining industry underground without charge."

Of course that decision was reversed, and I presume that our president here will tell us just how. I am not a lawyer. The forest reserves were born after that and we are all now under its influence, and we are treated as though we were usurpers. They are as jealous of the reserves as a mother is of her babe.

They seem to consider that as mine owners we are large capitalists, who ought to contribute a large amount of money for its support; hence, in my opinion, this outrageous charge which one of Uncle Sam's learned servants agrees to be ours by inherent right. It appears to me that the hardships and enormous expense incident to preparation for deep mining are now so great as to tax capital to its uttermost, and should not also be yoked to this additional burden.

My desire in speaking on this question again is to call your special attention to the opinion of one of the greatest jurists on the Federal bench on the question of timber for use in mining.

PRESIDENT RICHARDS: Are there any further remarks? I want to call especial attention to the program for this evening. I have had the pleasure of listening to Dr. Douglas before, and I consider him one of the best informed men on any subject that he pretends to understand, that I have ever heard address this Congress. I know that you will miss a treat if you fail to hear him tonight in this hall.

MR. DANIELS: I believe the introduction of resolutions is in order.

PRESIDENT RICHARDS: At any time.

MR. DANIELS: I would like to present the following for reference to a committee. It is somewhat in line with the recommendation made in the report of the Committee on Smelting:

Resolution No. 1.

(By W. P. Daniels, of Colorado.)

Whereas, The American Mining Congress has by amendments to its laws, provided for the establishment of branches of the Congress wherever fifty or more members desire the establishment of such a branch, looking to the ultimate establishment of state and local organizations to be governed by a national body consisting of representatives of such local and state organizations, and

Whereas, The present laws of the Congress did not originally contemplate a delegate or representative organization with subordinate

bodies, self-governing within the provisions of the laws of the Congress, and the amendments providing for the establishment of branches is not in harmony with the original plan or the present laws; therefore be it

Resolved, That a committee of three members of the Congress be appointed by the president whose duty it shall be to prepare and report to the next annual session of the Congress, such amendments or such a revision of the present laws as will provide for a representative national governing body with state and local bodies subordinate to and under the jurisdiction of the national body, and it is the sense of the members of this session of the Congress that all life members of the Congress who are or may become life members under its existing laws, should be made life members of the national Congress with all the rights and privileges of the representative or delegate members that may be provided for in such report.

PRESIDENT RICHARDS: The resolution will be referred to the Committee on Resolutions.

The secretary has some announcements to make.

The secretary announced the names of the members of the Committee on Resolutions; also calling attention to desirability of members registering, receiving their badges, etc.

MR. LANG, OF CANADA: While speaking this morning I omitted to state to this meeting that I had with me several reports by Arthur A. Cole, mining engineer, of the Northern Railway. In this report will be found details of what we have been doing at Cobalt. I should like to see these reports distributed as well as possible. I might say this, that anyone desiring a copy of this report may get the same by writing to Mr. Cole at Cobalt.

I wish to say, too, Mr. President, while speaking, that I have enjoyed immensely the discussions of this afternoon, particularly in regard to timber. I can quite understand your troubles, and I am interested in the discussion. I have enjoyed it very much.

PRESIDENT RICHARDS: Any other matters before we adjourn?

MR. KNIGHT: Just one more word relative to forestry—regarding water. If a man files on water for mining power purposes it is necessary to get a permit from the forester, and in the permit it is stated that the permit may be cancelled at any time. You can readily see how that places the operator. He goes to the expense of putting up a big power plant and at any time the Forestry Department has the right to cancel the permit. And yet we spend our money to develop the country and we are held back in this way. I desire to bring this before the committee along with the other complaints.

MR. BROWNLEE: Before we adjourn I would like to say that the Forest Service Committee will meet at eight o'clock to-night in Room 215 at the Hotel Henry. Anybody who wishes to communicate with them will find the full committee in session at that time and place.

COL. H. H. GREGG, OF MISSOURI: I would like to ask all gentlemen interested in zinc mining from Missouri, Illinois, Wisconsin, Iowa, Colorado and any other states to please remain here a little while after the adjournment of the session this afternoon that we may talk on some matters pertaining to that.

Thereupon an adjournment was taken until eight o'clock p. m.

WEDNESDAY, DECEMBER 2, 1908.

Evening Session.

PRESIDENT RICHARDS: I take great pleasure in introducing to you Dr. James Douglas of New York City, who will speak to you on "The Mining Industry as Influenced by Transportation."

Dr. Douglas' address will be found on page 71, Part II., of this report.

PRESIDENT RICHARDS: I know we shall all be gratified to have the opportunity of hearing Dr. George Otis Smith, Director of the United States Geological Survey, Washington, on the Distribution of the Nation's Wealth.

Dr. Smith's address will be found on page 247, Part II., of this report.

PRESIDENT RICHARDS: The Mineral Resources of Alaska, by Dr. A. H. Brooks, Chief, Alaskan Division, U. S. Geological Survey, Washington, D. C.

Dr. Brooks' address will be found on page 258, Part II., of this report:

Thereupon the Congress adjourned until 10 o'clock Thursday morning.

THURSDAY, DECEMBER 3, 1908.

Morning Session.

The Congress was called to order by President Richards.

The secretary read an invitation from the Engineers' Society of Western Pennsylvania, tendering the use of their club rooms to the members and delegates.

SECRETARY CALLBREATH: I desire to make announcement with reference to the luncheon which is offered to the members of the Congress, delegates and visitors at the H. J. Heinz pickle plant, which can be reached in ten minutes or less from this hall by the cars. The desire is that all of us shall go there in a body at noon; luncheon will be served at 12:30, and a chance given to visit the largest pickle works and pure food establishment in the world. This is a very pleasant and courteous invitation, and the management is very anxious that you shall go. It should be known in advance how many will take advantage of the invitation in order that proper preparations may be made. Tickets will be furnished to those who desire to go, and it is desired that you secure tickets not for the purpose of gaining admission but for the purpose of notifying the Heinz company as to how many people will be present in order that suitable preparations may be made. I know you will all be pleased when you get there. This establishment does not do things by halves. Tickets will be distributed at the door.

Secretary Callbreath read Resolution No. 2, introduced by Colonel H. H. Gregg, of Joplin, Missouri, as follows:

Resolution No. 2.

(Introduced by H. H. Gregg, of Missouri.)

Whereas, It is evident that the free importation of foreign ores is not only inimical to the direct interests of the miners of zinc ores in the United States, but also fruitful of wasteful methods of mining; and

Whereas, The principle of protection has been applied to spelter and unrefined zinc products; therefore, be it

Resolved, By the American Mining Congress that the Congress of the United States be urged to impose such a duty on the importation of all zinc ores as will protect the interests of the miners and conserve this most important mineral resource.

Secretary Callbreath read resolution introduced by Mr. Peter Hanraty, Chief Mine Inspector of the State of Oklahoma.

Resolution No. 3.

(Introduced by Peter Hanraty, of Oklahoma.)

Whereas, The number of fatal accidents in the mines of the United States is gradually increasing, and

Whereas, Thousands of men are being employed to work in the mines of our country who know nothing about the dangers incident to the business, thereby causing the death of hundreds of human beings and the destruction of thousands of dollars worth of property; therefore, be it

Resolved, That the delegates to this Mining Congress held in the City of Pittsburg, Pa., December 2, 1908, do hereby agree to work to the end to have incorporated in the mining laws of our respective states the following:

That in all mines where explosives are used to blast the coal, that shot firers shall be employed to fire the shots. Said shots shall be fired at the end of each shift, but not until all miners and other employees working therein are out of the mine. All holes shall be tamped by the shot-firers with fire clay, and it shall be unlawful for the shot-firer to light the shots in more than one working place at any one time in any one split of air. And be it further

Resolved, That if the mine inspector finds any matter, thing or practice in or connected with any mine to be dangerous or defective, so as in his opinion to threaten or tend to the bodily injury of any person, such inspector and each of his assistants shall have power to immediately stop the operation of any mine or part thereof where any dangerous conditions are found.

PRESIDENT RICHARDS: One of the great questions now attracting the attention of the thoughtful men of the country is how best to conserve the great coal interests of this country. We have with us this morning Mr. J. B. Zerbe, of Cleveland, Ohio, who will speak to us upon that subject.

Mr. Zerbe's address will be found on page 181, Part II., of this report.

PRESIDENT RICHARDS: In my short journey through life I have necessarily come in contact with one of the great questions that has been welling up from the human heart ever since the dawn of modern civilization, if not a long time before that. It is this inhumanity of man to man that raises that question so pre-eminently at this hour. And as I have come in contact with that thought, wholly irrespective of whether right in their ideas or in their methods, still, as I see it, underneath it all is a cry for justice; and if that is true then it devolves upon you and upon me to help solve that question, that justice may be done.

We have with us this morning the greatest exponent perhaps of that thought today in the civilized world. I know that you will be glad to hear from him upon that great question and upon its relation to the subject under discussion—Mr. John Mitchell. (Applause.)

Mr. Mitchell's address will be found on page 185, Part II., of this report.

MR. DANIELS: I would like to ask Mr. Mitchell a question.

DOCTOR BUCKLEY: May I make an announcement first? I wish to announce that the Resolution Committee will meet at this time in the basement of this building. At this meeting a special committee will be appointed, and such resolutions as have already been introduced will be taken up and considered. I wish also to request that those desiring to introduce resolutions do so not later than tomorrow noon. If resolutions are introduced later than that time, there is a liability or possibility that they cannot receive adequate consideration by this committee or by the Congress. Such has been the experience at previous meetings.

I wish also to request that you be as careful as possible in framing these resolutions. A great many errors creep in which tend to put a different construction upon resolutions than is intended by the person introducing them, so kindly be careful in the wording and construction of these resolutions.

I wish also to announce that anyone who desires to be heard upon these resolutions should notify either the secretary or myself, and a time will be set when you may be heard upon any resolution before the Committee on Resolutions. The purpose of sending these resolutions to the Resolution Committee is to relieve the Congress of at least a good part of the discussion, if not all of it, and thus to facilitate business. So be kind enough to notify either the secretary or myself if you desire to be heard upon resolutions introduced before this Congress.

MR. DANIELS: I would like to ask Mr. Mitchell if he can give us any data as to the comparative cause of explosions in coal mines from missed shots or faulty shots or from other causes.

PRESIDENT RICHARDS: Are you asking the question of Mr. Mitchell?

MR. MITCHELL: I did not understand the question.

MR. DANIELS: You referred to the cause of explosions as being very largely from faulty shots—what you call, I believe, "blow-outs." I want to ask if you have any data as to the comparative causes of explosions from that and other causes.

MR. MITCHELL: I have not with me but they are given in the report of the Geological Survey. They give the causes of them all, of all deaths; but I haven't them with me.

PRESIDENT RICHARDS: I am sure if this Congress accomplishes no other purpose than to send out the great thoughts that have been suggested under the discussion of this topic this morning, our time has been well invested.

I have the pleasure to announce that Mr. J. V. Thompson, of Uniontown, Pa., is present with us, and will speak to you on the question, "The Needs for Conservation of Our Coal Deposits."

MR. J. V. THOMPSON, OF PENNSYLVANIA: I have prepared a paper on the conservation of coal, which I wish to have read by our secretary, Mr. Callbreath.

Mr. Thompson's address will be found on page 177, Part II., of this report:

PRESIDENT RICHARDS: It affords me pleasure at this time to simply announce that we have present with us Secretary Garfield. (Applause.)

HONORABLE JAMES R. GARFIELD, SECRETARY OF THE INTERIOR, WASHINGTON, D. C.: I shall not weary the Congress at this time with any remarks. I am very glad to have been here in time this morning to hear some of these discussions on the question of conservation of resources and methods for greater safety in the mines. I shall take occasion this afternoon to go with you to the experiment station which the government has started in this city, and I hope that we may all see what the government is attempting to do toward the accomplishment of these important purposes.

The purpose of these experiments is not in any way, as I think you realize, to interfere with the necessary and proper activities either of individuals, corporations, or the state. But the federal government desires to be in active co-operation with all the other agencies which are studying these present day important problems of mining. The field is big enough for us all. These questions are not bounded by state lines, or by sections, or by different kinds of mineral industry. They affect the industrial life of the nation, and so it is that the national government has started on the investigation, examination, and study, in a scientific and technical way, of these questions, which you gentlemen are working out practically in the mines.

It affords me a great deal of pleasure to have met during the last few years with many men who are leaders in the mining industry, those who are guiding the financial side of it, those who are doing the active labor in the development of the mines. It is by such conferences as these that both sides are able to express their views frankly and fairly and find out the point of view of the other side, to the end that we may by such exchange of ideas discover the wisest and best methods for action.

I was very much impressed with one remark this morning in regard to the need of immediate action. It is true these are problems that cannot be postponed with safety to the life of our nation's industry. They are matters of such pressing importance that those of you who are actively engaged in the development of these industries cannot afford to

postpone for a year even the first long steps that must be taken for the improvement in conditions.

The questions of conservation affect not merely the conservation of the material resources, but they affect as well the conservation and the preservation of the lives of the men who are engaged in these great industries. We must not forget that in the development of society the individual constantly loses his so-called right of individual action and assumes greater obligations towards society with which he is working. In other words, what I as an individual may seek to do so long as it affects only myself is quite a different proposition from what I as an individual have assumed as obligations upon my shoulders when I am in co-operation with my fellow-men.

And it is this sense of obligation that is now being brought home to every man who is studying the industrial life of our nation. Each one of us, whether he is working with his hands or working with his head, has assumed obligations that cannot be fulfilled by the clamor for supposed rights. In other words, we must recognize that with the growth of society the individual must abandon much that he has claimed for merely himself, and must now so work in co-operation with others that the dangers, hazards and risks of his work, too great for the individual to bear alone, shall be fairly borne by the entire community or industry.

I hope that, as a result of these investigations, and of your conferences and inquiries here, we may immediately arrive at some definite conclusions, some definite line of action, that will appeal to the sound common-sense of the legislators of our state and nation, so that they can intelligently make such changes in our laws and regulations and methods of mining as will best accomplish what you here may determine to be the right steps in the safest and wisest development of this industry. (Applause.)

PRESIDENT RICHARDS: This closes the program that was placed in my hand for this morning. I now await your further pleasure. The Secretary has some resolutions which he will read:

Secretary Callbreath read

Resolution No. 4.

(Introduced by Col. A. G. Brownlee, of Colorado.)

Resolved, That it is the opinion of the American Mining Congress that any reduction in the present tariff on imported ores containing lead will render a hardship upon our American miners and will certainly result in a disastrous calamity to our lead industry, and be it further

Resolved, That a copy of this resolution be sent to the Ways and Means Committee of the House of Representatives at Washington, D. C.

Secretary Callbreath read

Resolution No. 5.

(Introduced by George J. Bancroft, of Colorado.)

Whereas, By the frightful disaster in the coal mine at Marianna, Pa., whereby 152 miners lost their lives causing desolation in scores of homes by the loss of the bread-winners within them, be it

Resolved, That the American Mining Congress is deeply grieved at this awful disaster, that its heartfelt sympathy goes out to those who have been bereft, and that it is cognizant of the added responsibility engendered by this concurrence in its endeavors to hasten the time when such accidents will be impossible. That it hereby publicly tenders its sympathy to the living whose loved ones have been lost, and to the town whose citizens have been torn away, and to the Pittsburgh-Buffalo Company whose faithful employees were sacrificed on the altar of duty.

Secretary Callbreath read

Resolution No. 6.

(Introduced by George J. Bancroft, of Colorado.)

Be It Resolved, That the American Mining Congress hereby expresses to the U. S. Geological Survey its appreciation of the splendid work it is doing for the advancement of the science of mining. The topographical maps prepared by the survey are most accurate and extremely useful. The geological work is of great importance to the miner of metal, coal or oil. The experimental work in fuels has shown great results already and has contributed in the best way possible toward conserving the natural resources.

That the work of the U. S. Geological Survey should be continued and augmented and that adequate appropriations should be made by Congress for continuing its work.

Secretary Callbreath read

Resolution No. 7.

(Introduced by David B. Rushmore of New York.)

Whereas, the use of electricity in mines is increasing rapidly and numerous small bodies are attempting to independently standardize the practise regarding its use and as this subject can be best handled by a national body working in harmony with all the different interests concerned, therefore be it

Recommended, That a standing committee be appointed by the President of the American Mining Congress to standardize as far as possible and make recommendations concerning electrical practice in mining work, said committee to consist of seven members, as follows, viz: one electrical engineer, two representatives of the manufacturers of electrical equipment, two representatives of the labor organizations and two mine operators.

Secretary Callbreath read

Resolution No. 8.

(Introduced by David B. Rushmore, of New York.)

Whereas, the best results can be accomplished in any given line of work by co-operation between the different parties interested in such line and

Whereas, it is possible that some of the work of the American Mining Congress can be better effected by co-operation with the American Institute of Mining Engineers, therefore be it

Resolved, That the officers of the American Mining Congress be instructed to invite the co-operation of the American Institute of Mining Engineers to the end that a larger service may be afforded the members of both organizations and the public.

PRESIDENT RICHARDS: Are there any further suggestions before we adjourn? If not, we will stand adjourned to meet at the Government Experimental Station this afternoon promptly at 2:00 o'clock.

DOCTOR J. A. HOLMES: I would suggest that we have an hour at our disposal before noon, which we cannot afford to spare. We are here for conference and discussion, not in the spirit of criticism, but of helpfulness. We all need that. None of us know very much about these great problems connected with mine disasters, and there is only one way we can learn anything, only one way in which we can formulate definite and wise policies, without those drastic measures which would do more harm in the long run than they would do good, until we have the information upon which to base action.

We are here, and I sincerely trust that these gentlemen who know so much about this subject will in a friendly way take advantage of

the opportunity and help in the discussion to bring out the results which we all want. Let us feel then that this is an opportunity and that a duty is upon us that we shall discuss these things to help arrive at the wise course to be pursued in connection with this matter in the future.

While I am on my feet let me say that we ought to adjourn shortly after 12 o'clock because it is important that by a little before 2:00 o'clock sharp we shall be inside the grounds at the old arsenal, so that the inauguration exercises of the afternoon may begin promptly. But we ought not to lose the three-quarters of an hour intervening before the noon hour, when there is much which we all want to learn from the gentlemen here who have had the actual experience in mining operations.

PRESIDENT RICHARDS: As suggested by Professor Holmes, we would be glad to hear any remarks from anyone in this hall at this time.

DR. JAMES DOUGLAS, OF NEW YORK: I take pleasure in corroborating Mr. Mitchell's estimate as to the cost of electric firing. We have introduced it, after some opposition from our miners, in five of the mines of the Dawson coal fields, and it costs us about two cents a ton more than the old method. With regard to the general cost of coal, I agree perfectly with Mr. Mitchell that the cost is low, and that certain provisions to ensure safety can only be made through an increase in its cost to the public. One such method undoubtedly is through increasing the number of bosses, and raising their qualifications, both of which conditions will increase the cost of superintendence. Taking the mines of the country at large, we cannot expect to get enough thoroughly trained miners, and even if we could, the trained miner is often willing to run a risk which the inferior miner is afraid to take. The number of deaths from falling roof is appalling, and in almost every case those are due to the neglect of necessary precaution. I know as a fact that in several instances in our own mines the foreman has distinctly instructed the miner to put in a prop, but he preferred to break coal instead of obeying an order looking to his own protection, which he thought unnecessary, and fatal results followed. When dealing with that class of labor the foreman ought to see that his orders are absolutely carried out. Such a system involves an increase in the force of foremen, and therefore and increase in the cost of coal.

Quite apart, however, from the extra cost of precautionary measures to ensure safety, the cost of mining must inevitably increase as we proceed further from the outcrop. Whoever has a large area of coal, especially when there is a sudden demand, cannot resist the temptation of starting a new entry, and using up his outcrop coal. This expedient, however, can be at best only temporary; and therefore the cost of mining coal is bound to go up all over the country, and the public has to pay the increased cost, for the balance between cost and average selling prices is as low, if not lower, than it ought to be.

As I remarked yesterday evening, the freight rates on fuel are low in comparison with the rates on high-class commodities. A rise in the rates of fuel might slightly affect certain of the prominent industries of the country, but they can stand it, but even if their fuel and the transportation of their fuel should cost the large manufacturing interests a little more, this would be a small evil compared with the feeling of antagonism against the railroads in the mind of the public at large, which originates very largely in high "class" rates and the very low rates which the public know are charged on commodities.

There are a great many other phases to this subject which one cannot elucidate in a few cursory remarks, and some of you I know have had a great deal more experience than I have had in both railroading and coal mining. But during my somewhat limited experience as a railroader and during my still shorter experience as a coal miner, these are the conclusions I have come to.

Looking back over the last two or three years, there is one other conclusion I believe we must all have come to, and that is that "booms,"

so called, are extremely expensive and extremely dangerous. It can hardly be accidental that since the boom burst there have been hardly any railroad accidents, and that while the boom was in full swing railroad accidents were of almost daily occurrence. How could it be otherwise? The traffic of the country nearly doubled up. We have a certain number of skilled railroad workmen. They were not able to handle the increased traffic, and therefore firemen had to be promoted to be engineers and brakemen had to be made into conductors, with the inevitable result of accident after accident. That was the cause of many of the accidents, quite apart from another still more prevalent cause, which was that all of us, whatever position we occupied, whether we were workmen or on the executive staff, were all more or less demoralized. I am sure that we ought to pray that another boom may be deferred for just as long as heaven will be willing to protect us from such a disaster.

MR. J. A. SPRINGER, OF WEST VIRGINIA: I desire to say, from the standpoint of the miner at least, that there have been some statements made relative to the causes of explosions that I cannot afford as a miner to let go without entering my challenge or protest. That statement is that the cause of the terrible explosions that we have had is a mystery or unknown. I am not sure that this is the proper time, however, to offer or give reasons of the miner for these explosions. But for the statement to go out that we do not know the cause, and that the cause is a mystery, I for one, do not wish, and I want to say now that my deliberate opinion as a miner is that the cause is known, and that cause is the dry condition of the mine. For one I am convinced of that fact. How to remedy that condition is another question altogether. But I am fully convinced that the cause of explosions in our state is and has been the dry condition of the mine. I hope it will be the pleasure of those men who have in charge this matter to bring out before this congress in a way which will give some satisfaction, the cause of these explosions and the remedy to be applied.

PRESIDENT RICHARDS: Dr. Holmes' suggestion has proved fruitful. We have a little more time yet, if you wish to occupy it.

DR. E. W. PARKER, OF WASHINGTON: We had the pleasure of listening last night to Doctor Douglas and also this morning he gave us one or two illustrations of mining at Dawson, New Mexico. What he said last night and this morning is certainly too modest, and shows Dr. Douglas' rather modest disposition. I think that the mine operators of Pennsylvania, of West Virginia, of Illinois and of other states could learn a great deal if they could visit the mining operations at Dawson. I had the pleasure of visiting that mine only a few weeks ago. The precautions taken there for the safety of the miners are certainly about the acme in the United States. I have visited coal mine operations throughout every state in the union, I think, and I have not seen any mines so well equipped for the safety of the miners as the plant at Dawson. As Doctor Douglas has already stated, the shots are electrically fired. They are not fired by shot-firers in the mines. Every miner, every employe, is out of the mine. The openings are closed by steel gates, and the shots are fired when it is impossible for there to be any loss of life, as the result of the firing of the shot.

I should also like to state in regard to what Mr. Mitchell has already said, that I corroborate his statement that our coal is too cheap. We have been making our material advancement, of which we are so proud, by the cheap fuel and at the cost of human life. The precautions to be taken for greater safety in the mines can only be taken at an increased cost, and I, as a consumer of coal, would be willing to pay my share for the increased cost of coal mining if it would produce the desired results. (Applause.)

MR. JOHN H. WALKER, OF ILLINOIS: There is one point that has been referred to a good many times this morning which it might not

be out of the way for me to give you our experience in dealing with, and that is the question of cheap coal. You will recall Mr. Mitchell said that the price of coal to the large consumers should be increased; with that statement I wholly agree. As a member of the miners' organization we have found that there is danger in having the price of coal generally increased, when there is a systematic method used for the purpose of discrediting the work of those who are making it necessary, for some humane or just reason, to have that added cost put on the price of coal.

In almost every instance where any action, at least of the organization, has made necessary the increase of the price of coal to the consumer, the increase has been made to the general public, the small consumer, away out of proportion to the necessary cost for the employer to meet the necessities of the occasion. That is to say, if he has 10 cents a ton added to the cost of coal production there will be practically no cost added for the large consumer who buys it, but there will be about 25 or 30 cents or 50 cents added for the small consumer, and he generally resents that sort of thing, and it has a detrimental effect, at least as regards the men who are making that increase necessary at all. We have found that if you own a railroad and you want to buy a half million tons of coal you can buy it for anywhere from 75 cents to $1.00 on the flat at the mine. If you are working on a farm, in a machine shop, on the street, as a laborer, getting $1.50 a day or $4.00 or $5.00 a day, it will cost you $2.50 or $3.00 a ton for that same coal. As the great majority of consumers are small consumers, and public sentiment in this country is created by the great majority, who are the small consumers, that action has the result of creating public opinion against the action making necessary that increased price. In the work of the Congress I think if you have any opponent to any necessary, humane, protective measures you will find that that phase of it will be used to the detriment of the Congress in its efforts to bring about such reforms.

There is one other phase of it that I wish to point out at this time. The certainties, the actual conditions, that exist can be taken care of by a systematic, well-directed organized effort either on the part of the government or our organization or both combined. The uncertainties are the things that are the cause of most troubles. One of them, faulty or blown-out shots, has been a large element in bringing about the explosions in the recent past. If you can put yourself in the place of a miner at the face, drilling a hole, it does not matter very much what the risks are, from the powder not being able to do the work, whether it is as the result of not being sufficient powder, or whether the hole was placed in a way that the shot could not do the work, the result will be a blownout shot. The wrong placing of the shot can be provided for, but if you have been accustomed to using powder of a certain strength and velocity and there is a change made in the powder without your knowing anything about it whatever, either in reducing or increasing the strength and velocity, there is an uncertainty that every miner in that mine has got to deal with, and any one of those conditions might be the means of blowing that mine up. In these days of competition it is immaterial generally to the operator whether he makes his money out of the profits in the sale of coal, or, as he generally sells the powder, whether he makes his profits out of the sale of the powder. Powder manufacturers in their fierce competition with each other may reduce prices and give inferior grades of powder, and make it attractive to the operator to buy those lower grades, and that has prevailed the last two years particularly, so that when a miner gets a keg of powder he does not really know what that powder is going to do when he starts to use it in his blasting. This is one of the things that this experimental bureau along these lines can eliminate. But my experience indicates that they will have to deal with the question by legislation; they will first have to standardize the powders, create a formula of ingredients, giving the strength that they

must have, and by law compel men who sell powder to conform to those formulae provided by statute. (Applause.)

MR. J. W. DAWSON, OF WEST VIRGINIA: I should like to mention for the information of the Congress how difficult it is, under some circumstances at least, to increase the price of coal to the large consumer. For instance, I might name a railroad, which, when you intend to develop a piece of coal property tributary to it and before they furnish you the necessary facilities, requires you to enter into a contract with that railroad to furnish them at least one-third of your product for their fuel purposes at a price fixed by the railroad. Under those conditions it will be rather difficult, of course, to increase the price of coal to some of the large consumers, at least.

In addition to that I have often heard stated, as by Mr. Mitchell this morning, that most of our fatalities in the mines are the result of inexperienced miners. If we increase our product and there is, as we all know, little or no surplus of experienced miners, I should be glad if Mr. Mitchell will explain to us what, in his judgment, is the most practical method of instructing inexperienced miners, so they will be experienced. (Applause.)

MR. MITCHELL: There is a sufficient number of experienced miners in the United States at the present time to produce all the coal that is required. One-third more men are employed as miners than are needed to produce the amount of coal we consume. That additional one-third, or that surplus of men, are the inexperienced men. You probably do not know that the average number of days the coal mines of America work is only about 200 annually, and that the men are idle one-third of the time; so that instead of employing this large number of surplus men, if the work were given to experienced men, they could produce all of the coal required, and work one-third more time. Of course I understand that the natural increase in the number of miners—that is to say, the miners' sons who learn to mine with their fathers and thus become experienced miners—has not been sufficient to keep up with the vastly increased output of coal year by year, so that the mines must depend upon outside sources for some of their labor. But there could be a system of apprenticeship that would prevent or prohibit responsibilities being given to the inexperienced men, who probably last week were doing farm-hand labor some place in continental Europe. For instance, in the state of Illinois under the present law an inexperienced man must first be employed for a period of two years as a company day laborer or he must work under the supervision of an experienced man mining coal, before he is qualified to mine upon his own responsibility. Of course these accidents, these great disasters, usually occur from some act of the coal miner. A day hand rarely causes an explosion in a mine. An explosion is often the result of a blown-out shot. It occurs by the act of some man who is working at what we call the face of the coal. And it is that sort of accident, the accident that comes from explosion, that the employment of experienced men would prevent. (Applause.)

MR. DAWSON: I do not quite agree with Mr. Mitchell in that the employment of an inexperienced man as a day laborer would fit him for the shooting and mining of coal as an experienced man. The reason for asking the question I did was to get information for myself and others who might desire it. I represent the organized portion of West Virginia. Now that state has been frequently referred to as an unorganized state. It is against the spirit if not against the rules of the organized men for a man to work as a helper, or what is known as a back-hand, or to do a piece of work and to employ others to help him to do it. With those rules in effect I cannot quite grasp how we are going to train inexperienced men without letting them go in a room by themselves. I am really anxious to get that information.

MR. CARL SCHOLZ, OF ILLINOIS: The question of the price of coal and the advance thereof is one of competition, which is largely regulated by the question of supply and demand. As long as coal mines can be developed as cheaply as they can in this country we cannot expect to have a system of operation such as exists in Germany, Belgium, France and other places referred to by Mr. Mitchell. Anyone who has been in those countries and is familiar with the method of mining by that class of people, appreciates that the conditions they are working under are quite different from ours. We have the question of farm labor to contend with. We have mines in Oklahoma where ten to twelve different languages are spoken. It is difficult to administer discipline under those conditions; whereas, in the foreign countries usually only one language is spoken, and rarely more than two or three.

The question of saving lives in the adoption of safety measures is one which goes hand in hand with mining. One gentleman a while ago stated that dust is one of the great causes of explosion. I think he is right. Dust is largely created by solid shooting, and solid shooting has been the effect of a lack of system; therefore, co-operation of the miners with the operators would reduce the death rate in the mine.

Mr. Mitchell stated that the explosions in West Virginia are due to the miners at the face. One of the most destructive explosions that I know of occurred in the middle of the day, when it must have been due to causes other than shot-firing or the miners. I have been carrying on, in behalf of our company, for the protection of our property and for the protection of our men, a series of investigations, and have recently concluded that nothing is more beneficial than the introduction of water, in the shape of sprays.

It is a well known fact that most of our explosions occur in November, December and January. Therefore, I believe that it behooves us to ascertain the conditions which exist at that time. The very same mines which explode in these cold months seem comparatively safe, or are safe, because they do not explode, in June, July and August. During that period of the year it is noticed that there is a heavy deposit of sweat in the mine, under the roof and walls, and the coal dust is fairly moist. It seems to me that what we have to do is to ascertain what the actual condition is of the atmosphere which enters the mine at that time, and try to bring about the same condition in the winter. It has been stated that the introduction of water in a mine is detrimental to the health of the employee, as shown by experience in England. I am not concerned about conditions that exist in England. I am confining myself to the problems that we have to solve in this country, and in fact I know from my own observation, from experience that I have had, that the introduction of water in the shape of sprays cannot be carried to excess with the temperatures existing in the United States, or in any of the mines that I have visited, and I think I have been in nearly all of them. For these reasons I cannot recommend too highly the investigation of this subject.

I have prepared several papers which have been read before various interested societies, and as yet I have to hear any evidence which I cannot contradict. As far as health is concerned, our office buildings are now equipped with sprays in order to remove the dust and inject the water which is necessary for health and comfort. As far as the effect on the roof is concerned I know that the roof of the mine is affected by a change of climatic conditions, the change from wet to dry causes the roof to decay, and to maintain it constantly wet or constantly dry removes that danger, and there is no doubt that the dust can be settled by water sprays, and I cannot urge too strongly that investigations be made at the experiment stations and at mines during the safe period as well as during the danger period. (Applause.)

Secretary Callbreath read Resolution No. 9 as follows:

Resolution No. 9.

(Introduced by Congressman J. G. McHenry, of Pennsylvania.)

Whereas, Notwithstanding the ceaseless efforts upon the part of mine operators to equip and operate their mines with every known modern and scientific equipment for the protection of their employees and property, the frightful loss of life to mine workers continues unabated.

Whereas, While we are pursuing our scientific investigations for the prevention of future mine accidents, and which should continue without interruption, and an earnest effort to secure uniform and effective legislation, we believe that some steps should be taken to alleviate the suffering due to unavoidable mine accidents. Therefore, be it

Resolved, That we recommend to the favorable consideration of the legislatures of the various coal mining states, that a tax not exceeding one cent per ton on bituminous coal or one and one-half cents per ton on anthracite coal, be levied and collected for the purpose of alleviating the suffering of injured miners and their families.

Resolved, That we respectfully request the governors of the various coal mining states to urge the prompt enactment of their protective legislation.

Resolved, That a copy of these resolutions be sent to the governors of the coal mining states.

Thereupon an adjournment was taken until 2:00 o'clock p. m.

THURSDAY, DECEMBER 3, 1908.

Afternoon Session.

FORMAL OPENING OF THE GOVERNMENT STATION FOR INVESTIGATION OF MINE EXPLOSIONS.

The session of the American Mining Congress convened at the government arsenal ground, Fortieth and Butler streets, Pittsburg.

HONORABLE JAMES R. GARFIELD, Secretary of the Interior: Gentlemen: As you know, the United States government has established this station for the purpose of beginning this great work of experimentation. You here in Pittsburg and the surrounding district are, it is needless to say, intensely interested in this kind of technical and scientific work. We fortunately have this area here, owned by the government, which we can use for this purpose.

I have no doubt but that with the co-operation of the War Department we will be able to extend the use of this ground in accordance with the needs of this growing service. Just how that may be accomplished I do not now know, but I am confident from the conferences I have had with the Secretary of War we will find no difficulty in making the best use possible of this ground, which is so well adapted for these purposes. I wish at this time to express our appreciation of the hearty co-operation which all of you gentlemen engaged in the mining industry have given to our work in the development of this new station.

We need the heartiest kind of co-operation. We want this station here to be used by all those who are interested in the mining industry, and when I say that, I mean those who are laboring as well as those who own the mines. We can only accomplish the best results by having the earnest and intelligent support of men engaged in all branches of the mining industry.

This technical work more than ever will be found to be the basis of industrial prosperity. We can no longer in competition with the other nations of the world attempt to carry on any great industry by the rule of thumb. We must know the facts. We must understand intelligently the conditions by chemical and physical analysis, by careful and painstaking experiment; we must find out what the conditions are under which

the thousands of men in our country are working, and it is for that purpose that this station, starting small, will become one of the great experiment stations of the world. We need here and now to understand that many mistakes will be made in the early days, upon which criticism will necessarily follow, but I ask that unfriendly criticism be withheld until our men have the opportunity of finding out what the problem is, and how it best can be studied. We need helpful criticism of every active operator, and we need helpful work and suggestion and criticism of our representatives in Congress, to the end that they may understand that these hundreds of thousands of dollars which have been appropriated, and the money that will be appropriated, are not frittered away in idle experimentation, but we desire to make every dollar count for some practical good in the development of the mining industry. (Applause.) And so, my friends, I simply now formally declare this station opened, and I trust that it means many years of useful endeavor for the mining industry. (Applause.)

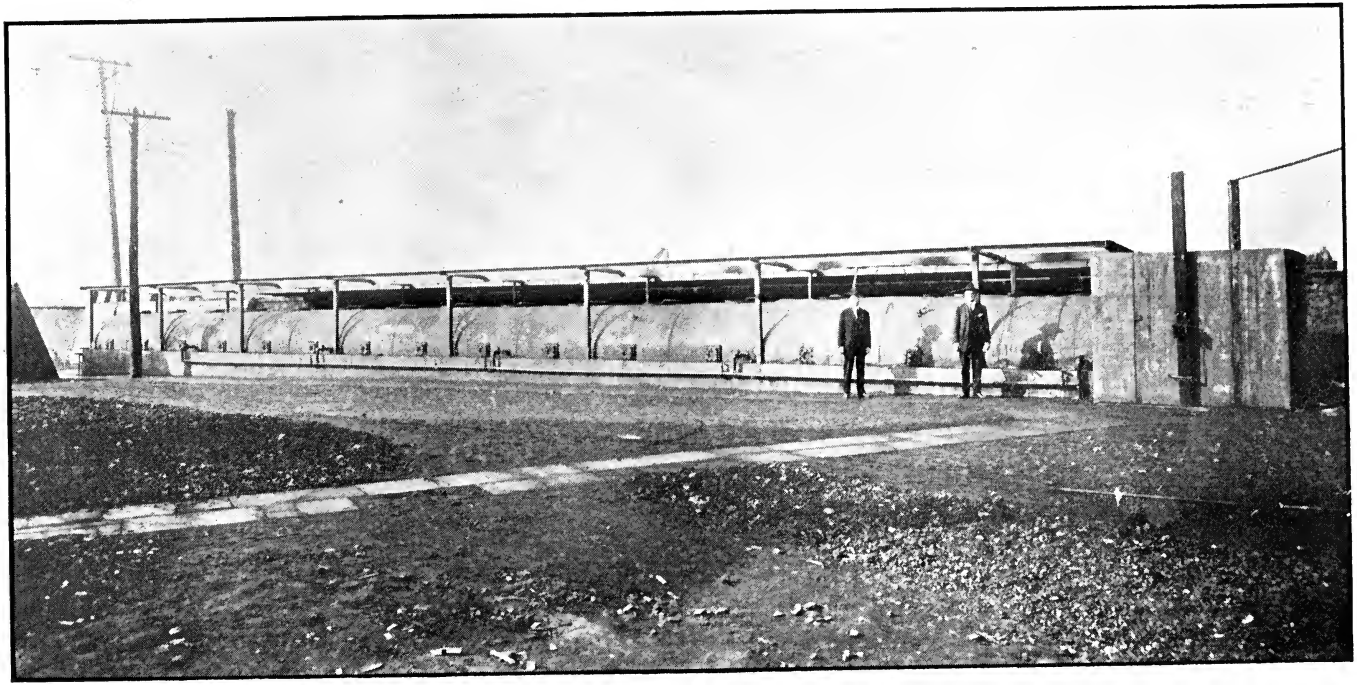
DR. HOLMES: I introduce Mr. John Mitchell—who really needs no introduction. (Applause.)

MR. MITCHELL: The formal opening of this station marks an epoch in the mining history of this country. It is the beginning of a new day. It is the point from which we start to diminish the number of accidents in the coal-mining industry. It is my hope and my belief that from this time forward the country shall not be shocked by a recurrence of these terrible catastrophes through which thousands of men are hurled into untimely graves. Gentlemen, what is needed to supplement this work is a bureau of mines at Washington. (Applause.) And if we who are interested in the preservation of human life will give our aid, I feel confident that the coming Congress will pass a bill creating a bureau of mines, under whose supervision the mining industry may be relieved of accidents and death. (Applause.)

DR. HOLMES: I now introduce Mr. Dempster, the dean of the coal operators of this Congress.

MR. ALEXANDER DEMPSTER, OF PENNSYLVANIA: This historic ground that was once made sacred in the preparation of war materials for the preservation of our Union, is now dedicated and consecrated to the arts of peace, (Applause) and not for the killing of men, but for the preservation of life. There are no persons in this country who are more interested in the success of what may be produced here than are the operators of Pennsylvania, and of the Pittsburg district. So far, Mr. Secretary Garfield, as the operators of this district are concerned, you will have the hearty support of every one. It is said that "corporations have no souls," but there are men who constitute the corporations whose feelings flow in the channel of sympathy for the suffering, of those who are bereaved by the accidents which have come. And I would say, Mr. Congressman Burke, that we hope to be in communication with you as our channel of communication with the government whereby we may express our thoughts, our opinions and our feelings, and if necessary we will give such friendly criticism to Brother Holmes and his coadjutors at every opportunity as we deem of importance. As Secretary Garfield has said, friendly criticism, criticism in sincerity, criticism with the aim in view to bring out the best that can be done, will be given by the operators and by all those who are really in sympathy with this movement.

When those foreign lights were brought over here from Belgium, Great Britain and Germany by our government and came to Pittsburg, we said to them that this bureau would be as a beacon to shine from any depths of the earth to which its investigators would go and would shed the results of their investigation, and the light of intelligent knowledge, throughout this country, so that every state in the Union, and every district that operates mines, should have that knowledge and that information, and then the operators would have the will to apply it, so that from now on it depends on our government to supply the information which



Explosives Chamber, Gas and Dust Gallery, Government Testing Plant at Pittsburg, Pa., where experiments are being conducted for the purpose of revealing the mysteries surrounding coal mine explosions.

may be disseminated throughout this country, and then it will be for the operators to make the application of the means that are devised and discovered to be the best for the prevention of accidents. For the welfare of the miners of this district, as well as others I speak for, all will be interested in the promotion of whatever may be deemed for the best interests of the miners in their employment.

And let me say, in this work there should be no antagonism between labor and capital. There should be no antagonism between the miners, whom Mr. Mitchell so ably represented for so long; but instead of antagonism, there should be the united effort to go forward in the pathway of duty according to the laws of supply and demand, and according to the laws of equal rights of one to the other. We should go on in that harmony of feeling and in that channel of reciprocal relationship that will put the United States, and its mining interests, away ahead of the world. (Applause.)

DR. HOLMES: I introduce Honorable James Francis Burke, in whose Congressional district this station is located.

MR. BURKE: Dr. Holmes and Gentlemen: I want to say with reference to what our distinguished friend the Secretary of the Interior has just adverted to—that this district, which I have the honor to represent in the American Congress, is making me prouder every day of my life. From the hour I entered Congress it has been my good fortune to come home and see many new buildings erected and new institutions established in the district, and today there are more temples of art, shrines of religion and institutions dedicated to the development of science being created and brought to perfection in this district than in any other Congressional district in the whole United States. (Applause.) It is a happy coincidence, I believe, that the opening of this institution here today, its formal dedication at the hands of Secretary Garfield, should take place at a time when men engaged in a great scientific work and a great industry all over the republic are assembled here in Western Pennsylvania.

But there is a great piece of work still to be done. It cannot be accomplished with ease; that which has already been done has not been wrought without encountering the usual amount of criticism. There never was a great movement instituted in the world's history that did not meet with its adversities as it traveled along its pathway, and, gentlemen, I want to say to the members of the American Mining Congress when they go back to the various states whence they came, that they should say to the representatives from those states in the American Congress that it is their duty to insist upon encouraging the men engaged in this work and in the development of this great enterprise.

As my friend Mr. Dempster has said, this tract upon which you stand today was dedicated to the arts of war. It has been controlled and is today properly under the control of the War Department of the United States government, but I say to you as a member of the Committee on Military Affairs of the American Congress that while I do not blame the War Department for clinging with the tenacity that characterizes every other department to anything that it has, (laughter). In this particular case my loyalty to the War Department is going to be made secondary to my loyalty to the Department of the Interior in the promotion of this enterprise. (Applause.) And I say that without any fear of working any detriment to the federal government, because I believe now that the dedication of this tract to the development of the science and the perfection of the work of this department of the government will be of far greater importance to this country and to the world than that it should remain dedicated to and be utilized for the original purposes of the War Department.

In order to accomplish the desired result legislation will be required, and over that legislation the Committee on Military Affairs of the Congress of the United States will have primary jurisdiction at least by reference to it, and I say with confidence in the intelligence and the patriotism

Explosives Chamber, demonstrating that Coal Dust is an explosive. Photograph was taken 15 seconds after explosion.

of my fellow-members on that committee, that anything that they can do, I believe, will be willingly and promptly done by them during the coming session of the American Congress. (Applause.) And once that is done, you will have an institution here to which pilgrims from the whole wide world will come, as we have pointed the pathway today. All roads lead to the arsenal, and all roads hereafter will lead hither the men engaged in the development of this science and the ascertainment of the facts that have so much to do with the work in which you are engaged. Because of all this; because of the prospects and because of the reality I see before me, I again repeat, that I hope my friend, Mr. Mitchell, and all these other gentlemen here, and especially my friend Senator Dick, who is on the other side of the capitol of the United States (and sometimes a Senator has a little influence—my friend Senator Dick having derived his because he used to be a member of the House) will exercise their influence in lining up the members of both Houses in bringing about the proper and permanent establishment of the institution which we all have in mind today, a Bureau of Mines and Mining in the Department of the Interior of the United States.

DR. HOLMES: At the meeting of the American Mining Congress tomorrow morning, Senator Dick will reply to the address just given you. I see before me a great many persons who have been foremost in leading this great movement, such as Mr. Englebright, of California, and others whom I know you would like to hear, but this platform on which we stand has explosives under it that are reached by clockwork, and I am told by my associates that exactly at 2:30 o'clock, which is only a half minute off, the performance underneath will begin!

All of you have been handed programs as you entered the grounds, and you will find on the program a list of tests which will be made here today.

(During the afternoon, a series of informal tests was made at the explosives testing station, showing conclusively that coal dust was highly explosive. Tests were also made showing the disruptive force of various powders used in blasting.)

THURSDAY, DECEMBER 3, 1909.

Evening Session, 8:30 O'Clock.

Meeting was called to order by Vice-President Dr. E. R. Buckley.

CHAIRMAN BUCKLEY: It gives me great pleasure to introduce to you this evening the Hon. James R. Garfield, Secretary of the Interior. (Applause.) Mr. Garfields address will be found on page 88, Part II., of this report.

MR. W. F. R. MILLS, OF COLORADO: Mr. Chairman, I think it is proper, and I move that a special vote of thanks be tendered to the Honorable James R. Garfield for his address this evening.

This motion was seconded and unanimously carried by rising vote.

CHAIRMAN BUCKLEY: Please give attention. The secretary has a resolution which has been introduced into the Congress. With your permission we will dispense with the reading of it and return it to the secretary to be transmitted to the Resolutions Committee.

There being no objection it was so ordered.

CHAIRMAN BUCKLEY: I take great pleasure in calling upon Judge Buffington to address the members and delegates to this American Mining Congress and their guests here this evening. (Applause.)

Judge Buffington's address will be found on page 251, Part II., of this report.

CHAIRMAN BUCKLEY: I have had the pleasure at several sessions of the American Mining Congress of introducing the next speaker, and I have always wished that I was sufficiently gifted to properly eulogize the great service which he has rendered the mining fraternity of this

country. I think no member of the American Mining Congress, no man who has taken any interest in the welfare of the mining industry of this country, has devoted so much of his time, so much of his energy, and so much of his good thought to bring about the important results which are now being accomplished by this organization.

I take great pleasure, ladies and gentlemen, in introducing to you our esteemed, and I may say our beloved, president, the Honorable J. H. Richards, of Idaho.

Judge Richard's address will be found on page 7, Part II., of this report.

Thereupon the evening session adjourned and the delegates repaired to the banquet hall, and enjoyed the reception tendered by the Pittsburgh Reception Committee.

FRIDAY, DECEMBER 4, 1908.

Forenoon Session.

The Congress was called to order by President Richards.

PRESIDENT RICHARDS: Are there any resolutions which it is desired to introduce at this time? The secretary will read what he has on the desk.

Secretary Callbreath read resolutions as follows:

Resolution No. 10.

(Introduced by George Max Esterly, of Alaska.)

Whereas, This Congress has been informed that location of coal claims in Alaska under an Act of Congress, entitled, "An Act to encourage the development of coal deposits in the Territory of Alaska," approved May 28, 1908, having made every effort to comply with the requirements of this statute, have been unable to secure title to their claims, and

Whereas, Owing the the ambiguous provision of Section 3 of said Act wherein the titles to the land covered by said claim, taken under the said Act, are liable to forfeiture to the United States if any of the provisions of said section are violated; it has been found impossible to secure capital to develop the coal fields, and

Whereas, Under the "Coal-land Laws and Regulations Thereunder," General Land Office, July 11, 1908, this point is emphasized on page No. 22, in dealing with said Section 3 as follows:

Inasmuch, As Section 3 deals exclusively with such coal lands or deposits as shall have been purchased under this act, its interpretation seems more properly to fall within the province of the Department of Justice, and it is deemed inadvisable for this department to attempt at this time to define its provisions, and

Whereas, This Congress deems it of the highest importance, not only for the Territory of Alaska, but also for the entire Pacific Coast, that these valuable coal deposits should be opened up without delay. Now, therefore, be it

Resolved, That the American Mining Congress in this eleventh annual convention assembled does earnestly recommend:

First. That the granting of patents to coal lands under said act be expedited.

Second. That said act should be revised so that difficulties and delays in obtaining proper titles to such coal lands by citizens of the Territory of Alaska who are desirous of developing the country be reduced to a minimum as far as is consistent with proper safeguards against fraud.

And Be It Further Resolved, That a copy of this resolution be forwarded to the Honorable Secretary of the Interior and the Senate and the House Committees on Public Lands, United States Congress.

Resolution No. 11.

(Introduced by H. Baumann, of Pennsylvania.)

Whereas, In the firing of shots in coal mines many accidents are caused by gas and dust explosions, premature shots and hung shots, and

Whereas, It is believed that many of these accidents could be avoided by electric firing; now, therefore, be it

Resolved, That the legislatures of the several coal mining states should be urged to enact such legislation as will require that in all gaseous coal mines, all shots shall be fired by electricity.

Resolution No. 12.

(Introduced by T. Wilson Henderson, of Pennsylvania and M. Duffy, of Oklahoma.)

Whereas, The American Mining Congress has affiliated itself with the U. S. Geological Survey, and

Whereas, The Congress assisted in the dedication of the said testing appliances, and

Whereas, It is desirous to continue the close relationship now existing; be it, therefore

Resolved, That a committee be appointed to act in conjunction with the U. S. Geological Surveyors in demonstrating the different systems of ventilation and extraction of coal dust and gases from the mines.

Resolution No. 13.

(Introduced by Wm. P. Daniels, of Colorado.)

Whereas, The American Mining Congress has placed itself upon record as opposed to fraud and deception in the promotion and sale of stocks in mining and other corporations, and

Whereas, Prevention of fraud is much preferable to punishment after has been and is a practical failure by reason of the difficulty of showing fraudulent intent, and

Whereas, The prevention of deception and fraud by punitive legislation it has been committed and it is the opinion of this Congress that proper publicity would deprive the fake promoter of the opportunity for fraud and deception that exist under present laws and would save to the investor the large amount of which he is continually being defrauded by the concealment of facts of which he should be informed; therefore, be it

Resolved, By this eleventh annual session of the American Mining Congress, that we indorse and approve the bill herewith and urge its adoption, with such changes as may make it applicable in the different states.

A Bill for an Act in Relation to Corporations.

Be it enacted by the General Assembly of the State of.....

Section 1. Whenever full paid stock is issued for property by any corporation, doing business in this state, it shall be the duty of the president and secretary of any such corporation, within ten days, from date of the issuance of such full paid stock, to file, or cause to be filed, in the office of the Secretary of State, a description of the property transferred to the corporation for such stock, with the name or names of the person or persons, or of the corporation from whom purchased, the number of shares of stock issued to each of such persons if the property be transferred from individuals, and if known to such president or secretary, the actual amount paid by the person or persons or the corporation so transferring said property to the corporation purchasing the same for such full paid stock, and if not known, such statement shall so state, and if any portion of the stock so issued in payment for property is donated to the corporation issuing it, such statement shall show the amount of stock so donated. Such statement shall be verified by the president and secre-

tary of the corporation, and with a certificate of its filing in the office of the Secretary of State shall be published in any general prospectus issued by such corporation.

Section 2. Every stock certificate issued by any corporation which is not for stock sold by the corporation all the proceeds of which go into the corporate treasury, shall have printed or stamped across the face of such certificate, with ink, the color of which is conspicuously different from that with which the body of such certificate is printed, and in letters not smaller than those printed from 12 point type, the words, "This certificate is a transfer of ownership of the stock represented by it and not a sale by the company."

Section 3. Before any foreign corporation shall be authorized to do business in this state, in addition to the requirements of any existing law, it shall make and file with the Secretary of State, a certificate signed and verified by its president and secretary, which shall show what proportion of its capital stock has been paid for in money and what proportion has been paid for in real or personal property, labor or thing of value other than money, the price per share at which such stock issued in payment for property was sold, with a description of such property with the name or names of the person or persons, or corporation, from whom purchased; the number of shares issued to each of such persons if the property be purchased from individuals, and if known to such president or secretary, the actual amount paid by such person or persons or corporation, from whom such property was purchased; and if not known, the certificate shall so state. If any portion of such stock issued in payment for property is donated, to the corporation issuing it, such certificate shall show the amount so donated. Such certificate with a certificate of its filing in the office of the Secretary of State shall be published in any general prospectus issued by such corporation. Any foreign corporation failing to comply with all of the provisions of this act, after being authorized to do business in this state shall forfeit such authority in addition to the penalities hereinafter provided.

Section 4. The Secretary of State shall be entitled to a fee of one dollar for filing any statement or certificate required by this act.

Section 5. Any officer of any corporation failing to comply with the provisions of this act, or wilfully certifying any false statement in any statement or certificate required by this act, shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not less than one hundred, nor more than one thousand dollars, or by imprisonment in the county jail for not less than thirty days nor more than one year, or by both such fine and imprisonment.

Section 6. Where the capital stock of any corporation doing business in the State of ..... is sold by any officer, director or other agent or promoter of any such corporation to any purchaser thereof for a cash consideration without a compliance with the provisions of this act in reference thereto, an action may be maintained in any court having jurisdiction in this state for the purchase price of such stock, and proof of the failure to comply with this act on the part of any officer, director or other promoter of any such corporation shall be prima facie evidence of fraud in the sale of such stock.

Section 7. Any law or part of law in conflict herewith is hereby repealed.

Resolution No. 14.

(Introduced by J. W. Dawson, of West Virginia.)

Whereas, The interest in or control of mines by railroad companies gives to the mine so owned or controlled such undue advantage over independent mines that it is exceedingly difficult for such independent mines to be operated with sufficient profit to enable them to conserve the mineral resources of the country and to properly safeguard the lives of employees; therefore, be it

Resolved, That we hereby urge upon the federal government, the great importance of enforcing the "Commodities Clause" of the Hepburn Bill, and in the event of that law being declared unconstitutional, we earnestly urge the passage by our national Congress at Washington of a law that will give the relief sought by the commodities clause of the Hepburn Bill. And the secretary of the American Mining Congress is hereby instructed to forward a copy of this resolution to each member of the national Congress.

Resolution No. 15.

(Introduced by David Ross, of Illinois.)

Whereas, While it is possible, through the exercise of greater care and ability in the management of mining properties to very greatly reduce the number of fatal and non-fatal accidents, it is unreasonable to hope that they can be entirely eliminated. In view of the unpreventable character of many accidents, be it

Resolved, That it is the sense of this Congress that our laws, and trade agreements where they exist, should provide some plan of adequate compensation to be allowed those receiving injuries and in the case of fatal accidents those sustaining direct loss in consequence of such casualties.

Chairman Buckley: We will now listen to the report of the Credentials Committee.

Report of Credentials Committee made as follows:

Carnegie Hall, Pittsburgh, Pa., December 4, 1908.

To the Eleventh Annual Session of the American Mining Congress:

Your Committee on Credentials respectfully presents the following report of the attendance at this Congress. The register indicates a representation from thirty-six states and the province of Ontario, Canada, as follows:

Alabama	1
Alaska	4
Arizona	3
Arkansas	4
California	5
Colorado	19
Delaware	2
District of Columbia	8
Florida	1
Georgia	1
Idaho	8
Illinois	17
Indiana	4
Iowa	2
Kansas	1
Kentucky	4
Massachusetts	1
Maryland	6
Michigan	1
Missouri	13
Montana	1
Nevada	2
New Jersey	3
New York	13
North Carolina	1
Ohio	41
Oklahoma	6
Ontario, Canada	2
Oregon	2
Pennsylvania	295
South Dakota	2
Texas	2
Utah	6

Washington	1
West Virginia	33
Wisconsin	3
Wyoming	1
Virginia	1

Respectfully submitted,

JAS. W. WARDROP, Chairman,
E. J. WALTERS,
JAS. W. MALCOLMSON.

LIST OF DELEGATES.

ALABAMA.

Coxe, Edward H. ..... Birmingham

ALASKA.

Bratnober, Henry ..... Cordova
Esterly, George M. ..... Valdez
Koonce, M. E. ..... Rampart
Steele, J. L. ..... Landlock

ARIZONA.

Clark, Mrs. W. L. ..... Jerome
Clark, W. L. ..... Jerome
Jacobson, A. E. ..... Safford

ARKANSAS.

Buie, Henry T. ..... Buffalo
Estes, A. W. ..... Yellville
Hand, J. H. ..... Yellville
Purdue, A. H. ..... Fayetteville

CALIFORNIA.

Clark, J. Ross ..... Los Angeles
Englebright, W. F. ..... Nevada City
Mendenhall, W. C. ..... Los Angeles
Rickard, Edgar ..... San Francisco
Wright, M. P. ..... Los Angeles

COLORADO.

Alderson, V. C. ..... Golden
Bancroft, Geo. J. ..... Denver
Brownlee, A. G. ..... Denver
Callbreath, J. F. ..... Denver
Cargo, L. M. ..... Denver
Cotton, Mrs. C. E. Jr. ..... Denver
Cotton, C. E. Jr. ..... Denver
Dalzell, T. J. ..... Denver
Daniels, Wm. P. ..... Denver
Howbert, Wm. I. ..... Colorado Springs
Kane, Harry W. ..... Central City
Kimball, Geo. K. ..... Idaho Springs
Mills, W. F. R. ..... Denver
Rogers, A. A. ..... Denver
Sellner, S. ..... Buena Vista
Stewart, T. W. ..... Central City
Suter, G. B. ..... Denver
Thompson, H. L. ..... Denver
Wood, John R. ..... Denver

DELAWARE.

Coyne, William ..... Wilmington
Reese, Chas. L. ..... Wilmington

FLORIDA.

Clapp, F. C. ..... Tallehasse

GEORGIA.

Thomson, Meldrim ..... Savannah

IDAHO.

Atwood, E. C ..... Hailey
Henry, H ..... Boise
Meggett, A. A. ..... Boise
Platt, B. C. ..... Boise
Richards, J. H. ..... Boise
Rockwell, Irvin E. ..... Bellevue
Stevens, A. F. ..... Silver City
Walters, E. J ..... Boise

ILLINOIS.

Bain, H. Foster ..... Urbana
Ross, David ..... Springfield
DeWolf, Frank W. ..... Urbana
Ede, J. A. ..... La Salle
Gates, Philetus W. ..... Chicago
Goodsell, B. W. ..... Chicago
Goss, W. F. M. ..... Champaign
Greene, L. A. ..... Chicago
Holman, J. W. ..... Chicago
Hunt, R. W. ..... Chicago
Moses, Tom ..... Westville
Ryan, W. D. ..... Springfield
Scholz, Carl ..... Chicago
Sisley, Lyman A. ..... Chicago
Skinner, M. B. ..... Chicago
Traer, G. W. ..... Chicago
Walker, J. H. ..... Danville

INDIANA.

Chaney, John C. ..... Sullivan
Lynch, John F. .....
Massie, J. G. ..... Terre Haute
McFadyen, John M. ..... Indianapolis

IOWA.

Calvin, Samuel ..... Iowa City
Levy, Ben. J ..... Sioux City

KANSAS.

Haworth, Erasmus ..... Lawrence

KENTUCKY.

Kemp, Geo. B ..... Middlesboro
Norwood, C. J ..... Lexington
Rule, John ..... Earlington
Von Borries, H. J ..... Louisville

MASSACHUSETTS.

Mitchell, Donald D. ..... Great Barrington

MARYLAND.

Dobbs, Albert E ..... Lonaconing
Donahue, John H ..... Frostburg
Drumm, F. J ..... Frostburg
Hawkins, Fred. D ..... Baltimore
Smith, C. H ..... Baltimore
Somerville, R. L ..... Lonaconing

MICHIGAN.

Stanton, F. M ..... Atlantic Mine

MONTANA.

Bowman, C. H. ..... Butte

MISSOURI.

Buehler, H. A. ..... Rolla
Burton, P. E. ..... Joplin
Culbertson, Jerry ..... Kansas City
Gregg, H. H. ..... Joplin
Gregory, Clay ..... Joplin
Grimm, C. B. ..... Webb City
Kirby, E. B. ..... St. Louis
Malcolmson, James W. ..... Kansas City
Maury, Geo. P. ..... Joplin
Royce, W. K. ..... Rich Hill
Thulin, Arthur ..... St. Louis
Vossler, E. M. ..... St. Louis
Young, Lewis ..... Rolla

NEVADA.

Hutchinson, J. H. ..... Goldfield
Luce, Ben D. ..... Reno

NORTH CAROLINA.

Hewitt, Frank R. ..... Asheville

NEW JERSEY.

Brown, John ..... Passaic
Cito, Cormillo, C. ..... Newark
Kummel, Henry B. ..... Trenton

NEW YORK.

Engelhard, Charles ..... New York City
Gessler, Theo. A. ..... New York City
Hale, H. P. ..... New York City
House, H. E. ..... White Plains
Ingalls, W. R. ..... New York City
McKay, Geo. F. ..... New York City
Morse, A. G. ..... Elmira
North, Chas. J. ..... Buffalo
Pearce, G. W. ..... New York City
Robinson, D. C. ..... Howe Cave
Rushmore, David B. ..... Schenectady
Wagner, John L. ..... Syracuse
Von Gerichlen, Wm. H. ..... New York City

OHIO.

Attleck, William ..... Cambridge
Ayter, J. C. ..... Athens
Brown, George ..... Columbus
Cassingham, J. W. ..... Coshocton
Fulton, H. F. ..... Cleveland
Green, William ..... Columbus
Harrigan, P. J. ..... Steubenville
Harrison, Geo ..... Columbus
Hornickel, Lute ..... Cleveland
House, W. B. ..... Oberlin
Huddy, T. H. ..... Bellaire
Jenkins, Lot ..... Bellaire
Johnson, J. F. ..... Bellaire
Jones, Ebenezer ..... Martins Ferry
Kennedy, Edw ..... Land Run
Lace, E. H. ..... Neff
Lewis, T. L. ..... Bridgeport
Loomis, Jas. P. ..... Akron
McDonald, C. A. ..... Wooster

McDonald, John.....Columbus
Miller, W. H.....Massillon
Morrison, Thomas.....Sherodsville
Moss, Henry.....Cambridge
Murphy, J. L.....Nelsonville
Osborne, F. M.....Cleveland
Reinartz, L. F.....E. Liverpool
Savage, G. W.....Columbus
Sherwood, C. L.....Columbus
Simpson, John.....Piney Fork
Smith, Alex.....Mineral City
Rowley, J. W.....Akron
Thomas, David.....St. Clairville
Townsend, P.....Cleveland
Turner, W. H.....Cambridge
Warwick, J. W.....Cleveland
Waters, Thomas.....Wellston
Wilson, J. S.....Toronto
Winsworth, W. G.....Youngstown
Wiper, Alex.....Zanesville
Zerbe, J. B.....Cleveland

OKLAHOMA.

Brown, B.....McAlester
Cameron, William.....McAlester
Duffy, Michael.....Midway
Elliott, James.....Haileyville
Gould, Charles N.....Norman
Hanraty, Peter.....McAlester

ONTARIO.

Lamble, B. C.....Elk Lake City
Lang, H. H.....Cobalt

OREGON.

Finley, J. P.....Portland
Sessions, E. A.....Portland

PENNSYLVANIA.

Abraham, J. W.....Uniontown
Acker, Louis K., Jr.....Bellevue
Adams, Thomas K.....Mercer
Ailes, J. W.....Donova
Allen, W. L.....Pittsburg
Aikman, John.....Brockwayville
Anderson, Mary.....Pittsburg
Armstrong, J. M.....Pittsburg
Armstrong, Frank.....Pittsburg
Arnold, George.....Pittsburg
Atcheson, Jno. F.....Rittenhouse
Bailie, F. H.....Pittsburg
Barr, J. H. C.....Philadelphia
Barnsley, Geo. T.....Pittsburg
Bart, J. G.....Cokeburg
Baton, Geo. S.....Pittsburg
Baumann, H.....Wikes Barre
Beadling, Thomas.....Carnegie
Beard, J. X.....Scranton
Beck, Harold E.....Sharon
Bell, John F.....Dravosburg
Bishoff, Avery M.....Swissvale
Black, Frank B.....Meyersdale
Blackburn, D. B.....Pittsburg
Blick, James.....Pittsburg

Blower, Daniel R. . . . . Johnstown
Bochert, C. G. . . . . Pittsburg
Boileau, John W. . . . . Pittsburg
Bongamon, F. E. . . . . Wilkinsburg
Boren, Earl E. . . . . Pittsburg
Boyd, Frank P. . . . . Pittsburg
Brenneman, Robert C. . . . . Pottsville
Brown, Thos. B. . . . . Canonsburg
Brown, Edward J. . . . . Du Bois
Burke, J. F. . . . . Pittsburg
Burke, W. J. . . . . Pittsburg
Burgan, R. P. . . . . Carnegie
Burket, H. C. . . . . Greensburg
Burton, J. S. . . . . Pittsburg
Buffington, Jos. . . . . Pittsburg
Byers, John W. . . . . Crafton
Calverly, Walter. . . . . Windber
Cameron, A. I. . . . . Irwin
Canon, B. H. . . . . Mount Lebanon
Clark, James S. . . . . Carnegie
Clayton, James. . . . . Beaver Falls
Cliford, William. . . . . Jeanette
Clingerman, W. H. . . . . Scottdale
Cole, Walter R. . . . . Beaver Falls
Caruthers, John S. . . . . Irwin
Cooper, Allen F. . . . . Uniontown
Connelly, C. B. . . . . Pittsburg
Cosgrove, P. B. . . . . Hastings
Couch, Alexander M. . . . . Scottdale
Crago, Richard. . . . . Barnesboro
Craig, Chas. E. . . . . Creighton
Crane, Walter R. . . . . State College
Crawford, George M. . . . . Pittsburg
Crawford, L. F. . . . . Pittsburg
Cray, James R. . . . . Uniontown
Crea, J. H. . . . . Mars
Crutzman, C. M. . . . . Avalon
Cunningham, F. W. . . . . Wilkinsburg
Currie, Wm. . . . . Lilly
Coutler, Richard, Jr. . . . . Greensburg
Dugger, George. . . . . Elrama
Daubenspeck, C. V. . . . . Cochranton
Davis, A. L. . . . . Venetie
Davies, Hywel. . . . . Kensec
Day, Edward B. . . . . Pittsburg
Diescher, Alfred J. . . . . Pittsburg
D'Invilliars, Edward V. . . . . Philadelphia
Dixon, J. L. . . . . Pittsburg
Dolan, Pat. . . . . Midway
Donaldson, Archie. . . . . Du Bois
Donaldson, R. T. . . . . Pittsburg
Dudley, C. S. . . . . Altoona
Dugan, B. P. . . . . Pittsburg
Dunn, Willis O. . . . . Pittsburg
Durbin, Wm. . . . . Boston
Dunk, Mrs. Walter. . . . . Perrysvile
Dunk, Walter. . . . . Perrysville
Eagle, Houston H. . . . . Pittsburg
Earley, M. J. . . . . Pittsburg
Elliott, Wm. E. . . . . Sharon
Elwood, W. F. . . . . Greensburg
Endsley, J. W. . . . . Somerfield
Evans, Nicholas . . . . . Tyrome

Falkel, D. J.....Pittsburg
Farrington, R. P.....Pittsburg
Feehan, Francis.....Castle Shannon
Filer, F. P.....Mercer
Fisher, Ed. F.....Somerset
Fischer, Wm. F.....Pittsburg
Fleming, James R.....Peale
Fogg, L. W.....Uniontown
Fohl, W. E.....Pittsburg
Fouse, John M.....Pittsburg
Frease, John B.....Wilkinsburg
Fraser, C. D.....Pittsburg
Fulford, John H.....Du Bois
Furey, C. D.....West View
Gates, W. H.....Graceton
Gay, George E.....Uniontown
Gilday, R.....Morrisdale Mines
Gillmor, Geo.....Pittsburg
Glass, Chas.....Pittsburg
Gluck, Leo.....Pittsburg
Golden, Robert S.....Pittsburg
Gould, Samuel C.....Pittsburg
Grassie, W. S.....Sewickley
Griffith, Wm.....Scranton
Haldeman, Geo. T.....Thompsontown
Hall, C. W.....Apollo
Hall, Clarence.....Pittsburg
Hallett, Henry M.....Pittsburg
Hampson, S.....Punxsutawney
Hanck, N. A.....Easton
Harrop, H. S.....Wilkinsburg
Hassenpflug, Geo. J.....Lilly
Henderson, T. Wilson.....Sharon
Henderson, James.....Uniontown
Hertzell, A. E.....Pittsburg
Hewitt, A. V. H.....Pittsburg
Hiller, L. L.....Pittsburg
Hobletezell, W. L.....Meyersdale
Holliday, Ben.....Ellsworth
Holliday, H. C.....Pittsburg
Hollis, J. H.....Pittsburg
Hopkins, N. F.....Pittsburg
Huber, A. J.....Pittsburg
Humphries, H. Howard.....Vancus Mill
Humphry, B. F.....Philadelphia
Hunt, A. G.....Bulgen
Imhoff, W. G.....Pittsburg
Jackson, Thomas A.....Uniontown
Jamison, W. W.....Greensburg
Johnston, J. B.....Pittsburg
Jones, Thomas P.....Pittsburg
Keefer, W. W.....Pittsburg
Keller, J. B.....Scottdale
Kelso, M. M.....Houston
Kelvington, W. M.....Van Meter
Kent, James.....Pittsburg
Kerr, Maurice.....Wilkinsburg
Keys, John A.....Wilkinsburg
Kirkbride, George T.....Carnegie
Knapper, Joseph.....Phillipsburg
Lace, W. T.....Vandergrift
Larva, F. J.....Pittsburg
Lehman, George M.....Pittsburg

Lennon, Fred.....Washington
Leschen, Arthur A.....Pittsburg
Lewis, Henry J.....Pittsburg
Lewis, R. M.....Etna
Lincoln, K. P.....Pittsburg
Livingston, L. O.....Pittsburg
Lloyd, W. J.....Uniontown
Lockhart, W. A.....Houston
Lowther, Thomas S.....Somerset
Lowther, W. C.....Somerset
Lyon, F. R.....Somerset
Maize, Joseph.....Van Meter
Maple, Harvey.....Pittsburg
Marcus, Morris M.....Pittsburg
Martin, John T.....Philadelphia
Mason, H. D., Jr.....Charleroi
Mather, Thomas A.....Bradenville
McCaffrey, Thos.....Brier Hill
McCasland, K. W.....LaBelle
McClane, John.....Ligomier
McCormick, John B.....Georgeville
McDonald, F. A.....Carnegie
McDowell, William.....Butler
McFadin, C. B.....Argentine
McGregor, C. P.....Pittsburg
McKay, Ed.....McKeesport
McKay, John.....Benton
McIlveen, H. C.....Pittsburg
McKinney, R. M.....Dravesburg
McLeod, James.....Wilkinsburg
McLurk, Morton H.....Philadelphia
McClasland, Robert J.....Pittsburg
Mendenhall, W. C.....Crafton
Miller, J. H.....Smoke Run
Mingus, G. W.....Pittsburg
Mohler, K. I.....Freedom
Montieth, Alex.....Patton
Morris, E. L.....Wilkinsburg
Morse, E. K.....Pittsburg
Moore, P. G.....Scranton
Morris, Isreal.....Castle Shannon
Most, David.....Lilly
Mugridge, John.....South Fork
Murdock, Robert J.....Pittsburg
Nelson, Edward.....Bulger
Nicholson, John.....Carnegie
Nicols, Lowell W.....Sewickley
Nielson, W. J.....Irwin
Nusser, Wm. E.....Ingram
Oates, John J.....Charleroi
O'Neil, J. D.....Pittsburg
Oshell, Thomas.....Pittsburg
Patterson, John.....Jacobs Creek
Penrose, R. A. F.....Philadelphia
Peters, C. M.....Ben Avon
Phillips, Elias.....DuBois
Pollack, Robert M.....Star Junction
Powell, David E.....Pittsburg
Powel, Griffith.....Johnstown
Pratt, John I.....Crafton
Price, Thomas H.....Wilkesbarre
Quach, J. M.....Freeport
Reith, August.....Pittsburg

Ramsay, A. C. . . . Greensburg
Ramstedt, Wm. . . . Johnstown
Rayburn, John M. . . . Pittsburg
Renzichausen, Henry. . . . Pittsburg
Renzichausen, Walter. . . . Allegheny
Renzichausen, James. . . . Pittsburg
Rice, George E. . . . Waynesburg
Richards, William G. . . . Pittsburg
Richards, W. J. . . . Pottsville
Rigg, W. N. . . . Pittsburg
Robert, J. C. . . . Pittsburg
Robbins, Samuel. . . . Pittsburg
Roderick, David, J. . . . Hazelton
Ross, C. B. . . . Greensburg
Russell, J. C. . . . Pittsburg
Salkeld, Howard B. . . . Carnegie
Satler, L. L., Jr. . . . Glenshaw
Saxman, M. W. . . . Latrobe
Schluederberg, W. . . . Pittsburg
Schluederberg, F. Z. . . . Pittsburg
Schluederberg, C. G. . . . Pittsburg
Schmidt, H. M. . . . Pittsburg
Schmunk, John F. . . . Pittsburg
Scholl, Louis A., Jr. . . . Pittsburg
Scott, James . . . Pittsburg
Scurfield, Jas. H. . . . Wells Creek
Shaw, G. M. . . . Pittsburg
Shillito, Mrs. Kate. . . . Pittsburg
G. M. Shillito. . . . Pittsburg
Smail, Jas. A. . . . Leechburg
Smith, Lee S. . . . Pittsburg
Smith, Geo. W. . . . Hite
Smith, Harvey D. . . . Pittsburg
Smith, John C. . . . Wilkinsburg
Sommerville, John S. . . . Winburne
Soppett, Edw. . . . Herminie
Spellmire, W. B. . . . Pittsburg
Sprague, J. B. . . . Pittsburg
Stambaugh, S. H. . . . Sharon
Steele, George D. . . . Pittsburg
Steinberg, Ben. . . . Pittsburg
Stoek, H. H. . . . Scranton
Stoneroad, J. M. . . . Pittsburg
Street, Reuben. . . . Ford City
Sturges, T. B. . . . Scranton
Sykes, Edward C. . . . Bellevue
Taggart, Eugene B. . . . Wilkinsburg
Taylor, Chas, T. . . . Turtle Creek
Taylor, Jas. M. . . . Pittsburg
Taylor, Samuel A. . . . Wilkinsburg
Tenary, Robert. . . . Pittsburg
Thomas, Mrs. D. C. . . . Thorn
Thomas, W. S. . . . Pittsburg
Thomas, W. A. . . . Wilkinsburg
Tilley, J. F. . . . Pittsburg
Veach, B. F. . . . Pittsburg
Verner, H. J. . . . Carnegie
Wadsworth, M. E. . . . Pittsburg
Wagner, W. H. . . . Carnegie
Wedd, Alfred M. . . . Pittsburg
Weller, Adam. . . . Allegheny
Wentling, J. C. . . . Greensburg
White, Thomas H. . . . Crafton

Whyel, George.....Uniontown
Williams, Thos. W.....Connellsville
Williams, Joseph.....Altoona
Williams, R. M.....New Castle
Williams, Morris.....Philadelphia
Williams, T. E.....Pittsburg
Wise, C. S.....Pittsburg
Wood, Geo. R.....Pittsburg
Woodworth, R. B.....Pittsburg
Woomer, J. W.....Pittsburg
Wyman, W. A.....Beechview
Wynne, Ira H.....Glenwillard
Yost, Raymond, G.....Mt. Lebanon
Young, David.....Brownsville
Zimmerman, Thomas M.....Dawson
Zimmerman, James Z.....Delmont
Zirg, A. V. W.....Pittsburg

SOUTH DAKOTA.

Fulton, Charles H.....Rapid City
Werth, Howard.....Rapid City

TEXAS.

Happer, H. F.....El Paso
Plaser, M. B.....El Paso

UTAH.

Boggs, S. L.....Salt Lake City
Carter, J. Owen.....Salt Lake City
Cox, Fred W.....Manti
Knight, J. W.....Provo
McKim, J. W.....Salt Lake City
Saxman, C. W.....Salt Lake City

VIRGINIA.

Schubert, E. A.....Norfolk

WASHINGTON.

Smith, Gale.....Spokane

WASHINGTON, D. C.

Ashley, Geo. H.....Washington
Brooks, Alfred H.....Washington
Fisher, Cassius A.....Washington
Merrill, George P.....Washington
Parker, Edward W.....Washington
Smith, George O.....Washington
Upham, Mrs. N. C.....Washington
Wilson, Herbert M.....Washington

WEST VIRGINIA.

Bratt, J. F.....Independence
Bryde, P. M.....Wheeling
Buck, Stuart M.....Bramwell
Cook, James F.....Fairmont
Cummings, W. R.....Sisterville
Dawson, J. W.....Charleston
Dremon, E. D.....Fairmont
Eavenson, Howard N.....Gary
Fleming, A. B.....Fairmont
Gartlan, Thomas.....Parkersburg
Grady, P. A.....Huntington
Hass, Frank.....Fairmont
Henry, Earl A.....Clifton
Hill, Bonner H.....Chilyan

Hite, R. M. ..... Fairmont
Hough, Elmer ..... Wellsburg
LaRue, R. S. ..... Morgantown
Malone, L. L. ..... Fairmont
McKabe, John ..... Clearfield
McKinley, J. C. ..... Wheeling
Ord, W. D. ..... Landgraff
Ott, Lee ..... Thomas
Parsons, Frank E. ..... Clarksburg
Paul, James W. ..... Davis
Phillips, David R. ..... Bramwell
Phillips, John ..... Bickley
Ross, John G. ..... Charleston
Steenbergen, William ..... Point Pleasant
Springer, John A. ..... Flemington
Strangham, J. A. ..... Huntington
Warner, William ..... Charleston
White, I. C. ..... Morgantown
Williams, R. Y. ..... Moundsville

WISCONSIN.

Estabrook Ned L. ..... Platteville
Holden, E. C. ..... Madison
Longhenry, Edw. G. ..... Benton

WYOMING.

Benton, William ..... Centennial

LIST OF MEMBERS OF THE AMERICAN MINING CONGRESS.

Life Members Marked (L).

Acheson, Edward G. ..... Niagara Falls, New York
Adams, Prof. Arthur K. ..... Socorro, New Mexico
Adams, Everett F. ..... Reno, Nevada
Adkinson, H. M. ..... Denver, Colorado
Agency Co., The ..... Salt Lake City, Utah
Alderson, Victor C. (L) ..... Golden, Colorado
Alexander, E. E. ..... Spokane, Washington
Alexander, F. J. ..... Denver, Colorado
Allen, C. A. ..... Deadwood, South Dakota
Allen, Orren ..... El Paso, Texas
Allen, Watson ..... Seattle, Washington
Allison, E. M. Jr. ..... Salt Lake, Utah
Althouse, W. D. ..... Philadelphia, Pennsylvania
Almeda Cons. Mines Co. ..... Portland, Oregon
Ameling, H. R. ..... Fredricktown, Missouri
Anderson, Chas. H. ..... Denver, Colorado
Anderson, G. Scott ..... Wallace, Idaho
Anderson, John B. ..... Bisbee, Arizona
Anderson, J. Herbert ..... Spokane, Washington
Anthony, C. E. ..... San Diego, California
Anthony, W. W. ..... San Diego, California
Arkell, Edwin ..... Reno, Nevada
Armstrong, L. K. ..... Spokane, Washington
Armstrong, W. W. ..... Salt Lake City, Utah
Atkin, W. T. ..... Salt Lake City, Utah
Atwood, Mrs. E. C. ..... Boston, Massachusetts
Ayres, Geo. V. ..... Deadwood, South Dakota
Azbell, Chas. C. ..... Eaton, Arkansas
Bache, Chas. F. ..... Tucson, Arizona
Bailey, R. W. ..... Denver, Colorado
Bain, H. Foster ..... Urbana, Illinois
Baker, E. P. ..... Laramie, Wyoming

Baker, Henry C. ..... Ogden, Utah
Bancroft, Geo. J. ..... Denver, Colorado
Barnes, Dr. B. ..... Douglas, Arizona
Barnes, Clarence E. ..... Boise, Idaho
Barnsley, Geo. T. ..... Pittsburgh, Pennsylvania
Bartlett, C. O. ..... Cleveland, Ohio
Bartlett, Sidney E. ..... Cheyenne, Wyoming
Bauer, B. F. ..... Salt Lake, Utah
Baumgartner, Matt. (L) ..... Spokane, Washington
Beck, W. A. ..... Spokane, Washington
Becker, Chas. M. ..... Victor, Colorado
Bedell, S. A. ..... Fenner, California
Beeler, H. C. ..... Denver, Colorado
Beery, H. F. ..... Seattle, Washington
Belcher, J. R. ..... Salt Lake City, Utah
Belen Mining Co. ..... Douglas, Arizona
Bell, C. B. ..... Douglas, Arizona
Bemis, G. L. ..... Salt Lake, Utah
Boileau, John W. ..... Pittsburgh, Pennsylvania
Billingsley, J. H. ..... Galena, Illinois
Bent, Geo. B. ..... Bent, New Mexico
Bentley, L. B. ..... Organ, New Mexico
Benton, Wm. ..... Centennial, Wyoming
Bettles, A. J. (L) ..... Salt Lake City, Utah
Beveridge, A. E. ..... Salt Lake City, Utah
Blackham, Henry F. ..... El Paso, Texas
Blockberger, F. R. ..... Portland, Oregon
Blumenberg, Henry ..... Daggett, California
Bolton, D. G. ..... Salt Lake City, Utah
Borden, Gail ..... Los Angeles, California
Boston, J. L. ..... Bisbee, Arizona
Bothwell, G. R. ..... Salt Lake, Utah
Bovard, H. F. ..... Greensburg, Pennsylvania
Boyrie, H. E. ..... Seattle, Washington
Bowen, J. J. ..... Bisbee, Arizona
Bradley, Wm. L. ..... El Paso, Texas
Bradley, Wm. M. ..... Salt Lake City, Utah
Brandes, Juan Felix (L) ..... Denver, Colorado
Bransford, J. S. ..... Salt Lake City, Utah
Bransford, W. H. ..... Salt Lake City, Utah
Bratnober, H. ..... Tacoma, Washington
Brattain, Ross R. ..... Spokane, Washington
Bretherton, S. E. ..... San Francisco, California
Bridgman, W. E. ..... Denver, Colorado
Brooks, Alfred H. ..... Washington, D. C.
Brophy, M. J. ..... Bisbee, Arizona
Brophy, Wm. H. ..... Bisbee, Arizona
Brougher, W. ..... Carson City, Nevada
Brown, C. T. ..... Socorro, New Mexico
Brown, John ..... Spokane, Washington
Brown, L. A. ..... Bisbee, Arizona
Browning, W. O. ..... Seattle, Washington
Brownlee, Col. A. G. (L) ..... Denver, Colorado
Brunton, D. W. (L) ..... Denver, Colorado
Bryant, L. ..... Spokane, Washington
Bryant, W. G. ..... Carterville, Missouri
Buckley, Dr. E. R. (L) ..... Flat River, Missouri
Buie, Henry T. ..... Buffalo, Arkansas
Bulger Block Coal Co. ..... Pittsburgh, Pennsylvania
Bunch, John A. ..... Harrison, Arkansas
Burke, G. M. ..... Joplin, Missouri
Burton Powder Co. ..... Pittsburgh, Pennsylvania
Busch Bros. ..... Rhyolite, Nevada

Butler, Edgar T. ..... Denver, Colorado
Butler, Geo. E. ..... Needles, California
Butler, Jos. G. ..... Youngstown, Ohio
Buxton, G. E. ..... Bisbee, Arizona
Caffey, B. F. ..... Salt Lake, Utah
Calahan, Henry C. (L) ..... San Francisco, California
Caldwell Bros. Co. ..... Seattle, Washington
Caldwell, J. N. ..... Denver, Colorado
Cray, James R. ..... Uniontown, Pennsylvania
Crescent Coal Co. ..... Pittsburgh, Pennsylvania
Callbreath, J. F. ..... Denver, Colorado
Campbell, F. J. ..... Denver, Colorado
Campbell, C. P. ..... Colorado Springs, Colorado
Canada, A. W. ..... Carterville, Missouri
Cannon, P. H. ..... Cherry Creek, Nevada
Cantwell, H. J. ..... St. Louis, Missouri
Caretto, B. ..... Bisbee, Arizona
Cardwell, B. A. ..... Seattle, Washington
Cargo, L. M. ..... Denver, Colorado
Carpenter, A. B. ..... Los Angeles, California
Carrigan, D. ..... Custer, South Dakota
Carlson, A. E. ..... Boise, Idaho
Carroll, James ..... Needles, California
Carroll, John ..... Victorville, California
Carter, W. T. ..... Los Angeles, California
Cary, R. J. ..... Denver, Colorado
Cass, Geo. W. ..... Douglas, Arizona
Casseday, David W. ..... Spokane, Washington
Catlin, W. P. ..... Carson City, Nevada
Catrow, Henry ..... Salt Lake, Utah
Caulkins, W. R. ..... Carthage, Missouri
Caven, Dr. C. L. ..... Bisbee, Arizona
Chaney, H. E. ..... Missoula, Montana
Chenoweth, H. K. ..... Nogales, Arizona
Chilberg, J. E. ..... Seattle, Washington
Child, Wm. H. (L) ..... Salt Lake, Utah
Chittenden, W. H. ..... Denver, Colorado
Christopher, Jas. K. ..... Kansas City, Missouri
Clancy, R. K. ..... Cananea, Sonora, Mexico
Clark, J. Ross ..... Los Angeles, California
Clark, H. S. ..... Butte, Montana
Clark, V. V. ..... Reiter, Washington
Clark, Wm. F. ..... Glover, Vermont
Clark, Will L. ..... Jerome, Arizona
Clark, W. H. ..... Salt Lake, Utah
Clausen, Carl ..... Bisbee, Arizona
Cleveland, J. F. ..... Phoenix, Arizona
Clifford, Henry B. ..... New York City
Cobb, E. M. ..... Chicago, Illinois
Cobb, Philander ..... Douglas, Arizona
Colburn, E. A. (L) ..... Denver, Colorado
Cole, David ..... Cananea, Sonora, Mexico
Coleman, Frank J. ..... Morenci, Arizona
Collins, Glenville A. ..... Seattle, Washington
Collins, R. F. ..... Spokane, Washington
Comstock, A. R. ..... Idaho Springs, Colorado
Conard, A. M. ..... Noria, Sonora, Mexico
Conrad, E. W. ..... Spokane, Washington
Cook, Edw. H. ..... Tucson, Arizona
Cooley, B. ..... Galena, Kansas
Cooney, Frank H. ..... Butte, Montana
Cooper, William ..... Georgetown, Colorado
Condron, John ..... Salt Lake, Utah

Coplen, J. B. ..... Globe, Arizona
Coplen, J. D. ..... Globe, Arizona
Cornell, Russell T. ..... New York City
Costello, Frank F. (L) ..... Colorado Springs, Colorado
Costello, John A. ..... Chicago, Illinois
Cowell, W. J. R. ..... Deming, New Mexico
Cowen, Jas. G. ..... Douglas, Arizona
Crandell, Jas. H. ..... Denver, Colorado
Crane, Chas. E. ..... Seattle, Washington
Crawford, Geo. ..... New York City
Crawford, Capt. Jack ..... Chicago, Illinois
Crawford, Alec. J. F. ..... El Paso, Texas
Crawford, G. H. ..... Jamestown, New York
Creelman, G. R. ..... Detroit, Michigan
Crescent Coal Co. ..... Pittsburgh, Pennsylvania
Crowdus, J. W. ..... El Paso, Texas
Cullen, J. F. ..... Los Angeles, California
Cunningham, Chas. ..... Bisbee, Arizona
Cunningham, M. J. ..... Bisbee, Arizona
Cutler, Thos. R. ..... Salt Lake, Utah
Cutler, John C. ..... Salt Lake City, Utah
Dahl, Henry P. ..... Cripple Creek, Colorado
Daily, M. J. ..... Park City, Utah
Damours, C. A. ..... Virginia City, Montana
Dana, L. N. ..... Joplin, Missouri
Daniels, Wm. P. ..... Denver, Colorado
Davidson, J. M. ..... Seattle, Washington
Davis, Jack (L) ..... Goldfield, Nevada
Davis, Robt. W. Jr. ..... Silverton, Colorado
Davis, O. C. ..... Douglas, Arizona
Dawson, J. W. ..... Charleston, West Virginia
Day, Eugene R. ..... Wallace, Idaho
Day, Harry L. ..... Wallace, Idaho
Degge, W. W. ..... Boulder, Colorado
Dehuff, M. A. ..... Spokane, Washington
De Lavergne, Hon. E. M. ..... Colorado Springs, Colorado
Delmas, P. D. ..... Salt Lake, Utah
De Maine, Ernest M. ..... Naco, Arizona
Dempster, A. ..... Pittsburgh, Pennsylvania
Denair, John ..... Needles, California
Denn, Maurice ..... Bisbee, Arizona
Dern, John ..... Salt Lake, Utah
Dern & Thomas ..... Salt Lake, Utah
Deveraux, T. E. ..... Fort Dodge, Iowa
Dewey, A. M. ..... Spokane, Washington
Dickson, W. H. ..... Salt Lake City, Utah
Dietrich & Goetz ..... Tucson, Arizona
Dignowity, C. L. ..... Reno, Nevada
Dignowity, F. A. ..... Reno, Nevada
Dillman, L. C. ..... Los Angeles, California
Dirks, Martin H. ..... St. Joseph, Missouri
Dittmar, M. E. ..... Redding, California
Donaldson, A. M. ..... Denver, Colorado
Doolittle, C. H. ..... Salt Lake City, Utah
Dorsey, Col. Geo. W. E. ..... Salt Lake, Utah
Doty, L. C. ..... Eureka, Utah
Douglas, F. S. ..... Douglas, Arizona
Douglas, Jas. S. ..... Nacozari, Sonora, Mexico
Douglas, Dr. Jas. ..... New York City
Douglas, Walter ..... Bisbee, Arizona
Downey, Chas. J. ..... Denver, Colorado
Downing, Chas. S. ..... Denver, Colorado
Doyle, R. J. ..... Rhyolite, Nevada

Draper, Frank B. ..... Chicago, Illinois
Dube, R. E. ..... Denver, Colorado
Dudley, A. A. ..... Douglas, Arizona
Duncan, John A. ..... St. Joseph, Missouri
Dunyon, Newton A. ..... Salt Lake City, Utah
Du Pont, E. I., Powder Co. ..... Salt Lake City, Utah
Dwight, F. L. ..... Los Angeles, California
Dwyer. Daniel ..... Joplin, Missouri
Dwyer, E. P. ..... Joplin, Missouri
Earnest, F. G. ..... Spokane, Washington
East, Jas. H. ..... Douglas, Arizona
East, John H. ..... Denver, Colorado
Eastman, A. F. ..... Tacoma, Washington
Ebbley, Norman ..... Wallace, Idaho
Ede, J. A. ..... La Salle, Illinois
Edmundson, Dr. C. L. ..... Bisbee, Arizona
Edmunds, Joseph E. ..... Salt Lake, Utah
Edwards, Henry W. ..... Denver, Colorado
Elkins, John T. ..... Kansas City, Missouri
Ellis, Chas. O. ..... Douglas, Arizona
Ellingwood, C. O. ..... Boston, Massachusetts
Elliott, Fred J ..... Globe, Arizona
Ellis, A. C., Jr. ..... Salt Lake City, Utah
Ellsworth Collieries Co. ..... Ellsworth, Pennsylvania
Ellwood, N. F. ..... Greensburg, Pennsylvania
Elmendorf, Wm. J. ..... Spokane, Washington
Emberson, A. L. ..... Denver, Colorado
Engelhard, Chas. ..... New York City
Eng. & Mining Journal ..... New York City
Erisman, J. F. ..... Denver, Colorado
Estes, Ambrose W. ..... Yelleville, Arkansas
Estmere, Chas. ..... Candle, Alaska
Evans, C. W. ..... Ashland, Oregon
Evans, David (L) ..... Salt Lake City, Utah
Evans, Evan E. ..... Denver, Colorado
Evans, Mark G. ..... Denver, Colorado
Evans, R. J. ..... Salt Lake City, Utah
Everett, Dr. W. Eugene ..... Tacoma, Washington
Ewing, Col. Thos. (L) ..... Fenner, California
Ewing, W. E. ..... Fenner, California
Farish, Wm. A., Jr. ..... El Paso, Texas
Fassett, C. M. ..... Spokane, Washington
Feather River Dev. Co. ..... San Francisco, California
Felt, J. H. ..... Kansas City, Missouri
Fellows, Walter C. ..... Needles, California
Ferguson, N. E. ..... Los Angeles, California
Ferguson, Col. S. W. ..... San Francisco, California
Ferry, W. M. ..... Salt Lake, Utah
Fickell, Fred W. ..... Tucson, Arizona
Fiduciary Co., The ..... Chicago, Illinois
Finch, Marcus ..... Denver, Colorado
Fisher, Thos. ..... Pittsburgh, Pennsylvania
Fitch, Max B. ..... El Paso, Texas
Fletcher, Geo. T. ..... Joplin, Missouri
Fletcher, John G. ..... Kennett, California
Foley, W. R. ..... Denver, Colorado
Foote, Arthur De Wint ..... Grass Valley, California
Foote, Robt. W. ..... Breckenridge, Colorado
Forbes, A. W. ..... Tucson, Arizona
Forrester, Robert (L) ..... Salt Lake City, Utah
Foster, Ernest Le Neve ..... Denver, Colorado
Fox, Moylan C. ..... Salt Lake City, Utah
Franz, E. H. ..... Globe, Arizona

Fredericks, L. G. ..... Buffalo, Arkansas
Freed, C. M. ..... Salt Lake City, Utah
Freeman, M. P. ..... Tucson, Arizona
Friedman, L. A. ..... Lovelock, Nevada
Fukuda, R. ..... Berkeley, California
Fogg, L. W. ..... Uniontown, Pennsylvania
Galigher, J. E. ..... Salt Lake City, Utah
Gallagher, Jas. F. ..... Joplin, Missouri
Garm, J. E. ..... Joplin, Missouri
Gatch, Elias S. (L) ..... St. Louis, Missouri
Gay, Geo. E. ..... Uniontown, Pennsylvania
Gaylord, M. D. ..... Globe, Arizona
Geisenhofer, O. W. ..... Bisbee, Arizona
Gemmell, Robert C. (L) ..... Salt Lake City, Utah
General Eng. Co. ..... Salt Lake City, Utah
George, Dr. R. D. ..... Boulder, Colorado
Giffin, Abner ..... Seattle, Washington
Gifford, A. W. ..... El Paso, Texas
Gilbert, M. P. (L) ..... Los Angeles, California
Gilson, John W. ..... Spokane, Washington
Gmahling, Wm. ..... Cananea, Sonora, Mexico
Godbe, E. L. ..... Salt Lake, Utah
Godfrey, Jas. J. ..... Seattle, Washington
Godshall, Dr. D. L. ..... Needles, California
Godthorpe, Edwin F. ..... Benton, Wisconsin
Goodall, Arthur ..... Drytown, California
Goodsell, B. W. ..... Chicago, Illinois
Gould, S. H. ..... Tucson, Arizona
Granberg, H. O. (L) ..... Oshkosh, Wisconsin
Grant, B. F. ..... Salt Lake City, Utah
Grant, M. N. ..... Laramie, Wyoming
Gray, Douglas ..... Tombstone, Arizona
Gray, Geo. F. ..... Tucson, Arizona
Gray, Jas. R. ..... Uniontown, Pennsylvania
Gray, John (L) ..... Deadwood, South Dakota
Gray, W. A. ..... Portland, Oregon
Greene, Ernest H. ..... Salt Lake City, Utah
Great Lakes Coal Co. ..... Pittsburgh, Pennsylvania
Green, M. M. ..... Chicago, Illinois
Gregg, Col. H. H. (L) ..... Joplin, Missouri
Gregg Investment Co. ..... Denver, Colorado
Greenewald Furniture Co. ..... Salt Lake City, Utah
Greenough, W. D. ..... Mullan, Idaho
Gridley, F. P. ..... Salt Lake City, Utah
Grier, F. J. ..... Lead, South Dakota
Grigsby, W. W. ..... Skidmore, Missouri
Gritman, A. D. ..... Spokane, Washington
Gunnell, Alva H. ..... Grants Pass, Oregon
Gunn, Geo. E. ..... Salt Lake, Utah
Haas, J. C. ..... Spokane, Washington
Haas, F. J. ..... Douglas, Arizona
Hale, Irving ..... Denver, Colorado
Halteman. W. A. ..... Meteor, Washington
Halter, E. S. ..... Copperfield, Colorado
Hamilton, Thos. W. ..... Globe, Arizona
Hand, J. H. ..... Yelleville, Arkansas
Haninger, Geo. ..... Bisbee, Arizona
Hanks, L. C. ..... Douglas, Arizona
Hanson, Chas. T. ..... Douglas, Arizona
Hanson, Rasmus ..... Silverton, Colorado
Hardy, James Gordon ..... El Paso, Texas
Hardy, J. W. ..... Cananea, Sonora, Mexico
Hardy, James Gordon ..... El Paso, Texas

Hardy, W. C. ..... Hazel Green, Wisconsin
Harlan, M. R. ..... Bisbee, Arizona
Harrington, F. L. ..... Bisbee, Arizona
Hawes, R. L. ..... Cananea, Sonora, Mexico
Haworth, Dr. Erasmus ..... Lawrence, Kansas
Hayes, C. Willard ..... Washington, D. C.
Hechtman, J. F. ..... Globe, Arizona
Hedberg, Fred ..... Don Luis, Arizona
Heidenrich, C. J. ..... Spokane, Washington
Heigho, E. M. ..... Weiser, Idaho
Heizer, D. N. ..... Colorado Springs, Colorado
Henderson, H. B. ..... Columbus, Kansas
Henderson, James ..... Uniontown, Pennsylvania
Henderson, W. M. ..... Pittsburgh, Pennsylvania
Herr, H. L. ..... Galena, Illinois
Herrick, R. L. ..... Denver, Colorado
Hicks, Ira W. ..... Seattle, Washington
Hiller, Albert L. ..... Denver, Colorado
Hodgman, Jas. A. (L) ..... Los Angeles, California
Hoffman Bros. ..... Salt Lake City, Utah
Holman, Austin T. ..... Victor, Colorado
Holmes, Dr. J. A. ..... Washington, D. C.
Hoofer, A. O. ..... Grants Pass, Oregon
Hopkins, M. E. ..... Boise, Idaho
Hornickel, Lute ..... Cleveland, Ohio
Horse Shoe Mng. Co. ..... Seattle, Washington
House, S. R. ..... Denver, Colorado
Houtz, J. C. ..... Rhyolite, Nevada
Howell, F. D. Jr. ..... Los Angeles, California
Howell, George D. ..... Uniontown, Pennsylvania
Hubbard, M. E. ..... Salt Lake City, Utah
Huff, L. B. ..... Greensburg, Pennsylvania
Hull, C. W. ..... Bisbee, Arizona
Humphries, Col. C. K. ..... Seattle, Washington
Husted, Jas. D. ..... Denver, Colorado
Hutchinson, Chas. T. ..... San Francisco, California
Hutchinson, Geo. W. ..... Greensburg, Pennsylvania
Hutchinson, R. A. ..... Spokane, Washington
Hutton, James ..... Waukesha, Wisconsin
Hymer, J. P. ..... Denver, Colorado
Hyndman, N. P. ..... Pittsburgh, Pennsylvania
Iglehart, Wm. ..... Salt Lake, Utah
Ingalls, J. Aaron ..... Reno, Nevada
Irvine, Thos. E. ..... Boulder, Colorado
Ish, Marvin E. ..... Goldfield, Nevada
Ivey, J. W. ..... Seattle, Washington
Jackling, D. C. (L) ..... Salt Lake City, Utah
Jacobs, A. L. ..... Salt Lake City, Utah
Jacobson, J. A. ..... Salt Lake City, Utah
Jacobson, Tony ..... Salt Lake City, Utah
James, Evan Shade ..... Denver, Colorado
Jameson, Wm. L. ..... Denver, Colorado
Jamison, W. W. ..... Greensburg, Pennsylvania
Janes, L. M. ..... Carterville, Missouri
Jansen, L. H. ..... Kansas City, Missouri
Jarrett, Geo. L. ..... Platteville, Wisconsin
Jarrett, John G. ..... Cuba City, Wisconsin
Jenson, J. B. ..... Salt Lake City, Utah
Johnson, C. J. ..... Spokane, Washington
Johnston, J. B. ..... Pittsburgh, Pennsylvania
Johnson, Chas. M. ..... Seattle, Washington
Johnston, Jesse K. ..... Charleroi, Pennsylvania
Johnson, Peter ..... Bisbee, Arizona

Johnson, J. B. ..... Denver, Colorado
Johnston, C. J. ..... Denver, Colorado
Jones, C. L. ..... Bisbee, Arizona
Jones, Lloyd Kenyon ..... Denver, Colorado
Jones, W. A. ..... Mineral Point, Wisconsin
Jordan, Irwin ..... Kansas City, Missouri
Joseph, Harry S. ..... Salt Lake City, Utah
Keady, L. Y. ..... Portland, Oregon
Keelyn, Dr. Jas. E. ..... Chicago, Illinois
Keith, David (L) ..... Salt Lake City, Utah
Kendrick, W. F. ..... Denver, Colorado
Kennedy Bros. ..... Salt Lake City, Utah
Kennedy, C. Justin ..... Seattle, Washington
Kennedy, John F. ..... Seattle, Washington
Kilbourne, E. C. ..... Seattle, Washington
King, Henry L. ..... Spokane, Washington
King, M. M. ..... Bisbee, Arizona
King, W. H. ..... Salt Lake, Utah
Kingsbury, J. T. ..... Salt Lake City, Utah
Kinkead, Jas. H. ..... Virginia City, Nevada
Kinney, M. J. ..... Portland, Oregon
Kinney, W. Z. ..... Silverton, Colorado
Kirby, John A. (L) ..... Salt Lake City, Utah
Kirkbride Coal Co. ..... Carnegie, Pennsylvania
Klinefelter, P. K. ..... Needles, California
Knight, Jesse (L) ..... Provo, Utah
Knight, J. Wm. (L) ..... Provo, Utah
Knowles, W. H. ..... Los Angeles, California
Koch, Walter A. ..... Denver, Colorado
Koonce, M. Egbert ..... Sharpsville, Pennsylvania
Kountz, Louis K. ..... Goldfield, Nevada
Krepps, J. E. ..... Los Angeles, California
Krull, Wm. F. C. ..... Boise, Idaho
Laidlaw, Andrew ..... Spokane, Washington
Laird, Geo. A. ..... Bisbee, Arizona
Lake, C. F. ..... Cardinal, Colorado
Lambourne, G. W. ..... Salt Lake City, Utah
Lammers, Theo. L. ..... Spokane, Washington
Lamont, E. M. ..... Canon City, Colorado
Lancaster, Henry M. ..... Wallace, Idaho
Lane, Chas., D. (L) ..... Brown's Valley, California
Lane, Martin ..... Philadelphia, Pennsylvania
Lang, H. H. ..... Cobalt, Ontario, Canada
Langford, J. E. ..... Salt Lake, Utah
Langford, F. M. ..... Salt Lake, Utah
Largent, J. A. ..... Rhyolite, Nevada
Larsen, Lewis P. ..... Metaline, Washington
Lawton, M. J. ..... Joplin, Missouri
Lee, Drachman & Pryce ..... Tucson, Arizona
Lee, J. C. ..... Portland, Oregon
Leftwich, Thos. J. ..... Ft. Collins, Colorado
Lehman, B. N. ..... Salt Lake, Utah
Lennox, William ..... Colorado Springs, Colorado
Leonard, J. M. ..... Joplin, Missouri
Leschen & Sons Rope Co. ..... Denver, Colorado
Lewandowski, J. A. ..... Brooklyn, New York
Lewis, S. J. ..... Needles, California
Lightcap, R. L. ..... Hazel Green, Wisconsin
Lingle, C. M. ..... Graceton, Pennsylvania
Linney, W. H. ..... Spokane, Washington
Lister, Thos. A. ..... Lordsburg, New Mexico
Locker, P. B. ..... Salt Lake, Utah
Logan, G. W. ..... Denver, Colorado

Lohmann, A. S. ..... Denver, Colorado
Lomiester, Frank ..... Leadville, Colorado
Long, Geo. W. ..... Bisbee, Arizona
Longhenry, Edw. G. ..... Benton, Wisconsin
Loose, C. E. ..... Provo, Utah
Lund, S. ..... Carson City, Nevada
Lucky Tiger Con. Gold Mining Co. ..... Kansas City, Missouri
Lyons, Jas. K. ..... Pittsburgh, Pennsylvania
Lundberg, Alex. ..... Bohemia, Oregon
Lynch, Col. J. K. ..... Butte, Montana
McAllister, Wm. H. ..... Marblemount, Washington
McBride, J. W. ..... Spokane, Washington
McCaffery, Richard S. ..... Salt Lake, Utah
McCaffery, Thos. ..... Brier Hill, Pennsylvania
McCarthy, E. T. ..... Baxter Springs, Kansas
McCarthy, Jas. F. ..... Wallace, Idaho
McCarthy, P. B. ..... Rapid City, South Dakota
McChrystal, J. H. ..... Salt Lake, Utah
McClelland, Geo. E. ..... Idaho Springs, Colorado
McClurg, J. A. ..... Denver, Colorado
McCone, Alex. J. ..... Reno, Nevada
McCormick, C. K. ..... New York City
McCormick, John B. ..... Georgeville, Pennsylvania
McCullough, A. ..... Tocoma, Washington
McDermott, Wm. ..... Tucson, Arizona
McDonald, D. C. ..... Ely, Nevada
McDonald, Ed ..... Carterville, Missouri
McDonald, J. R. ..... Rhyolite, Nevada
McGraw, John H. ..... Seattle, Washington
McIntire, A. W. ..... Seattle, Washington
McKay, Kay ..... Seattle, Washington
McKinnie, J. R. ..... Colorado Springs, Colorado
McKinnie, R. A. ..... Benton, Wisconsin
McLean, Henry A. ..... Mt. Vernon, Washington
McLean, M. H. ..... Morenci, Arizona
McMullan, John ..... Goldfield, Nevada
McMurray, John H. ..... Denver, Colorado
McNeil, John ..... Denver, Colorado
McNeish, J. S. ..... Bisbee, Arizona
McQuarrie, W. F. ..... Denver, Colorado
McWeeney, P. J. ..... Albany, New York
MacDonald, J. L. ..... Seattle, Washinton
McManus, I. ..... Cananea, Sonora, Mexico
MacVichie, Duncan (L) ..... Salt Lake, Utah
Maas, Walter L. ..... Salt Lake, Utah
Mabry, Bob ..... Spokane, Washington
Magnan, A. U. ..... Denver, Colorado
Maguire, Don ..... Ogden, Utah
Malcolmson, Jas. W. ..... Kansas City, Missouri
Mann, Fred A. ..... Joplin, Missouri
Markwell, J. Fred ..... Wallace, Idaho
Marshall-Ellis Inv. Co. ..... Denver, Colorado
Marshall, W. C. ..... Salt Lake, Utah
Martin, E. L. ..... Kansas City, Missouri
Martin, R. L. (L) ..... Denver, Colorado
Martineau, Lyman R. ..... Salt Lake, Utah
Mason Co., The E. B. ..... Bisbee, Arizona
Mason, L. C. ..... Independence, Kansas
Mattheissen & Hegeler Zinc Co. ..... La Salle, Illinois
Meese, Geo. C. ..... Joplin, Missouri
Menardi, J. B. ..... Reno, Nevada
Merk, W. W. ..... Spokane, Washington
Merrick, Charles ..... Seattle, Washington

Merrill, Jos. F. ..... Salt Lake City, Utah
Meyer, J. E. ..... Salt Lake, Utah
Middlekauff, E. D. ..... Plainfield, New Jersey
Millar. H. J. ..... Joplin, Missouri
Miller, Cyrus ..... Denver, Colorado
Miller, Fred A. ..... Laramie, Wyoming
Miller, F. B. ..... Greensburg, Pennsylvania
Miller, David ..... South Bend, Indiana
Miller, L. F. ..... Joplin, Missouri
Miller, W. A. ..... Denver, Colorado
Mills, W. F. R. ..... Denver, Colorado
Mine & Smelter Supply Co. ..... Salt Lake, Utah
Minor, C. E. ..... Cananea, Sonora, Mexico
Mitchell Co., The C. E. ..... Spokane, Washington
Mitchell, Mark ..... Chewelah, Washington
Mitchell, S. D. ..... Carthage, Missouri
Mitchell, W. H. ..... Seneca, Missouri
Moffat, D. H. (L) ..... Denver, Colorado
Monroe, Edward ..... Boulder, Colorado
Montague, John V. ..... Cananea, Sonora, Mexico
Moore, F. C. ..... Boise, Idaho
Moore, L. L. ..... Bisbee, Arizona
Moore, O. P. ..... Spokane, Washington
Moritz, Jacob ..... Salt Lake, Utah
Morris, Robert ..... Greensburg, Pennsylvania
Morrison, S. W. ..... Salt Lake, Utah
Morton, J. C. ..... Everett, Washington
Monongahela River Cons. Coal & Coke Co. .. Pittsburgh, Pennsylvania
Mosier, Frank ..... Carterville, Missouri
Mt. Baker & Shuksan Manufacturing Co. ..... Seattle, Washington
Mudd, Seeley W. ..... Los Angeles, California
Mueller, Dr. Victor F. ..... Milwaukee, Wisconsin
Muheim, Jas. M. ..... Bisbee, Arizona
Muir, Capt. Thos. K. ..... Portland, Oregon
Mullen, R. G. ..... Orogrande, New Mexico
Mulvey, M. E. ..... Salt Lake, Utah
Murray, J. J. ..... Orogrande, New Mexico
Myers, Clarence ..... Chehalis, Washington
Naquin, M. L. ..... Globe, Arizona
National Dev. Co. ..... Salt Lake, Utah
Natoma Dev. Co. ..... San Francisco, California
Nay, George ..... Needles, California
Neale, Geo. H. ..... Bisbee, Arizona
Nevada-Utah Dev. Co. ..... Salt Lake, Utah
Newcomb, B. M. ..... San Francisco, California
Newhouse, Sam'l (L) ..... Salt Lake, Utah
Newman, J. B. ..... Globe, Arizona
Newsander, Sam ..... Spokane, Washington
Newman, M. ..... Bisbee, Arizona
Nicholson, Samuel (L) ..... Leadville, Colorado
Nisbet, Wm. ..... Greensburg, Pennsylvania
Nix, Geo. M. ..... New York City
Noon, Thos. F. ..... Peru, Illinois
Norcross, C. A. ..... Reno, Nevada
Nordquist, John H. ..... Wallace, Idaho
North Coast Mining & Milling Co. ..... Tacoma, Washington
North, Chas. J. ..... Buffalo, New York
Northern Exploration Co. ..... Seattle, Washington
Northwest Mining News ..... Spokane, Washington
Norton, E. A. ..... Denver, Colorado
Null, H. H., Jr. ..... Grensburg, Pennsylvania
Oberndorfer, J. ..... Salt Lake, Utah
O'Brien, W. M. ..... Salt Lake, Utah

O'Connell, J. M. ..... Bisbee, Arizona
Olsen, M. E. ..... Salt Lake, Utah
Omo, J. T. ..... Spokane, Washington
Orem, W. C. ..... Salt Lake, Utah
Orient Coke Co. ..... Uniontown, Pennsylvania
Ovens, R. L. ..... Bisbee, Arizona
Overlock, C. A. ..... Douglas, Arizona
Overlock, L. J. ..... Bisbee, Arizona
Pack, Fred J. ..... Salt Lake City, Utah
Packer, H. G. ..... Joplin, Missouri
Paige, N., Jr. ..... Joplin, Missouri
Palace Drug Co. ..... Joplin, Missouri
Palmer, Edw. Vose ..... Denver, Colorado
Parker, E. W. ..... Washington, D. C.
Parker, M. B. ..... El Paso, Texas
Patrick, Fred L. ..... Columbus, Ohio
Pattison, B. M. ..... Bisbee, Arizona
Paul. Alfred ..... Douglas, Arizona
Payne, Dr. Henry Mace ..... Morgantown, West Virginia
Pearl, E. H. ..... Denver, Colorado
Pease, L. A. ..... Denver, Colorado
Peck, I. F. ..... Denver, Colorado
Pershing, A. N. ..... Greensburg, Pennsylvania
Phelps, A. H. ..... Denver, Colorado
Phillips, Arthur ..... Spokane, Washington
Phillips, S. B. ..... Spokane, Washington
Phillips, Wm. B. ..... Birmingham, Alabama
Phinney, Frederick V. ..... Wallace, Idaho
Phipps, S. A. ..... Cripple Creek, Colorado
Piatt & Heath Co. ..... Helena, Montana
Pickerell, Jas. E. ..... Spokane, Washington
Playter, C. C. ..... Joplin, Missouri
Playter, Franklin ..... Boston, Massachusetts
Playter, Geo. H. ..... Boston, Massachusetts
Plummer, Frank ..... Washington, D. C.
Pollard, Ira ..... Denver, Colorado
Pollock, Jas. A. ..... Salt Lake, Utah
Pompeney, Dr. Jos. ..... Frontenac, Kansas
Portland Gold M. Co. ..... Colorado Springs, Colorado
Powell, Col. L. W. ..... Bisbee, Arizona
Power, Christy & Co. ..... Goldfield, Nevada
Prather, H. R. ..... Joplin, Missouri
Preston, W. J. ..... Silver Cliff, Colorado
Prier, W. F. ..... Portland, Oregon
Quigley, E. D. ..... Denver, Colorado
Railton, A. B. ..... Spokane, Washington
Raddatz, E. J. ..... Salt Lake, Utah
Randolph, Epes (L) ..... Tucson, Arizona
Range, J. W. ..... Seattle, Washington
Rapp, Abram ..... Cripple Creek, Colorado
Ratliff, L. L. ..... Spokane, Washington
Ray, L. O. ..... Rhyolite, Nevada
Ratcliff, E. M. ..... Seattle, Washington
Rathman, Geo. H. ..... Salt Lake, Utah
Rawlins, J. L. ..... Salt Lake, Utah
Read, T. A. ..... Reno, Nevada
Read, W. C. ..... Bisbee, Arizona
Reese, Mrs. Clara (L) ..... Denver, Colorado
Reinert, E. G. (L) ..... Denver, Colorado
Reinert, Lewis A. ..... Denver, Colorado
Reinert, N. A. ..... Denver, Colorado
Reitler, Chas. W. ..... Denver, Colorado
Remington, W. H. ..... Seattle, Washington

Renshaw & Co. ..... Wallace, Idaho
Renshaw, W. E. ..... Idaho Springs, Colorado
Reppy, W. E. ..... Carl Junction, Missouri
Reynolds, Chas. A. ..... Sneffles, Colorado
Rice, John A. ..... El Paso, Texas
Rice, W. V. ..... Salt Lake, Utah
Richards, A. G. ..... Laramie, Wyoming
Richards, A. M. ..... Tacoma, Washington
Richards, Bartlett (L) ..... Ellsworth, Nebraska
Richards, J. H. (L) ..... Boise, Idaho
Richey, D. T. ..... Uniontown, Pennsylvania
Richmond, F. C. ..... Salt Lake City, Utah
Riebe, Ed ..... Redding, California
Ridge, W. R. ..... Reno, Nevada
Riedel, H. A. ..... Denver, Colorado
Riepe, Richard A. ..... Ely, Nevada
Riordan, D. M. ..... New York, New York
Risque, J. B. ..... Salt Lake City, Utah
Riter, Geo. W. ..... Salt Lake City, Utah
Robbins, Chas. P. ..... Spokane, Washington
Roberts, Wm. ..... Shultz, Arizona
Robertson, P. C. ..... Globe, Arizona
Robinson, W. J. ..... Joplin, Missouri
Rocks Coal & Coke Co. ..... Connelsville, Pennsylvania
Rodgers & Rogers ..... Chicago, Illinois
Romadka, Chas. A. ..... Douglas, Arizona
Rooklidge, Chas. D. ..... Salt Lake, Utah
Roscorla, N. B. ..... Soo, Ontario
Rose, Patrick ..... Globe, Arizona
Ross, Beauregard ..... Denver, Colorado
Rosskopf, J. X. ..... Spokane, Washington
Root, L. V. ..... Needles, California
Ross, J. B. ..... Silverton, Colorado
Rowse, W. A. C. ..... Seattle, Washington
Royce, W. K. ..... Rich Hill, Missouri
Royse, O. D. ..... Joplin, Missouri
Rummel, A. G. ..... Denver, Colorado
Sachs, Claude ..... Denver, Colorado
Salt Lake City Brewing Co. ..... Salt Lake, Utah
Samuel, R. L. ..... Cananea, Sonora, Mexico
Samuels, H. F. ..... Wallace, Idaho
Sanford, J. H. ..... Pittsburgh, Pennsylvania
Sapp, Wm. F. ..... Galena, Kansas
Saxman, C. W. (L) ..... Salt Lake, Utah
Scaife, H. L. ..... Clinton, South Carolina
Schader, Carl F. (L) ..... Los Angeles, California
Schermerhorn, E. B. ..... Galena, Kansas
Schrock, J. B. ..... Spokane, Washington
Schwan, Gustave ..... Murray, Utah
Seburn, Frank P. ..... Bagdad, California
Seeman, Henry I. ..... Denver, Colorado
Senior, George ..... Seattle, Washington
Sessions, E. A. ..... Portland, Oregon
Severance, Dr. A. E. ..... Seattle, Washington
Shane, W. H. ..... Bohemia, Oregon
Shanks, D. W. ..... Chihuahua, Mexico
Shannon, C. M. (L) ..... Los Angeles, California
Shattuck, L. C. ..... Bisbee, Arizona
Shearer, L. V. ..... Denver, Colorado
Shedden, J. S. ..... Spokane, Washington
Shenk, Wm. W. ..... Tacoma, Washington
Sherman, Gerald ..... Bisbee, Arizona
Shomon, J. ..... Galena, Kansas

Shropshire, A. S. J. ..... Douglas, Arizona
Siegwein, John ..... Weiser, Idaho
Sierra Madre Mining Co. ..... Kansas City, Missouri
Sigafoos, R. B. ..... Denver, Colorado
Sigel, F. L. ..... Denver, Colorado
Simmons, A. J. ..... Deadwood, South Dakota
Singleton, John ..... Log Angeles, California
Siren Gold M. & M. Co. ..... Greeley, Colorado
Skagit Queen Con. Mng. Co. ..... Seattle, Washington
Skeels, Alfred ..... Central City, Colorado
Skinner, C. ..... Denver, Colorado
Slaughter, W. J. ..... Douglas, Arizona
Smedley Steam Pump Co. ..... Dubuque, Iowa
Smith, Andrew Young ..... Pearce, Arizona
Smith, Claude W. ..... Goldfield, Nevada
Smith, Edmund ..... Valdez, Alaska
Smith, Edward ..... Boise, Idaho
Smith, E. G. ..... Irwin, Pennsylvania
Smith, Frank Clemes ..... Ontario, Canada, Sault Ste M.
Smith, Frank C. & Son ..... Denver, Colorado
Smith, Franklin W. ..... Bisbee, Arizona
Smith, Gale ..... Spokane, Washington
Smith, Geo. Otis ..... Washington, D. C.
Smith, Herbert E. ..... Spokane, Washington
Smith, Hoval C. ..... Bisbee, Arizona
Smith, James ..... Carterville, Missouri
Smith, J. F., Jr. ..... Salt Lake, Utah
Smith, Oscar J. ..... Reno, Nevada
Smith, Peter J. ..... Boise, Idaho
Snapp, F. T. ..... Joplin, Missouri
Snyder, F. J. ..... Cerro, Colorado, Arizona
Snyder, Willard F. ..... Salt Lake, Utah
South, Frank M. ..... Grants Pass, Oregon
Spalding, E. P. ..... Spokane, Washington
Speer, Alex. (L) ..... Near Congress Junction, Arizona
Spry, John C. (L) ..... Chicago, Illinois
Stacy, Albert ..... Douglas, Arizona
Standard, F. H. ..... Seattle, Washington
Standard, R. & D. Co. ..... Seattle, Washington
Star, Sol. ..... Deadwood, South Dakota
Star Electric Fuse Works ..... Wilkesbarre, Pennsylvania
Stearns-Rogers Manufacturing Co. ..... Denver, Colorado
Steele, J. L. ..... Landlock, Alaska
Steffner, S. W. ..... Portland, Oregon
Steinfeld, Albert ..... Tucson, Arizona
Stephens, John R. ..... Kansas City, Missouri
Stevenson, W. L. ..... Wadsworth, Nevada
Stewart, W. B. ..... Portland, Oregon
Stolzenbach, A. H. ..... Pittsburgh, Pennsylvania
Stone, H. E. ..... Douglas, Arizona
Stone, Col. W. B. ..... Galena, Kansas
Stone, W. A. ..... Uniontown, Pennsylvania
Storm, Lynn W. ..... Valdez, Alaska
Stoneroad, J. T. M. ..... Pittsburgh, Pennsylvania
Stowell, Wm. H. ..... Spokane, Washington
Straub, Frank ..... Denver, Colorado
Strevell & Paterson ..... Salt Lake, Utah
Suits, J. E. ..... Douglas, Arizona
Sultana-Arizona Copper Co. ..... Chicago, Illinois
Sultan, Harry ..... Globe, Arizona
Sumner, C. M. Co. ..... Reno, Nevada
Suter, G. B. ..... Denver, Colorado
Swart, W. G. ..... Denver, Colorado

Sweek, Alex. ..... Portland, Oregon
Sweet, Arthur A. ..... Salt Lake, Utah
Swift, J. V. ..... Benton, Wisconsin
Swindler, F. P. ..... Robinson, Utah
Talbert, High ..... Carterville, Missouri
Talmage, Dr. Jas. E. (L) ..... Salt Lake, Utah
Tarbell, W. S. ..... Denver, Colorado
Tarbet, A. H. ..... Salt Lake, Utah
Taylor, C. A. ..... Douglas, Arizona
Taylor, E. A. ..... Salt Lake, Utah
Taylor, H. S. ..... Spokane, Washington
Taylor, Jas. A. ..... El Paso, Texas
Taylor, Samuel A. ..... Pittsburgh, Pennsylvania
Tehaney, P. J. ..... Cananea, Sonora, Mexico
Temple, Geo. B. ..... Joplin, Missouri
Temple, W. O. ..... Denver, Colorado
Tener, G. E. ..... Pittsburgh, Pennsylvania
Terry, M. C. ..... Carterville, Missouri
Thatcher, G. W. ..... Rhyolite, Nevada
Thennes, J. N. ..... Spokane, Washington
Thomas, B. ..... Seattle, Washington
Thomas, Gomer ..... Salt Lake, Utah
Thompson, H. L. ..... Denver, Colorado
Thompson, J. V. ..... Uniontown, Pennsylvania
Tibbals, Wm. H. ..... Salt Lake, Utah
Tibbetts, Col. O. A. ..... Salt Lake, Utah
Tibbitt, Alton W. ..... Seattle, Washington
Timothy, Thos. ..... Baxter Springs, Kansas
Toombs, F. L. ..... Globe, Arizona
Tracy, T. H. (L) ..... Los Angeles, California
Travers, Richard P. ..... Chicago, Illinois
Treweek, Nicholas ..... Salt Lake, Utah
Trenton Iron Co. ..... Denver, Colorado
Triangle Mng. & Dev. Co. ..... Missoula, Montana
Turner, J. H. ..... Salt Lake, Utah
Turnagain Arm Gold Mining Co ..... Chicago, Illinois
Tuttle, Sidney ..... Janesville, Wisconsin
Underwood, Pierce ..... Chicago, Illinois
Union Iron Works ..... San Francisco, California
Utah-Arizona G. & C. M. Co. ..... Salt Lake, Utah
Utah Mine, The ..... Salt Lake, Utah
Venable, J. M. ..... Boise, Idaho
Vaile, Joel F. ..... Denver, Colorado
Vest, Col. T. J. ..... Galena, Kansas
Verner Coal & Coke Co. ..... Carnegie, Pennsylvania
Vigus, W. E. ..... Salt Lake, Utah
Vigneau, Jos. J. ..... Pittsburgh, Pennsylvania
Vincent, Maj. F. C. ..... Kansas City, Missouri
Voorhies, E. C. ..... Sutter Creek, California
Wadsworth, M. E. ..... Pittsburgh, Pennsylvania
Walden, Chas. ..... Victor, Colorado
Walker, C. J. ..... Everett, Washington
Walker, J. W. ..... Cherry Creek, Nevada
Walker, M. H. ..... Salt Lake, Utah
Wall, E. A. ..... Salt Lake, Utah
Wallace, H. Vincent ..... Nogales, Arizona
Wallace, I. W. ..... Bisbee, Arizona
Walsh, Jas. A. ..... Helena, Montana
Walsh, Thos. F. (L) ..... Littleton, Colorado
Walters, Wm. J. ..... Seattle, Washington
Wampler, W. W. ..... Webb City, Missouri
Ward, E. R. ..... Spokane, Washington
Wardrop, Jas. W. ..... Pittsburgh, Pennsylvania

Ward, John G. ..... Albany, New York
Ward, W. S. ..... Denver, Colorado
Warwick, A. W. ..... Choix, Sinaloa, Mexico
Watson, J. Frank ..... Portland, Oregon
Watson, J. W. ..... Omaha, Nebraska
Watts, L. H. ..... Baxter Springs, Kansas
Weaver, Geo. B. ..... Salt Lake, Utah
Webber, W. H. ..... Fairview, Nevada
Webb, I. A. ..... Deadwood, South Dakota
Weir, Thomas ..... Salt Lake, Utah
Welch, H. T. ..... San Jose, California
Wells, Hon. Heber M. ..... Salt Lake, Utah
Wells, Henry F. ..... Boston, Massachusetts
Welsford, J. V. ..... Cuba City, Wisconsin
Wendler, A. J. ..... Spokane, Washington
Wentling, J. D. ..... Greensburg, Pennsylvania
West, Hon. John H. ..... Needles, California
Westinghouse Machine Co. ..... Denver, Colorado
Wheeler, H. K. ..... Los Angeles, California
White, Arthur L. (L) ..... Lima, Ohio
White, E. L. ..... Denver, Colorado
White, F. Wallace (L) ..... Baker City, Oregon
White, Dr. I. C. (L) ..... Morgantown, West Virginia
White, J. J. ..... Denver, Colorado
Whitford, Dr. O. B. ..... Butte, Montana
Whyel, Geo. ..... Uniontown, Pennsylvania
Weir, Thomas ..... Salt Lake, Utah
Whyel, Harry ..... Uniontown, Pennsylvania
Wilber, F. A. ..... Joplin, Missouri
Wilcox, E. J. ..... Denver, Colorado
Williams, Clayton M. ..... Everett, Washington
Wright, M. P. ..... Los Angeles, California
Youghiogheny & Ohio Coal Co. ..... Pittsburgh, Pennsylvania
Williams, D. A. ..... Douglas, Arizona
Williams, E. W. ..... Denver, Colorado
Williamson, J. D. ..... Idaho Springs, Colorado
Wilson, Geo. B. ..... Searchlight, Nevada
Wilson, Leonard ..... Salt Lake, Utah
Wingfield, Geo. (L) ..... Goldfield, Nevada
Wire, Frank E. ..... Libertyville, Illinois
Wolfe, Leon B. ..... Lewisberg, Pennsylvania
Wolff, John R. ..... Boulder, Colorado
Wolfle, C. ..... Spokane, Washington
Wood, Ernest C. ..... Spokane, Washington
Wood, Guilford S. ..... Denver, Colorado
Wood, James ..... Douglas, Arizona
Wood, J. D. (L) ..... Salt Lake, Utah
Woodman, Parker ..... Bisbee, Arizona
Woods, F. M. ..... Victor, Colorado
Woodward, Felix J. ..... Denver, Colorado
Worthen, B. L. ..... Denver, Colorado
Worthington, W. H. ..... Douglas, Arizona
Wourms, John H. ..... Wallace, Idaho
Wright, E. M. ..... Union, Oregon
Wright, Jesse B. ..... Tucson, Arizona
Wright, H. J. ..... Douglas, Arizona
Wright, John M. (L) ..... San Francisco, California
Wright, Louis A. ..... Globe, Arizona
Woodson, W. H. ..... Globe, Arizona
Young, Lewis E. ..... Rolla, Missouri
Zang, Adolph J. ..... Denver, Colorado
Zimmerman, Ed. ..... Harrison, Arkansas

(L) Following names denotes life membership.

CHAIRMAN BUCKLEY: I know we shall all be pleased to hear from the gentleman who has crystalized the thought which has been embodied in the technologic branch of the United States Geological Survey. I take pleasure in introducing to you Dr. J. A. Holmes. (Applause.)

Mr. Holmes' address will be found on page 98, Part II., of this report.

SECRETARY CALLBREATH: Certificates for return railroad fare at a reduced rate will be received now, and the representatives of the railroad companies are here ready to pass upon such certificates as may be presented. I fear greatly that this will not be of avail because of the fact that many delegates failed to get the certificates when purchasing tickets, but if there are a sufficient number the reduced return fare will be granted; 100 in the Trunk Line territory, 1,000 in the Central Passenger Association territory. The Central Passenger Association includes the territory between here and Chicago; the Trunk Line territory eastward to New York. Those of you who have certificates will kindly file them at once, and we will endeavor to make it possible for you to get a return ticket at the reduced rate.

PRESIDENT RICHARDS: The question on the program for discussion this morning is "The Duties of the Federal and State Governments in Relation to the Mining Industry." We are fortunate in having with us Congressman W. F. Englebright, of Nevada City, California, who will lead in that discussion.

Congressman Englebright's paper will be found on page 255, Part II., of this report.

PRESIDENT RICHARDS: The next gentleman to take part in leading this discussion is Mr. George H. Harrison, Chief Inspector of Mines, Columbus, Ohio.

MR. GEORGE H. HARRISON, OF OHIO: Mr. Chairman, Members of the Congress and Visitors: Since receiving an invitation to attend and take part in this Congress my time has been almost exclusively occupied in connection with a commission appointed by the Governor of our state to revise and remodel the mining laws of the state, and to suggest such new laws and bills as in our minds needed enactment into law. Consequently, I have not had much time to go deeply into the matters that I think would interest the members of this assembly.

Mine inspectors as you know have to be very careful indeed of what they say; and they have to be still more careful about what they do not say. In order that there may be no misconstruction of anything that may be said, I deemed it necessary to note down a few of what I think are important matters to be taken into consideration in the advisability of state and federal co-operation in connection with the government of mines. With the exception of one instance I have not gone into details, but I feel that with reference to a great many questions all that is necessary for people to understand is the injury or the benefit that may be derived from those subjects.

Mr. Harrison's address will be found on page 57, Part II., of this report.

Secretary Callbreath read Resolution No. 16, as follows:

Resolution No. 16.

(By William Benton, of Wyoming.)

Resolved, That the American Mining Congress in convention assembled, petition the Congress of the United States, to pass a law transferring the public lands in the several states to the several states wherein such lands are situated, to be disposed of to citizens in a similar manner to the school lands in these respective states; thereby abolishing the abuses growing out of the present management of these lands under the present Forest Reserve and other laws.

MR. JOHN ROSS, CHIEF MINE INSPECTOR, WEST VIRGINIA: I would like to have the privilege of about five minutes to explain some of the conditions in regard to the State of West Virginia.

PRESIDENT RICHARDS: Will you postpone that until after the next address on the program, when the subject will be open for discussion?

MR. ROSS: I yield to the pleasure of the chairman.

PRESIDENT RICHARDS: We will now be privileged to hear from a gentleman whom you all know, on the subject under discussion, Senator Charles Dick, of Ohio.

Senator Dick's address will be found on page 18, Part II., of this report.

PRESIDENT RICHARDS: As I sat and listened to Senator Dick it became apparent to my mind that the aims of this organization were gradually penetrating the conscience of the American people; its mission is just commencing, as he has suggested, to co-operate with these governmental institutions in furnishing them with what the people of this country need from a mining standpoint.

Secretary Callbreath read Resolution No. 17, as follows:

Resolution No. 17.

(Introduced by A. H. Purdue, of Arkansas.)

Whereas, The American Mining Congress realizes the need of the dissemination of knowledge relating to subjects of mining and metallurgy, thus increasing the safety and efficiency of mine operations, and

Whereas, There is need of furthering the development and conservation of our mineral resources, and

Whereas, The several State Mining Schools or departments of mining in other state institutions are leaders in this work by technically training men for the mining profession, in most cases without adequate support, be it

Resolved, That the American Mining Congress pledges its influence toward securing federal aid to state mining schools or mining departments of other state institutions.

The secretary then read the following report:

PRELIMINARY REPORT OF THE NATIONAL FOREST SERVICE COMMITTEE.

Pittsburg, Pa., Dec. 4, 1908.

To the American Mining Congress:

Gentlemen: Your committee having under consideration specific complaints made to it in this open session of the Congress, to the effect that the National Forest Service has collected and insists upon collecting fees from miners for timber cut from ground which is open to mineral location within the national forests, and which timber is used exclusively in the development of miners' claims, respectfully submit that the Act of June 3, 1878, (20 Stat. 88) provides that "residents of the State of Colorado, or Nevada, or either of the Territories of New Mexico, Arizona, Utah, Wyoming, Dakota, Idaho or Montana, and all other mineral districts of the United States, shall be, and are hereby, authorized and permitted to fell and remove, for building, agricultural, mining, or other domestic purposes, any timber or other trees growing or being on the public lands, said lands being mineral, and not subject to entry under existing laws of the United States, except for mineral entry, in either of said states, territories or districts of which said citizens or persons may be at the time bona fide residents, subject to such rules and regulations as the Seretary of the Interior may prescribe for the protection of the timber and of the undergrowth growing upon such lands, and for other purposes."

Pending the complete work of investigation by your committee, it has been requested and urged by many members attending this session of the Congress, to recommend that the American Mining Congress petition the National Forest Service, now, and without further delay, to so modify its

rulings and regulations as to permit the free use of timber in accordance with the provisions, authority and spirit of the act referred to.

Your committee, therefore, recommends that favorable action be taken in this emergency to assist in promoting the welfare of the mineral industry,

Respectfully submitted,

(Signed) A. G. BROWNLEE,
Chairman.

PRESIDENT RICHARDS: What is your pleasure with the report the Secretary has just read?

MR. ROCKWELL: I move you, sir, that this report as read be accepted as the expression of this assembled congress in this far-reaching and most important matter, and that the expression of it be conveyed in no uncertain terms and by any method prescribed by the Chairman to the head of the Forest Service in Washington as quickly as it can be done.

MR. JOHN R. WOOD, OF COLORADO: I desire to second the motion.

PRESIDENT RICHARDS: It has been moved and seconded that this report be accepted and communicated in some appropriate manner to the Chief of the Forestry Service at Washington. Are you ready for the question?

The question was called for and being put was duly carried.

PRESIDENT RICHARDS: The secretary has a communication to read.

SECRETARY CALLBREATH: This is a communication from Mr. E. H. Harriman.

New York, Dec. 2, 1908.

James F. Callbreath, Jr., Secretary American Mining Congress, Westinghouse Bldg., Pittsburgh, Pa.:

Message received. I have just dictated a letter which will go by tonights mail. I am very sorry it will not be possible for me to be present, but I am sending memorandum of what I would probably say if present, and you can use it or not, as you choose. I greatly appreciate the compliment, but it is just impossible at this time for me to be present.

E. H. HARRIMAN.

Secretary Callbreath also read a telegram from John Hayes Hammond, Mining Engineer of New York, and a letter from Congressman Geo. F. Huff, chairman of the Committee on Mines and Mining, House of Representatives, Washington, as follows:

New York, Dec. 3rd, 1908.

Jas. F. Callbreath, Jr., Secretary American Mining Congress, 1211 Westinghouse Bldg., Pittsburgh, Pa.:

Have only just received notification from Governor of California of my appointment as delegate to represent California in Mining Congress. Regret very much my inability to be present. Would willingly make considerable sacrifice of my own business, but interests confided to me by other parties would be jeopardized by my absence just now. Wish Congress very successful meeting.

JOHN HAYES HAMMOND.

Washington, D. C., Nov. 27, 1908.

Mr. J. F. Callreath, Secretary the American Mining Congress, No. 1211 Westinghouse Building, Pittsburgh, Pennsylvania:

My Dear Mr. Callbreath—I am so overcrowded with matters here, it will not be possible for me to attend the sessions of the American Mining Congress at Pittsburg, December 2-5. I am heartily in accord with the movement, however, and bespeak for the meetings abundant success. Necessarily the inquiries, investigations and discussions which will arise

at this Congress will not only enlighten the mine owners, mining engineers, mine superintendents, foremen, fire bosses, etc., but will also prove of interest to the miners themselves, whose welfare is paramount.

The entire mining subject will undoubtedly be greatly benefited by the investigations which are now being conducted by the Government, and I desire to commend the work already done under the appropriation made by the Congress at its last session, looking to the prevention of the loss of life in mining operations.

I am strongly of the opinion that when the National Bureau of Mines is established, and I confidently believe it will be, its recommendations will be adopted by all the states in which mining laws are necessary and mining will then be conducted along the lines of safety, economy and conservation. Very truly yours,

GEO. F. HUFF.

SECRETARY CALLBREATH: I would like to say that the Program Committee intended to have one session entirely devoted to the transportation question as it applies to the mining industry, and it was intended that Mr. Harriman's address should be given at that time, also the address of Dr. Douglas and that of Mr. Dempster. In view of the fact that Mr. Harriman's address was not sent, as he had not prepared it, until so late that we were not able to put it on the program, and the further fact that Dr. Douglas was anxious to have his lecture illustrated which necessitated that it should be given at night, that plan had to be given up. But the paper of Mr. Harriman, which is in my possession, will be presented in the regular order at some time, I presume this afternoon, by the president, if it is in order. I think the delegates present would be very glad to hear that paper, and would like to know in advance of the time that it is to be presented.

The Congress thereupon adjourned for luncheon at the establishment of the H. J. Heinz Company.

FRIDAY, DECEMBER 4, 1908.

Afternoon Session.

PRESIDENT RICHARDS: The convention will be in order.

DOCTOR BUCKLEY: I wish to make another announcement this afternoon to the effect that the resolutions that were introduced this morning will be considered in the special committee this afternoon. The special committee is now in session in the basement of this building. I would suggest that any one who is interested in these resolutions and cares to be heard before the committee appear in that room, and he will be given an opportunity.

MR. JOHN G. ROSS, CHIEF DEPARTMENT OF MINES, WEST VIRVINIA: Mr. Chairman and Members of the American Mining Congress: I wish to be given your kind attention for a few moments this afternoon to set aright the state which I am representing in the Resolutions Committee, and as acting chief of the Department of Mines, on a point which I wish to bring to your attention, regarding a statement made by Mr. John Mitchell in an address before this body. I will say before beginning my address that Mr. Mitchell has my entire respect, and I am sure that he will be only too glad to be set right. Mr. Mitchell said, and I quote from the press report, which I believe is accurate, as I also so remember the statement myself, speaking of fatalities in West Virginia, "In West Virginia 12.35 men out of every 1,000 employed in the mines were killed." Now I have gone to the trouble to telegraph back to Charleston for the exact figures upon this, and taking the year ending June 30, 1908, which owing to certain unfortunate circumstances, not likely ever again to occur, has brought us high up in this list, the production of West Virginia for the year ending June 30, 1908, was 44,091,051 tons. This I believe is in short tons, as that was the information I asked for. Fatal accidents,

total, 625; non-fatal, 842. The employees were 60,397. This telegram is signed by F. L. Truslow, Clerk. I believe it to be accurate in all respects. Now, taking the total number of 625, by figuring it will be found this gives the number of 10.3 per thousand. If we subtract from this the number lost in one explosion of 361 we have then 264 fatal accidents. Using then the same number of men employed as a basis, with this smaller number, and omitting for the moment this one fatality, the figures are reduced to 4.37. This to be sure is high, but there are a great many conditions which we must not overlook in fairness to our state and to the operators; and last, but I hope not least, since it represents the sentiment of the whole of the state, and the law is supposed to represent the public sentiment of the state, the Department of Mines. Now, we have some difficulties to contend with in West Virginia on account of the character of our miners.

We have on the south Virginia, and my compliments to that state, which has no mining laws, I believe, or no inspection force. From the State of Virginia we got some 10,000, I believe, of colored people, who have not much knowledge of mining. A great many of them come from over in the neighborhood of Roanoke. We also have the Italians as well as other foreigners. We also have the conditions that are common where mines are new, while they are no worse than the mines in other states not so well known.

I will now, if I may beg your attention, inform you as to the method we take as to collecting information as to the accidents, in our state, to show that we exercise due care. All the operators are supplied either directly through the department or through the district mine inspectors, with blank accident forms. Immediately an accident occurs this blank must be filled out fully, and I think most of the operators here will say that we have asked them to do this, and that they have complied. This is signed by the superintendent, sent to the district mine inspector, of whom we have twelve, and signed by him. It is then sent to the Department of Mines and O. K.'ed by the department. In case the accident is fatal we not only do this, but we have what is known as a mine inspector's fatal accident report, which means that the district mine inspector visits the scene of the fatality and makes out a report upon it which is also sent to our office.

We also require of the district inspector that he have the superintendent of the hospitals furnish him with a list of the accidents to prevent overlooking of any one by carelessness. These are checked with those sent in; and if we do not get the other reports, or if they are mislaid in some way, we write and ask for the reports. Our reports of accidents are kept on file in the order of their occurrence, and we have a complete list at all times for the reference of any one who may wish it.

Through the farsightedness, we believe, of Mr. Paul, and Governor William M. O. Dawson, of West Virginia, and I believe that you will all agree that they are representative men of our country, we have, beginning with my appointment as assistant, issued a monthly bulletin. In this bulletin there is given a list of the accidents, a description of the same, and other information. In addition, there are careful tables compiled for the annual report.

I believe that these things will indicate to you that we are taking great care in West Virginia in all respects to insure that the miners shall receive consideration under all circumstances. I thank you, gentlemen.

GOVERNOR A. B. FLEMING, OF WEST VIRGINIA: Mr. Chairman: I would like to ask Mr. Ross this: The fatalities referred to by Mr. Mitchell must have been for the year 1907, not for the last year, from June 30, 1906, to June 30, 1907.

MR. ROSS: I have not made any calculations upon that basis, but I presume they were.

GOVERNOR FLEMING: I want to inquire of you whether or not, even if Mr. Mitchell should be correct in his percentage for the year 1907,

any such percentage can possibly maintain for the year 1908, at least up to this time, December?

MR. ROSS: I believe up to the present time we have had no explosions, or only one small explosion which I saw reported in the paper, of which I am not fully informed, but which was a very small accident, probably not injuring more than two or three men.

GOVERNOR FLEMING: If the president will allow me a word in this connection, for the sake of the reputation of the state we represent, I would like to say that my understanding is that we had two bad explosions in 1907 in the southern part of the state. I do not just remember the names of the mines now, Mr. Dixon's mine and the Stuart mines, in which there was something less than a hundred killed in each of those mines in the year 1907. There was also that terrible explosion at Monongah, on the 6th of December last year, in which 361 lost their lives. We cannot apologize for those explosions. We don't know why they occurred. We do not know what condition brought them about. We only know that because of these three—yes, and there was another one that year up near the Thomas mine—four explosions that year, which brought the fatality of West Virginia up, if Mr. Mitchell was correct, to that fearful figure. No such condition and no such accidents, no such explosions in magnitude or such fatalities had ever before occurred. Mr. Mitchell said it was getting worse and worse in the state. Whether it is true that the year 1907 was the worst in the state's history, I do not know. I do not know how many years it would take to make in the aggregate as many fatalities as we had in 1907, but we would like to have this Mining Congress bear in mind that in the year 1908, now about closed, we have had no explosions of any magnitude, but one, which we saw reported in the papers since we came here, perhaps as serious one as we have had this year, in which, if I remember correctly, three men lost their lives.

Now, if we are correct that there have been no such explosions this year, and I am told by the district mine inspector, sitting right here, than whom none are more competent, that his understanding is that the fatalities other than from explosions have been reduced in the year 1908 to about one-half, certainly that in his district, then West Virginia will not make a bad showing, and we hope she will never make such a showing as she made last year.

MR. H. H. LANG, OF ONTARIO, CANADA: Mr. President and Gentlemen: Owing to the fact that I am obliged to leave the sessions of your Congress now, owing to an engagement in New York tomorrow morning, I wish, before leaving, to tender my thanks to the American Mining Congress now assembled here for its kindness in extending invitations to mining districts in Canada for delegates to attend its assembly at this time.

Being the only delegate taking part in your assembly from Canada, I feel it my duty to in some way recognize the kindness not only of this Congress but of your nation in recognizing the country from which I come in this great meeting on this great subject.

Gentlemen, I believe that this is only the beginning. I wish also to say this that I believe that perhaps we have as great mineral resources in the country to the north of you as you have here, and we can hardly carry on this great industry independently of each other. We know today that mining men throughout your country are interested in Canada; Canadians are interested in the United States, and I believe this feeling will grow.

I thank you very much, and when I return it will be my pleasant duty to report to the Minister of Mines of our Province of the high character of this Congress.

PRESIDENT RICHARDS: I am sure we accept this as an expression of the kindly appreciation of any courtesy that may have been extended to the gentleman. We feel that we may rest assured that in the

future we will have the co-operation of the mining industries of Canada, and their help in solving some of these great problems.

For the program of this afternoon, Congressman Wilson being absent, the discussion of the question, "Problems of the Coal Industry," will be led by Mr. Frank M. Osborne, of Cleveland, Ohio.

Mr. Osborn's address will be found on page 66, Part II., of this report.

PRESIDENT RICHARDS: As I listened yesterday to the inspiring words of the gentleman who will now address you, he aroused in me a desire to hear him again. You will now have the privilege of listening to Mr. Dempster.

DOCTOR BUCKLEY: Before going ahead I would like to make a report from the Resolutions Committee.

PRESIDENT RICHARDS: The Resolutions Committee under our rules has the right of way when no one has the floor, so we will listen to the report.

DOCTOR BUCKLEY: The Committee on Resolutions has to report back Resolution No. 2 by H. H. Gregg, entitled, "Protection to Zinc Ore Miners," and respectfully recommends that the resolution do pass. The committee also reports back Resolution No. 5, introduced by George J. Bancroft, entitled, "Referring to the Marianna Mine Disaster."

This resolution is also reported back with the recommendation that the same do pass.

I would move you that the report of the committee on Resolution No. 2 be adopted.

The motion was seconded.

Secretary Callbreath read the resolution, and the report of the committee was adopted unanimously.

Secretary Callbreath read Resolution No. 5.

DOCTOR BUCKLEY: I move you that the recommendation of the committee on this resolution be adopted.

The motion was seconded and the resolution was adopted.

DR. BUCKLEY: The Resolutions Committee desires to report back several resolutions. Resolution No. 1 by W. P. Daniels. This resolution is referred back to the Congress, the committee considering that it has no power to act.

Resolution No. 4 by Colonel A. G. Brownlee, resolution regarding duty on lead. Your Committee on Resolutions reports this resolution back with the recommendation that it do pass.

Resolution No. 6, introduced by George J. Bancroft, the Committee on Resolutions reports this resolution back with the recommendation that it do pass. This Resolution is relative to the United States Geological Survey.

Resolution No. 8 by David B. Rushmore, regarding co-operation with the American Institute of Mining Engineers. This resolution is reported back by the committee with the recommendation that the same do pass.

I would move you that the report of the Committee on Resolution No. 1 by Mr. W. P. Daniels, be approved by the Congress.

Secretary Callbreath read Resolution No. 1.

MR. DEMPSTER: I second the motion.

PRESIDENT RICHARDS: It has been moved and seconded that the resolutions just read be adopted on the report of the committee.

MR. DANIELS: I would second the motion to adopt.

PRESIDENT RICHARDS: All in favor of the motion say aye; contrary, no.

The ayes seem to have it.

SECRETARY CALLBREATH: What was the motion?

PRESIDENT RICHARDS: Adopt, and appoint a committee as recommended.

DR. BUCKLEY: The motion was that the recommendation of the committe be adopted by this Congress. That is the motion that was presented by me.

PRESIDENT RICHARDS: I did not understand the motion, then. You have evidently voted under a misapprehension. The Chair has not yet declared the vote so that the matter may be cleared up.

"Your Committee on Resolutions having had under consideration Resolution No. 1, introduced by W. P. Daniels, do respectfully recommend that said resolution be referred back to the Congress, the committee considering that it has no power to act."

That is the recommendation of the Committee on Resolutions.

MR. DANIELS: Mr. President, that motion to adopt the recommendation of the committee does not recommend, but simply is a reference of the resolution back to this body. There is no recommendation, as I understand it, to adopt—there is no recommendation of the committee to act on it. Consequently, I make the point of order that the motion to adopt the recommendation of the committee, when there is no recommendation there, is out of order.

PRESIDENT RICHARDS: The Chair said that he stated the motion under a misapprehension.

MR. DANIELS: And I seconded it under a misapprehension. So I say there was no motion because we started anew, and it is now for the consideration of the Congress as to what it wishes to do with it. I now move the adoption of that resolution by this Congress, and if I can get a second, I will be glad to try in my feeble way, to explain why I believe it should be adopted.

MR. ROCKWELL: For the purpose of bringing it before the Congress, I second the motion.

PRESIDENT RICHARDS: You have heard the motion to adopt the resolution; are you ready for the question?

The question was called for.

MR. DANIELS: Mr. President, and Gentlemen of the Congress: The resolution is reported back to you by the committee because it believes it is without authority to act upon it—that, as I understand from the committee, this Congress has no authority and no right under its by-laws to adopt such a resolution, but that on the other hand the resolution must go to the members only, and that they only may say as to whether or not a committe shall be appointed to investigate the laws and report amendments.

The American Mining Congress is a slightly complex organization. It started out by being a purely voluntary organization. All of its members were delegates appointed by commercial and other organizations of that character and by municipal and state authorities. Under those laws and with its meetings at that time it was in a condition which the president described one year ago as being neither respected nor respectable. There have been some material steps taken to make it respectable, but unfortunately it is not yet in a good many places respected. It does not command the respect, in a good many places, of the people who ought to be members of the organization and contribute to its support.

First, if you will permit me, I will explain as briefly as I can, that the American Mining Congress was incorporated under the laws of Colorado, principally in order to enable it to hold property legally. That incorporation provides that only members may act upon certain matters. Those matters are the actual adoption of laws and the election of its officers.

May I ask the secretary how many members there are, including delegates, approximately.

SECRETARY CALLBREATH: There are more than 500 delegates registered. I suppose the number of members of the organization who are present is something like fifty.

MR. DANIELS: The secretary advises me that there are present at this Congress, including both members of the Congress and delegates appointed, something over 500. Out of that 500 there are only about ten per cent. who have authority to make the laws and to elect officers. Now,

I believe that is one thing that should be changed just as soon as conditions will make it practicable to make that change. But this resolution does not amend the law. It does not interfere in any way with the election of officers; it does not interfere in any way with the right that is exclusively with the members to change the law. It simply provides for a committee to be appointed by your president who shall examine its present laws, report to the next annual session, twelve months hence, such a revision of the laws as will be consistent with amendments already made by the members looking to the organization of local bodies by the national organization.

Now you gentlemen who are here as delegates are just as much and possibly a little more interested in that than I am interested as a member. I believe it is entirely within your province to say whether a committee of that character shall be appointed or not. The amendments to the law which are contemplated by the resolution at some time in the future will if adopted take away from you your membership as delegates. I believe with the gentleman who spoke a few moments ago, that you should be interested enough in the American Mining Congress to become members with us, and enjoy all the rights and privileges of members. Whether the time has yet arrived when that can be done for the best interests of the organization or not, I do not know. I am not prepared to say as to that, but I do believe that the time has arrived when it is up to the members of this Congress to consider as to whether or not they shall in the future take that step. It is a notorious fact in several of the past sessions of the Congress that delegates have attended and taken part in the business of the Congress who have had no more interest in mining than I have in the government of China. I do not believe that that is quite as it should be. It seems to me that a Mining Congress should be composed of those who are interested in that industry. It is also a notorious fact that any one who asks for it, it does not make any difference who it is, anyone who asks for it, can get an appointment—yes, he can get forty appointments as a delegate to this Congress. I venture to say that if I took the pains to do it and to start thirty days before the meeting of the Congress I could come here as a delegate from at least three-fourths of the states of these United States.

Now, we are pleased to have the delegates with us, those that represent the mining industry, but we want you with us a little closer, just as soon as it is practicable to come to that point. We want you, as the speaker said a while ago, to march up to the captain's office and sign your application and help us support the organization—make it a business organization. I believe that there can be no question as to the adoption of the resolution by this Congress if the question is settled in your minds as to whether or not we have the authority to adopt it here.

It seems to me that there ought not to be any question as to the authority because, as I have explained, and the president will bear me out in the statements that I have made as to the rights of members, it is true that this committee, if appointed, will have to do with the by-laws. It does not, however, amend them in any way. It simply considers the matter and makes a report to the next Congress, referring it to the members then to use their judgment as to whether or not its report shall be adopted and enacted into law. Now, if there is any doubt in regard to the right of this Congress and the right of the delegates to vote on this motion, I would like to have the matter made distinct, the point raised and decided in some way before an actual vote is taken on the resolution itself. Possibly the decision on that point as to the authority would make it entirely unnecessary to have any vote on the resolution itself. It seems to me, however, that it ought to be absolutely plain that you delegates who are directly interested in the outcome of the report of a committee, if it shall be appointed, should have something to say as to whether or not such an appointment should be made.

The only aim that I have in view is to build up this Mining Congress and to make of it a business organization which shall be not only respectble but which shall command the respect of every mining man, and every other man in the whole broad country. Why, it is less than thirty days ago, on the streets of my own home city, the city where the first mining Congress ever gathered, I asked a gentleman why he had not joined the Mining Congress. "Oh," he says, "the Mining Congress is a farce." He said, "If I want to be a member I can get appointed any time that I want to, and I can attend the Congress and take part in it just as much as you can, and what is the use of my joining, putting up my money to be a member when I can get a dozen appointments if I want them." I do not believe that there is a business man present who will not agree with me that we should do either the one thing or the other; we should either make this an organization with its own members exclusively transacting its business or we should do away with the membership and throw it open as it was originally to anyone that any mayor, any governor, any president of a chamber of commerce, or any president of any other commercial organization, may appoint as delegate to come here and sit and transact business.

I do not want to take up your time needlessly, but I am very much interested in the matter of the adoption of this resolution, and I sincerely trust that it will be adopted even if there be a question as to the right of this Congress with the delegates voting to appoint such a committee. You can at least express your wish upon the adoption or the rejection of the resolution, and I believe if you vote in favor of its adoption that the members, if they feel impelled to act upon it afterwards, will abide by your wish.

DR. BUCKLEY: On behalf of the Committee on Resolutions I simply desire to make a statement. This resolution requests the appointment of a committee that shall recommend back to the Congress an amendment to the constitution eliminating the delegate feature of this organization. I simply wish to say that there is a way to eliminate the delegate feature of this organization that is provided for by the constitution of this Congress. The section which governs that can be read by any member, or can be read by the secretary. I say there is a proper way to secure amendment to the constitution governing this feature if it is desired, and I do not think it is necessary or proper that a resolution should be introduced and referred to the Resolutions Committee, instructing them to appoint a committee to investigate and find out whether they shall propose an amendment eliminating the delegate feature.

I would say for the information of the gentleman who introduced this resolution that if this resolution had not been referred back to the Congress in this manner it would have been referred back with the recommendation that it do not pass. We do not question the right of this Congress to take any action that it may see fit. They can pass any kind of a resolution that they choose to pass. It is a body that governs itself, and it can pass any resolution; we do not question that whatever. But we believe that there is a proper method of securing such an amendment if it is desired by this Congress, and we believe that that method should be pursued.

SECRETARY CALLBREATH: Mr. Chairman, I do not desire to cut off this discussion and I am very anxious that it shall go on, but there are two gentlemen here with papers who ought to be heard at this time, and there are a number of gentlemen here who came specifically to hear these papers presented, and I therefore think this discussion should be postponed.

DR. BUCKLEY: The Resolutions Committee, if so desired, will give way to these gentlemen, in order that we may hear their papers.

PRESIDENT RICHARDS: To make it clear to you, it seems necessary that the chair make a ruling upon this question. This is a legally incorporated body, incorporated under the laws of the state of Colorado, and only members have anything to say about its legal organization. This question of a delegate system has come up at every session during the last six years. I know Mr. Daniels' good faith, and I know what he is striving to do. That is why I did not interrupt him before. But what has a delegate to do with the legal existence of a corporation when he is invited here more as a guest to take part in helping solve these questions, and to show to those delegates, if possible, that this Congress is worthy of their respect and confidence, in the hope that they will take hold and help us make this organization what it should be. (Applause.) Therefore the chair rules that this is not in order, and therefore it will be necessary, to raise it again, to take an appeal to this body.

MR. DANIELS: Mr. President, I desire now to give notice that I shall appeal from the decision and ask the floor on that appeal, after these gentlemen have been heard.

PRESIDENT RICHARDS: On yesterday we had on the program under the subject, "Conservation in the Coal Mining Industry," Mr. G. W. Traer, of Chicago, Illinois, who was not then with us, but he is now with us, and we will have the privilege of listening to him.

Mr. Traer's paper will be found on page 152, Part II., of this report.

PRESIDENT RICHARDS: This paper and the one that is just to follow I believe justifies our gathering here. I know we will have a treat in the paper that is now to be given by Mr. White, "The Barren Zone of the Northern Appalachian Coal Field and Its Relation to Pittsburg's Industries," by Dr. I. C. White, State Geologist, Morgantown, West Virginia.

DR. I. C. WHITE, OF WEST VIRGINIA: I will take a moment or two of your time to explain these diagrams. The Appalachian coal field, as most of you know, is a long boot-shaped area, beginning in Northern Pennsylvania and extending southward parallel to the Alleghany mountains, and in fact in the Alleghanies through Western Pennsylvania, West Virginia, Ohio, Kentucky, Tennessee and Alabama. It was formerly supposed that this central area would be richer than any other portion of the Appalachian field. A few years ago I discovered that the great Pittsburg bed after coming down through Northern West Virginia into this central zone, which it underlies at a depth of four to a thousand feet below the surface, suddenly disappears. It might be of interest to tell you how I learned that fact.

For many years I was connected with the university at Morgantown —many think I am still, although I have not been so connected since 1892. During trips with my classes in the field—because I always believe in taking the boys out to get close to nature—I found that on the Burning Springs which crosses the B. & O. railroad 30 miles east of Parkersburg, there was no Pittsburg coal. And then later I learned by inspection of bore holes near Upper Glades, in Webster county, that what little coal was there was of not much importance.

I probably saved one man a large amount of money, and it may interest you to know just the way. The late Senator Camden knew of the building of the Western railroad long before anyone else did, and supposing, as everyone else did at that time, that this entire area was filled with Pittsburg coal, he, like any other citizen, thought it would be a good thing to take up some coal land there, and the farmers did not know or did not suspect that they had coal, or if they had, it was so deep that they thought it would never be of any value, and they were glad to auction their land at the low sum of $5.00 per acre. Mr. Camden had taken up about 100,000 acres along the line of that railway. I happened to be on the train with him one day, and he asked me about this investment. Now, as I thought that the coal disappeared somewhere be-

tween Wheeling and Eureka, below Sistersville, where that great bridge crosses the Ohio river, I told him that he ought to be careful, that $5,000 while to many meant so much was not a great deal of money to him; and that while oil wells had reported coal near the line where he was taking the land up, they did not drill for coal, they were after oil, and hence it might be possible there was no coal there of value, so I advised him to put down a bore hole with diamond drill, and take out a core and see what there was there. The senator being a level-headed business man at once acted on the suggestion. He had a diamond drill hole put down near Pine Grove, within two miles of where the oil-well borings had reported five feet of coal. To his surprise, when they got down to where the Pittsburg bed should be, he found three feet of black slate and two feet of coal. He was not consulting me at the time, and thought it could not possibly be the Pittsburg coal, and went 200 feet lower and still no coal. The origin of the name "Pine Grove" is a ridge there, and it was thought possible that the coal had locally thinned away on the crest of that ridge, so he concluded to go a couple of miles below, near the mouth of Piney, where an oil well had reported six feet of coal, and to go so close to that boring that there could not be any question concerning the test. There they put down another hole, and there they got one foot 11 inches of coal and a little black slate. Of course he cancelled the leases. Subsequently the oil well people drilled all over that country, and I was enabled by taking advantage of the borings—hundred of them —to delimit the area of the Pittsburg coal.

So much for the Pittsburg coal, which has been on my map ever since my map was constructed. It was supposed that the Alleghany coal and the Clarion coal would furnish the richest, or a very rich strata in this central portion of the Appalachian field. To my surprise, on examining the drillings, test holes of every description, where I have seen the sand pumping, the results have been that I find that over vast areas in this central part of the state of West Virginia, and also southwestern Pennsylvania, there are no Alleghany coals. They are gone. And I repeat here that there is no coal under Pittsburg. It was formerly supposed there was plenty of it. One of your great coal men, Captain Brown, who I presume at one time thought he would steal a march on the rest of you, came slyly on the Monongahela river—I do not know that he did it slyly, except that there was never any noise made about it—and sank a shaft to find the Freeport coals, and he told me himself that he did not find it. He went on lower, but did not find any coal. There have been several borings put down here right under Pittsburg, of which we have very accurate records, and there is practically no coal, or what you would call commercial coal here now. So this great barren zone begins north of your city; as you go under the surface it soon disappears, and I find that the same thing is true not only here in Pennsylvania but clear across West Virginia, as represented by the blue line on the map; so that beyond the point I now indicate the Allegheny coals are represented only by thin one or two-foot beds, and in insignificant layers.

Again, the same thing happens to the Pocahontas series. You know the Pocahontas series of coal in its extent northward or along the river, is simply a wedge 20 or 30 miles wide that underlies all the coal measures. They are older even that the Northern Pottsville and lower part of the Pottsville series, and they fade away before they get into Pennsylvania, except in the anthracite region, as they dip down under the Allegheny series. Even the formation of rocks passes out. As the Kanawha series and the Allegheny series pass under water level, up in the mountains, up where we can see them, they are thick and valuable; when they pass down into this basin which I now indicate they disappear. The same thing happens when we come in from Ohio passing down over the Ohio side of the Appalachian field, they also disappear. Hence we are led to some philosophy concerning the accumulation of these coals.

Many of you will ask, why is it that they disappear in toward the center of this place, where we should have the thickest coal, where on the old theory the older geologists, as to the central portion of this area —I have myself before I knew much about it—dilated on that great wealth of fuel that would be found in the center of this Appalachian valley. But it is not there, and you see what an immense hole it makes in this Northern Appalachian field. The reason and the philosophy of it I think is that our coal measures accumulated fringes around the great central basin covered with water; the water was too deep in this area for vegetation to get a foothold, and hence as we come successively toward it, first the lower formations, then higher and higher, as the distance increased toward the center, until they all disappeared, because this area appears to have been covered with water too deep for vegetation to secure a foothold.

Now that is the matter that I felt it a duty to call your attention to because it is not generally known. Even Mr. Camden, probably the best posted man in the country generally on the amount of coal in the country, who made an estimate which was submitted at the White House conference in May, has not taken it into account in making up his estimates of the amount of coal in West Virginia, Pennsylvania and Ohio, and figures that that entire area, representing thousands of square miles, held as much coal as any other portion of the field.

It have a paper here to every word of which I wish you to listen, because it affects not only Pittsburg, to which I have called especial attention, but Chicago; and Chicago, Cleveland, Buffalo, Erie and these great manufacturing cities which cluster around this northern end of the Appalachian basin, get their metallurgical coal and coke from this field, so it is very important. With this preliminary statement I will read you this paper so as to be brief.

Dr. White's paper will be found on page 166, Part II., of this report.

PRESIDENT RICHARDS: We have learned enough this afternoon to keep us thinking for a long time.

This closes the program of which I have charge this afternoon, and the convention will stand adjourned until 8:00 o'clock.

FRIDAY, DECEMBER 4, 1908.

Evening Session.

The Congress was called to order by President Richards.

Secretary Callbreath read resolution No. 18.

Resolution No. 18.

(Introduced by W. F. R. Mills of Colorado.)

Whereas, The Federal Government has established at Pittsburg, Pa., laboratories for the testing of the coal and structural materials of the United States, and for the study of explosives, of mine accidents and the conditions of safety in coal mining, and

Whereas, The proper conclusion of these investigations is vital to the safety of the men employed in our mines and to the prosperity of the mineral industry, and

Whereas, Similar and extended investigations are necessary to the proper development and the wise conservation of our metalliferous deposits as well, now, therefore, be it

Resolved, That the American Mining Congress expresses its hearty approval of the steps so far taken and the work now under way, and extends its thanks to the Honorable Secretary of the Interior and to the officers of the U. S. Geological Survey for this auspicious beginning of the great national work in which it is peculiarly interested, and further, be it

Resolved, That we pledge our support collectively and individually to these investigations and respectfully urge Congress to extend their scope to our other great mineral resources.

Secretary Callbreath read resolution No. 19.

Resolution No. 19.

(Introduced by John G. Ross, of West Virginia.)

Whereas, Certain mines in the coal mining states have been visited by severe explosions, and

Whereas, The impression is abroad that it is impossible to decide as to the elements which have caused the disasters in the coal mines referred to; in our judgment there are but two elements found in these mines which cause these explosions, and these two elements are coal dust and gas, which singly or in conjunction have produced these violent explosions. We recognize the IMMEDIATE NECESSITY of stating clearly our opinion as to the remedies to be applied to prevent a recurrence of these terrible disasters, and

Whereas, Many authorities recommend that the roof, sides and bottom of all dry and dusty sections of the mines be kept thoroughly wet by systematic watering; that a record shall be kept by the mine foreman or some competent person appointed by him of the amount of water used, the time expended, the sections watered and the dates on which such labors were performed; that this record shall at all times be kept open for examination by the inspector, and that at the end of each month a copy of the same be sent to the district inspector accompanied by a sworn statement as to its accuracy, and

Whereas, We believe if a strict compliance be had with the present statutes of the state, many of the dangers arising from the liberation of explosive gas will be eliminated, and

Whereas, We realize the danger of depending upon brattice in gassy mines to ventilate the working places at a distance in excess of 60 to 100 feet between break-throughs, which distance is already prescribed by many of the states. Our reasons for especially mentioning this precaution are that by the excessive use of brattice it is impossible to maintain adequate ventilation to dilute, render harmless, and carry away explosive gas or gases, and further, this practice endangers the loss of the air current entirely in the working place by falls of roof and by tearing down of the brattice by cars or mules or by careless miners, now, therefore, be it

Resolved, That the practical details of mine operation, the violations of which cause these disasters, must be given serious attention IMMEDIATELY, and

Resolved, That competent men, properly qualified, shall be placed in charge of our mines, as mine foremen, assistant mine foremen and fire bosses, and

Resolved, That this can be best brought about by placing upon the statute books a law conferring authority upon the proper official to conduct examinations, as a basis for the issuance of certificates of competency to mine foremen, assistant mine foremen and fire bosses, in whose hands rest the safety of these miners and the preservation of property, and be it

Resolved further, That we recommend authority be given to revoke these certificates for sufficient cause, which shall be fully set forth in the statute.

DR. BUCKLEY: The Resolutions Committee reported back this afternoon resolution No. 6, by George J. Bancroft, which is a resolution regarding the United States Geological Survey. I would move that the report of the committee, which recommends its adoption, be accepted by the Congress.

The motion was seconded.

Secretary Callbreath read the resolution, and Dr. Buckley's motion was duly put and carried unanimously.

DR. BUCKLEY: Resolution No. 8, introuced by David B. Rushmore, entitled "Regarding Co-operation With the American Institute of Mining Engineers, the Committee on Resolutions respectfully recommends that said resolution do pass.

I would move you, Mr. President, the adoption of the report of the committee on this resolution.

Secretary Callbreath read the resolution, and the motion prevailed unanimously.

DR. BUCKLEY: Resolution No. 10, by George M. Esterly, entitled "Relating to the Title of Coal Lands in Alaska," the Committee on Resolutions do respectfully recommend that said resolution do pass.

I would move you, Mr. President, that the report of the committee upon this resolution be adopted.

Secretary Callbreath read the resolution, and the motion prevailed unanimously.

DR. BUCKLEY: Resolution No. 4, introduced by Colonel A. G. Brownlee, entitled "Regarding Duty on Lead," the Committee on Resolutions do respectfully recommend that said resolution do pass.

Mr. President, I move you that the report of the committee on this resolution be adopted.

Secretary Callbreath read the resolution.

PRESIDENT RICHARDS: You have heard the motion; are you ready for the question? If there is no objection, the recommendation of the committee will stand adopted. Hearing none it is so ordered.

DR. BUCKLEY: Resolution No. 17, introduced by Dr. A. H. Purdue, "Regarding State Mining Schools," the Committee on Resolutions do respectfully recommend that said resolution do pass.

Mr. President, I would move you that the report of the committee on this resolution be adopted.

Secretary Callbreath read the resolution.

PRESIDENT RICHARDS: You have heard the motion on the resolution just read. Are you ready for the question? If there is no objection the recommendation of the committee will be adopted. Hearing none, it is so ordered.

DR. BUCKLEY: Resolution No. 7, introduced by David B. Rushmore, entitled "Committee for Standardization of Electric Practice in Mines," the Committee on Resolutions do respectfully recommend that said resolution do pass.

Mr. President, I would move you that the report of the committee on this resolution be adopted.

Secretary Callbreath read the resolution.

PRESIDENT RICHARDS: You have heard the motion in reference to the resolution just read. Are you ready for the question? If there is no objection, the recommendation of the committee will be adopted. Hearing none, it is so ordered.

PRESIDENT RICHARDS: This brings us up to the program of the evening. The subject is "Arbitration as a Factor in the Mining Industry." The leader in this discussion is Thomas L. Lewis, President of the United Mine Workers of America, of Bridgeport, Ohio.

Mr. Lewis address will be found on page 235, Part II., of this report.

MR. JOHN H. WALKER, OF ILLINOIS: I would like to make a statement with reference to some remarks made by Mr. Traer, of the Illinois Coal Operators' Association, this afternoon.

Some of our members wanted to leave on the train and they would like to have it before they leave.

Mr. Chairman, it is in justice to our organization as well as for the benefit of some of the workers in our industry in other portions of the country who are trying to get legislation on the subjects that were

mentioned, that we desire to have this statement made. Mr. Traer today made the statement that the miners in Illinois had by the U. M. W. of A. got the industry in that shape that so far as men going into the mines was concerned, they would be in the same position as a man who wanted to get into the oil business would be if the directors of the Standard Oil Company had the determining of those who went into that industry. Mr. Chairman, it may be some information to the members of this Congress to know that Mr. Traer, who is president of the Illinois Coal Operators' Association, along with Mr. Bent, who was secretary of that organization, agreed in sub-committee to that law itself, with myself and another member of our organization acting on that committee for our organization, before it was presented to the two boards, and that the entire executive board of the Illinois Coal Operators' Association agreed to that law as it stands on the books today before it was presented to the legislature of that state.

According to his own figures as presented to this body, last year's statistics show an increase of $10,000,000.00 in the output of coal from the state of Illinois, and the miners only worked an average of 196 days during that year. I want to ask if that looks as if the law was hindering the coal operators from getting a sufficient supply of miners to work in their mines. And during the year just passed, or the time that estimate was made from, I believe if the actual figures were here we would find that we did not work one-half of the actual working days that we could have operated. During that time there has been an increase of 10,000 miners in the state of Illinois. I want to ask if that looks as if this law was restricting the supply of labor in that industry in our state. Mr. Chairman, I do not know of a man in the coal industry that I have more respect for or a higher regard for than I have for Glen Trear, but, as I told him today, I never heard him in my life make such an unfair statement as he did on that subject to this Congress today.

With reference to the bonus placed on the miners because of the shooting of coal from the solid in that state and for the use of powder in a reckless manner, I want to say he had reference to the shot-firing law in the same statement, it is evident that as a result of that shot-firing law in the state of Illinois for the first year we were freer from accident than usual as compared with previous years. There was 50 per cent decrease in the loss of life in accidents in the industry in our state from accidents due to the careless or accidental misuse of powder.

Since that time in the comparative statistics there is shown for somewhere in the neighborhood of four years, a reduction of 26 per cent of accidents and deaths from that source, notwithstanding that that percentage estimate is based without taking into consideration that there has been 15,000 more miners in the state since that time, so that the original estimate of 50 per cent reduction in accidents and loss of life from powder would apply all the way through, as the result of that law.

When the shot-firing law was made the operators succeeded in getting a limitation placed upon the amount of powder that made necessary shot-firers, all under two pounds of powder can be shot by the miners themselves. Coal operators over an entire district where they have machines in the mines and use less than two pounds of powder, came to our joint executive meeting, asking that they be given shot-firers in their mines. Their coming of themselves is plain evidence that they realize the benefit which it has been in saving of life and limb. And in that way I want to say without desiring to reflect on those operators that the cost for liability damage suits was their main reason for coming in there and asking that they get shot-firers in that particular district.

There were many reasons why coal has been shot and is being shot in the manner it is at the present time in our state.

Prior to the establishment of our organization we had what is known as the screen coal system; the operators sold the powder and the coal that went through an inch and a quarter screen he got for nothing. He

made a profit on the powder, he got all the coal that went through that screen for nothing, and he hired miners who would use the most powder and give him the most fine coal. And when the first agreement was made it was based on that condition of mining, and it is with bad grace that any operator comes before a body with a knowledge of the facts in the case and tries to lead them to believe that the miners of that state are responsible for this condition, because there are no men who fought harder against the establishment of that condition than the practical miners who were in that state in advance of the operators themselves.

Mr. Traer may have done it innocently or for the purpose of a joke, I cannot say, but it puts the miners in a wrong position in the matter, if we allowed his statement to go uncorrected, and if this is putting the operators right to their dislike they have only Mr. Traer to blame for it. (Applause.)

PRESIDENT RICHARDS: An adjourned meeting of the members of the Congress, from the Schenley Hotel last evening, will be held at 11 o'clock tomorrow in this hall.

We have with us Mr. J. G. Beard, representing the National Association of Mine Directors, who will make a short statement if he is present.

MR. J. G. BEARD, SCRANTON, PA.: Mr. Chairman and Members of the American Mining Congress: I have asked for a few moments in behalf of our association, of our institute of the Mine Inspectors of America to extend to this Congress our felicitation and our feelings of assurance of co-operation with the American Mining Congress in the work that they have undertaken to do. It may not be known to all of us, in fact it was not known to the members of our own institute until recently that so many of our members were members of this Congress. There were some 50 or 60, possibly 70 of our members present, and in a short, brief meeting this morning they wanted to make this statement that we have drawn up. You have not heard from these men as you might have expected to have heard if they were present in such a body, for one particular reason which I think all will appreciate. The mine inspector perhaps above everybody else is a conservative man. He is a man that says very little in public, and he is very cautious about what he does say, and for this reason our mine inspectors have not been heard from as they might have been expected to have been in a congress like this. But in a meeting this morning they expressed the desire to present a statement to this Congress.

Some of the statements incorporated in this brief expression may seem to be rather strong, especially in regard to the causes of mine explosions. It was not the idea or the intention of our committee and the members of our institute in any way to make the assertion that we understood the cause of the Marianna explosion. Of course that would be wholly premature; we know nothing as to those causes. We know nothing of the explosion as yet, but the statement has been made so strong day before yesterday and again today that these explosions are a mystery and that they cannot be understood, that what occurs in an explosion of dust and gas is so much of a mystery that we may expect it at any time and may never expect to be free from the dread results, those statements were made so strong that we did not consider after three thoughtful and careful discussions they should be allowed to stand without being refuted. I thank you, Mr. Chairman, and beg to present the following:

STATEMENT OF THE MINE INSPECTORS' INSTITUTE OF AMERICA.

The Mine Inspectors' Institute of the U. S. A. present as the invited guests of the American Mining Congress now assembled at Pittsburg, Pa., desire to thank the officers and members of the Congress for their

cordial invitation to be present and confer with them on matters of signal concern to both of these organizations.

While the American Mining Congress is a body of mining men organized for the purpose of considering questions relating to the welfare and safety of mining operations and using their efforts to secure remedial legislation both in state and federal governments.

The Mine Inspectors' Institute of America is a body composed of all the mine inspectors of the United States, organized for the purpose of conferring together, and thus securing the mutual aid and assistance of all mining states, in ascertaining not only the causes that produce mine explosions, but what measures can be adopted in and about mines to increase the security of the mine and the safety of those who work therein.

The members of the Institute wish to take this opportunity of asserting with emphasis, their belief individually and collectively, as confirmed by the life-long experience of its oldest members engaged in the daily inspection of mines, that the causes of mine explosions are known, and that it is possible by the united efforts of all those who have the best interest of the miner at heart, to greatly reduce the liability to explosion of gas and dust in mines, and eventually make the occupation of the miner as safe as the average of other trades and callings.

In the opinion of the members of our Institute, it would be a grave error to allow the statement to stand unrebuked by this Congress—that the causes of mine explosions are not known. It is the business and concern of all mining men and particularly of our Institute and of this Congress to ascertain such causes. The reports of the mine inspectors of our several states made subsequent to the terrible disasters that have occurred from time to time in this country, which reports have been widely published, have defined the causes and in many instances have formed the basis of remedial measures; but in all cases these published reports of the inspectors made after careful and painstaking investigations in the mine have resulted in re-establishing the confidence of the miner and mining men in general that there is no hidden mystery in these dread happenings that has escaped human knowledge and experience.

The Institute only expresses the feelings that arise in every human heart when it extends to the bereaved families and friends of the victims of the late lamentable Marianna disaster, the sympathy of every member of the Institute.

The Mine Inspectors' Institute of the United States of America desires to extend to the American Mining Congress their thanks and assurance of their hearty co-operation in the great work we have undertaken to do.

(Signed) TOM MOSES, Ill.
THOS. K. ADAMS, Pa.
JOS. WILLIAMS, Pa.
THOS. H. PRICE, Pa.
W. H. TURNER, Ohio.
C. J. NORWOOD, Ky.
J. A. SPRINGER, W. Va.
PETER HANRATY, Okla.
J. G. BEARD, Secy. of Com. Pa.

PRESIDENT RICHARDS: Before we adjourn the secretary wants to call attention to some things that are on his table.

SECRETARY CALLBREATH: I have three very important and very interesting papers, but I personally could not possibly read them to you tonight. The first is a paper by Judge George F. Gray, of Delaware, upon the question of arbitration, and as much of it will appear in the public press, and as all of it will be printed in the proceedings, I would like to ask your permission to read it by title and have it appear in the proceedings.

Judge Gray's paper will be found on page 230, Part II.. of this report.

The next paper is upon the same subject by Honorable Carroll D. Wright, for many years United States Labor Commissioner and now the president of Clark College of Worcester, Mass. This is a very interesting paper, and I would like to ask for it the same privilege.

Mr. Wright's paper will be found on page 52, Part II., of this report.

The third is a paper upon transportation as it affects the mining industry, by Edward H. Harriman. This is a very lengthy, a very exhaustive and a very interesting paper, but it will be impossible for me, at least, to read it tonight, and as much of this paper will appear in the newspapers and as all of it will be published in a very short time in our proceedings, I beg to ask that this also may be read by title and printed in the proceedings.

Mr. Harriman's paper will be found on page 38, Part II., of this report.

The Congress then adjourned until Saturday, December 5, 1908, at 10 o'clock a. m.

SATURDAY, DECEMBER 5, 1908.

Morning Session.

The Congress was called to order by President Richards.

SECRETARY CALLBREATH: Mr. President, Resolution No. 20 has been introduced and gone to the Committee on Resolutions without reading, the chairman insisting on having the resolution at once in order that the committee might have time to give it consideration.

PRESIDENT RICHARDS: We had better read it.

SECRETARY CALLBREATH: The committee has the only copy which was prepared.

We have a communication which I know will be of particular interest to those who are present, and I am sorry there are not more here to get this word of encouragement from the men who today stands pre-eminent in the United States, President-elect William H. Taft.

PRESIDENT-ELECT TAFT'S LETTER.

Hot Springs, Va., November 30, 1908.

My Dear Sir:

I regret exceedingly my inability to accept your invitation to attend and address the American Mining Congress at its approaching session in Pittsburg. I am glad of an opportunity, however, to express my interest in the important work which the Mining Congress is doing in behalf of the mining industry and my desire to encourage and to cooperate in this work in every possible way.

The mining industry in this country, which is second only to agriculture in its contribution to the national wealth, which furnishes more than 65 per cent of the total freight traffic of the country, and which employs more than a million men in its difficult and dangerous tasks, deserves all the assistance which this government can render it. No country is so rich in those resources which make for great and permanent wealth as is the United States; but this condition of itself has helped develop a national habit of waste in the use of our forests, our soils, our minerals, and other resources. Fortunately, however, the public conscience of the country is awakening to both the loss of life and waste of materials in all our industries; and we must see to it that the movement is guided wisely and carried forward to success.

Very sincerely yours,

WM. H. TAFT.

Mr. James F. Callbreath, Jr., Secretary, American Mining Congress, Pittsburg, Pa.

SECRETARY CALLBREATH: Along the line of much of the discussions of this session, an editorial which came to the office this morning, published in the Daily Mining Record of Denver, Colorado, being so far distant from the center of coal production, seems to be one of timely interest, and one which should be made a part of the records of the proceedings of this Congress. To that end and with your permission I will read this short editorial:

The Plea of the Dead.

It is an interesting, though tragic, coincidence that the American Mining Congress enters its session at Pittsburg at the very time of the frightful disaster at the Marianna coal mines, a few miles away. Perhaps the foremost subject before the gathering is that of providing means to increase the safety of mine workers. And there is a touch of irony in the circumstance that the government representatives are present at Pittsburg to attend the dedication of the experimental station, which has been established to discover safeguards against explosions in coal mines. The one hundred or more miners, whose lives have just been sacrificed to the needs of society, will send their memories to that dedication, to plead more eloquently than all the scientific utterances that may be there addressed.

This is the time of the year when coal bills are presented to the householder, and the average citizen understands that comfort has its expenses. To be reminded, at the same time, that the cost of his own comfort does not cover the price of horror, is for him to wonder why he regularly burns the bodies of suffocated miners in his home. If he does so wonder, we doubt not that he suggests his own willingness, if that be necessary, to add something to his fuel outlay for the betterment of the conditions under which he is benefited.

There is no other problem before the country that demands such prompt attack as this. There is scarcely any sacrifice that the nation should not make to satisfy the pleas of humanity. Not only does it fall within the province of the coal-mining states, whose representatives are in special conference upon this subject during the present week, to enact effective legislative measures, but the national government should be continually urged to increase its vigilance and expenditures in this direction.

PRESIDENT RICHARDS: Before calling on the gentlemen who are to address us under the regular program as announced on yesterday afternoon the special order of the meeting of the members of the Congress for electing new directors is at 11 o'clock, so that any one will have the right to call that up as a part of the special order. In our regular program we have first on the list "The Mineral Resources of Virginia," by Mr. E. A. Schubert, of Roanoke, Virginia.

MR. SCHUBERT: Mr. President and Gentlemen of the American Mining Congress, and Ladies: Before entering on the delivery of my paper I desire to show you a copy of a work entitled "The Mineral Resources of Virginia," by Doctor Thomas L. Watson. Any person desiring a copy of this, by giving me his name and address will be supplied with the same free of charge. I believe an examination of this publication will demonstrate that the Old Dominion has a book which sets out its possibilities equal if not superior to any work of the kind ever published in any of the states. It is for this purpose that I ask you to accept it with the compliments of Governor Swanson of the State of Virginia if you so desire. (Applause.) I further desire to say that I am willing to be one of twenty gentlemen of this convention to guarantee to the American Mining Congress five members at $25.00 each for the ensuing year. (Applause.)

I further desire to say that there never in my history has been another deliberative body of so much profound thought and wherein such timely suggestions have been offered as before this convention in the

City of Pittsburg. I regret, however, and I am saying this without suggestion from any one, that we should in convening this convention in the City of Pittsburg receive criticisms from one of the leading mining journals of the United States for bringing this Congress east of the Mississippi river. I am sorry that such an editorial was published, and I only trust that it was a misunderstanding and was not intentional. I might add further that what I have to say in this paper may provoke some emphatic criticism.

I am not infallible; I am only human, but the statements that I am here to present to you are based on years of exploratory work in the Old Dominion and Southern States. In conclusion, Mr. President, I desire to extend to the American Mining Congress an invitation to meet at some point in the State of Virginia in the year 1910, two years hence, and we will give you a royal welcome.

Mr. Schubert's paper will be found on page 124, Part II., of this report.

SECRETARY CALLBREATH: Mr. S. Duffield Mitchell, of Carthage, Missouri, is not here, but has sent his paper to me, entitled "A Tariff Duty on Zinc Ores," and I ask that it be read by title and be made a part of the record of the Congress.

This motion was seconded, and it was so ordered.

Mr. Mitchell's paper will be found on page 212, Part II., of this report.

MR. A. W. ESTES, OF ARKANSAS: I have a paper entitled "The Mineral Resources of Arkansas." I just want to say that inasmuch as the time for the special order of business is here, and inasmuch as there can be no dispute as to the variety of the mineral resources of Arkansas as being as great of those of Virginia or those of any other state in the Union, I ask that my paper be read by title.

It was so ordered.

Mr. Estes' paper will be found on page 146, Part II., of this report.

A similar order was made as to paper by Prof. Robert H. Bradford, Professor of Mining, Utah State University, Salt Lake City, Utah, entitled "Utah's New Development in Mining."

Mr. Bradford's paper will be found on page 101, Part II., of this report.

A similar order was made as to paper by Dr. Herman Fleck, Professor of Chemistry, Colorado School of Mines, Golden, Colorado, entitled "The New Mining Industry—The Rare Metals."

Dr. Fleck's paper will be found on page 204, Part II., of this report.

A similar order was made as to paper by Mr. W. A. Thomas, Commercial Engineer, Westinghouse Electric and Manufacturing Company, entitled "Electricity as Applied to Mining."

Mr. Thomas' paper will be found on page 196, Part II., of this report.

MR. STEELE: I have a matter that I would like to bring to the attention of this meeting and that is in regard to one of the committees that was appointed from which we have heard no report. It is a very important committee and is entitled the Committee on Alaskan Mining Law. Let me say that this committee is one of the most important committees, especially to the people of the Northwest. It is urgent I believe, coming from the suggestions of the Secretary of the Interior that they might report to this Congress and that this Congress might recommend to the Secretary of the Interior or other departments such laws as might be necessary for the development of the mining industry in Alaska. I would like, Mr. Chairman, that this committee be continued as a committee, with a change in the personnel of the committee, for the reason that we believe we have just as competent men within the limits of Alaska to suggest changes in the mining law as they have in Seattle or elsewhere. We believe that we know what we want. We believe that we can ask the Congress of the United States or this American Mining Congress to assist us better than our neighbors can ask it for us. There-

fore, sir, I would move you that this present committee be discharged and that a committee composed of Alaskans on Alaska Mining Law be appointed by the President of this Congress, if I can get a second.

MR. M. E. KOONIE, OF ALASKA: I wish to second the motion which has just been made.

PRESIDENT RICHARDS: A motion has just been made and seconded that the present committee be discharged and the president of this organization appoint a new committee of citizens of Alaska. Are you ready for the question?

MR. WOODS: I would like to know if that committee that it is desired to discharge has any report to make to this Congress.

PRESIDENT RICHARDS: Mr. Secretary, has the Committee on Alaskan Laws any report to make?

SECRETARY CALLBREATH: The committee appointed a sub-committee, and that sub-committee went over the matter and made a recommendation, but instead of sending it to the committee appointed by this Congress, they sent it direct to the Secretary of the Congress. I immediately wrote back to the chairman of the committee and called his attention to the fact that this report had been made to me and telling him that the report must go through his committee in order to be recognized by the Congress. I have had no response to that request and there is no report before this Congress.

MR. WOODS: I am in favor of this motion personally, but I thought it would be courtesy to hear from the committee if there was any report first.

PRESIDENT RICHARDS: Is there any further discussion?

(No response.)

The motion was then put, and carried.

DR. BUCKLEY: The Resolutions Committee report back resolution No. 19, introduced by John G. Ross, and your committee recommends that said resolution be spread upon the proceedings of the Congress as an expression of the views of the officials of West Virginia on the origin of and protection against mine disasters.

Mr. President, I would move that the recommendation of the committee be adopted.

The secretary read the resolution.

PRESIDENT RICHARDS: If there is no objection the recommendation of the committee will be declared adopted. Hearing none, it is so ordered.

DR. BUCKLEY: The Resolutions Committee report back resolutions No. 15, No. 11, No. 12 and No. 3, and recommend that they be referred to a special committee of three to be appointed by the President of the American Mining Congress, with the request that these resolutions be considered carefully and report made to the officers of the Congress and to each member and delegate of the Eleventh Annual Session of the American Mining Congress.

Resolution No. 15, by David G. Ross of Illinois, refers to compensation given men who are injured within the mines; No. 11 is by H. Baumann, and refers to electric shot firing, and No. 12 is by F. Wilson Henderson, and it refers to a committee to be appointed to act in conjunction with the United States Geological survey with regard to the testing demonstrations of different systems of ventilation. No. 3 is by Peter Hanraty on mine accident. All of these resolutions refer to the same subject, practically.

Mr. President, I move you that the recommendation of this committee be adopted.

PRESIDENT RICHARDS: You have heard the motion. Is there any discussion. If there is no objection it will be declared that the recommendation of the committee is adopted. Hearing none, it is so ordered.

DR. BUCKLEY: Resolution No. 18, introduced by W. F. R. Mills, refers to the testing plant, the Resolutions Committee reports this resolution back with the recommendation that it do pass.

Mr. President, I move you that the recommendation of this committee be adopted.

The secretary read the resolution.

PRESIDENT RICHARDS: You have heard the recommendation of the committee on resolutions. Are you ready for the question? If there is no objection the recommendation will be adopted. Hearing none, it is so ordered.

DR. BUCKLEY: Resolution No. 20, introduced by Fred C. Keighley, regarding Water Storage and Reforestration. Your Committee on Resolutions respectfully recommend that said resolution be referred to the Committee on Forestry.

Mr. President, I would move you that the recommendation of the committee be adopted.

Secretary Callbreath read the resolution.

MR. BANCROFT: Was the motion that the report of the Resolutions Committee be adopted?

PRESIDENT RICHARDS: What was the report?

DR. BUCKLEY: That it be referred to the Committee on Forestry.

PRESIDENT RICHARDS: You have heard the recommendation of the Committee on Resolutions. Any remarks? Hearing none, the report of the committee is declared adopted.

DR. BUCKLEY: Resolution No. 9, by J. G. McHenry. This resolution will be read by the secretary. Your Committee on Resolutions, to which this resolution was referred, recommends that it be referred to the Board of Directors with a request that a committee of five be appointed, to which committee this resolution shall be referred with instructions to report an equitable plan to carry out the spirit and intent of this resolution in a practical manner, such committee to report at the earliest possible time.

Mr. President, I would move you that the report of the committee on this resolution be adopted.

Secretary Callbreath read the resolution.

PRESIDENT RICHARDS: You have heard the recommendations of the Committee on Resolutions; any remarks? Hearing none, the recommendations of the Committee on Resolutions will be declared adopted.

DR. BUCKLEY: Resolution No. 13, by W. P. Daniels. This resolution refers to mining frauds. Your Committee on Resolutions recommend that this be referred to a committee on protection against mining frauds, and urge its speedy consideration. I believe the bill submitted with this resolution contains many valuable suggestions, which should in a proper legal manner be prepared for submission to the several states.

Mr. President, I move you that the report of the committee on this resolution be adopted.

PRESIDENT RICHARDS: You have heard the report of the committee; any remarks?

MR. DANIELS: I do not rise to oppose the adoption of the report of the committee. I am a little disappointed in the report, because I dislike a further postponement of action by the Congress on this question. The Congress has had this matter under consideration for three years now, and has accomplished practically nothing. This bill will be presented to the next session of the Colorado legislature, and an effort will be made to have it enacted into law by that state. I very much regret that it cannot be before that legislature with the unanimous endorsement of this congress. With that brief explanation I second the motion to adopt the report of the committee.

PRESIDENT RICHARDS: You have heard the motion. Are you ready for the question? If there is no objection the report of the committee will be declared adopted. Hearing none, it is so ordered.

SENATOR DICK: I move the adoption of the following resolution:

Resolution of Thanks.

(Introduced by Senator Charles Dick of Ohio.)

Resolved, That the American Mining Congress in session assembled, hereby extends its grateful thanks to the city of Pittsburg, through its mayor; to the Chamber of Commerce, through its president; to Mr. Samuel A. Taylor, chairman of the local executive committee; to Mr. John W. Boileau, Mr. W. G. Wilkins, Dr. M. E. Wadsworth, Mr. W. R. Woodford, Mr. John B. Jones and Mr. J. W. Wardrop, members of the Executive Committee, and Chairmen of the several sub-committtes, and to their associates; to the public press of the city; to the President, Judge J. H. Richards, the Secretary, Mr. Jas. F. Callbreath, and the associate officers of the American Mining Congress, and to all those who have so ably contributed to the successful outcome and results of this, the Eleventh Annual Meeting of the American Mining Congress.

The resolution was unanimously adopted.

I have requested Dr. Holmes to make a brief statement about the visit of the Congress to the government station for mine investigation, which we visited Thursday afternoon.

DR. HOLMES: Mr. President and Gentlemen: I do not feel that I should like to lose the opportunity before this meeting adjourns, because I have unfortunately not been able to attend all the sessions owing to the necessity of attending the sessions of another body meeting here at the same time on a related subject. I want to make perfectly clear that the experiment station is here for the investigation of mines, explosives and for the purpose of benefiting the mining industries of this country in every possible way; and I want the members of the Congress who are here representing those mining industries to feel that this station belongs to them.

It will be necessary for us to have a considerable amount of time at that station for conducting real investigations. For that purpose it is the desire of the management that on about four days in the week, the work of the station will go on uninterrupted by the necessity of making tests for different people under different conditions, but we propose to set aside two days, Friday and Saturday, of every week, at which time the operators in different parts of the country can bring samples of dust from their mines and the explosives they are using, bring their mine foremen and mine superintendents and managers, and come themselves, and make tests or co-operate in making tests in which they are particularly interested. We will put on double shifts and work day and night if it is necessary for the accomplishment of this purpose.

One other suggestion, Mr. Chairman, and that is concerning mine prospecting on public lands:

Every member of this Congress appreciates what is a growing source of friction throughout a large part of the West with reference to prospecting in the forest reserves and on public lands. I am glad that this agitation has brought out the sources and cause of that friction. I am sure that the Secretary of the Interior and the Chief of the Forest Service are anxious to do away with that friction; and I believe that on request to do so by the President of this oganization the Secretary of the Interior would be willing to appoint an impartial commission of mining men who will represent no special interests, but represent the mining interests and the public interests of this country, to go through the West and discuss this situation with the mining men and submit to him (the Secretary) recommendations as to measures which will probably safeguard all these interests thoroughly.

I believe the Secretary of the Interior will act upon this suggestion to the satisfaction of all the mining men of that great western country. I believe, therefore, that this agitation and a request of that kind, coming

from our president, will lead to permanent positive good, not only for the present but for the future. All of us who are interested in mining want the mining interests of this country properly recognized and properly taken care of, and properly fostered; and I assure you that the Secretary of the Interior is anxious to co-operate with you in the accomplishment of this important purpose. (Applause.)

MR. LUCE, OF NEVADA: I would like to ask when the members or committee will meet to consider the question of selecting the place for the next meeting.

PRESIDENT RICHARDS: When this organization first started it was composed entirely of a delegate system, and those delegates received invitations from various sections of the country where they wanted to hold the next session. After this organization was incorporated the by-laws provided that the board of directors should determine the place of holding the next session. But as we had a very large delegate attendance, in order that they might feel that they had been treated fairly, the custom has been for years to receive an invitation at large in the session and let the delegates and members vote as to their recommendation to the board of directors where the next session should be held. But I am in this position now, no action having been taken, as provided by the by-laws, that the board of directors determine the place of holding the next session. The recommendation of the last session was to hold it at Columbus, Ohio. There seems to have been a misunderstanding in some way about that, and the directors decided to hold it at Pittsburg. Under the by-laws the board of directors determine the place of holding the next session. The board of directors will meet at the Colonial hotel at 2:30 o'clock this afternoon for organization. At 3:30 we will be glad to receive anyone who desires to have the next session of this Congress held in his locality.

This concludes all that we have to present to this Congress for its consideration at this session.

MR. DANIELS: I was absent from the Congress at the time the partial report of the Forestry Committee was presented, and I have been informed that the report was simply adopted, but that no provision was made for its execution; is that correct?

SECRETARY CALLBREATH: I think the report carried its own recommendation, but I have not examined it.

MR. DANIELS: I wish, then, Mr. President, to tender my resignation as a member of the Forestry Committee in order that I may without embarrassment make a motion later.

PRESIDENT RICHARDS: I do not know that I have the power to accept the resignation.

MR. DANIELS: I was appointed by you.

PRESIDENT RICHARDS: During the session, I have limited powers.

MR. DANIELS: There will be no further meeting of the Congress after we adjourn now.

PRESIDENT RICHARDS: No. I do not believe you will be very much embarrassed if you will get at that question right.

MR. DANIELS: The idea is, the committee has barely begun its investigations. It took up one particular matter from which the mining industry in the West, metal miners, are suffering daily, and it made a report upon that one particular matter. I believe, however, in order to make that report effective that this Congress should take some definite action in regard to carrying out the recommendation of the committee. The embarrassment that I feel in regard to it is that it seems to me that the proper committee to carry out that recommendation is the Forestry Committee. I really do not like to make a motion to send myself to interview Mr. Pinchot, and if necessary to interview the Secretary of the Interior and Agriculture.

PRESIDENT RICHARDS: I think Mr. Brownlee is the chairman of the committee and that perhaps we ought to send a telegram to Mr. Pinchot. I will say this, that I expect to leave tonight for Washington, and will meet him there personally on Monday.

COLONEL BROWNLEE: Mr. President, when that report was submitted, it carried with it a recommendation that the Congress petition the National Forest Service to enforce the act of June 3, 1878, whereby the miner could secure the free use of timber on lands open to mineral location. That was adopted by the Congress. It seems to me that all that is necessary is to present those recommendations to the forest service and notify them that the Congress adopted them. And I think that all that could be done under the circumstances, and if that is done, I have no doubt whatever but what it will receive the consideration of the Forest Service.

PRESIDENT RICHARDS: Are there any other matters you desire to present before adjournment?

(No further matters were presented.)

PRESIDENT RICHARDS: This closes our work so far as the officers have anything to suggest.

SENATOR DICK: I move the convention adjourn sine die.

The motion was seconded and was duly carried, and the Congress stood adjourned.

MINUTES OF ANNUAL MEETING OF MEMBERS.

A meeting of the members of the American Mining Congress was held at the Hotel Schenley, Pittsburg, Pa., on Thursday evening, December 3, 1908, pursuant to notice duly mailed to each member more than thirty days prior to said meeting, a copy of which notice follows:

"Notice of Annual Meeting.

"A meeting of the members of the American Mining Congress is hereby called to meet at Pittsburg, Pa., on Thursday, December 3, 1908, at 8 o'clock p. m., for the election of three Directors to hold office for three years, to succeed E. A. Colburn, Alexander Dempster and L. W. Powell, whose terms of office as Directors expire, and for the transaction of such other business as may properly be brought before said meeting.

"By order of the Executive Committee,

"J. H. RICHARDS, President.

"JAS. F. CALLBREATH, JR., Secretary.

"Denver, Colo."

The meeting was called to order by Vice-President E. R. Buckley.

The minutes of the special meeting of members held at Denver, Colorado, on July 15, 1908, for the purpose of voting upon amendments to the By-Laws, were read, excepting certain parts thereof, the reading of which was by special order dispensed with, and upon motion duly seconded and carried, the minutes were approved.

The Secretary presented his report of the receipts and expenses, as follows:

FINANCIAL STATEMENT OF SECRETARY FOR PERIOD NOVEMBER 1, 1907, TO NOVEMBER 1, 1908.

Receipts.

Cash on hand November 1, 1907	$ 193.12
Received from Life Memberships	1,230.00
Received from Annual Memberships	3,315.00
Received from Annual Dues	4,742.80
Joplin Convention fund	3,000.00
Voluntary contribution, Jesse Knight, Provo, Utah	100.00
Total receipts	$12,580.92

Disbursements.

(Covered by Vouchers Nos. 396 to 592½, inclusive, excepting No. 420, not used.)

Secretary's salary	$ 3,600.00
Stenographers' salaries	1,410.30
Organizers' salaries	1,497.76
Office expense	167.76
Printing and Stationery	942.47
Postage	590.00
Secretary's traveling expenses	1,437.35
(Including $780.85 expense at Washington, D. C., on behalf of Bill for National Bureau of Mines and expense in connection with Joplin Convention.)	
Traveling expenses of organizers	1,822.30
Miscellaneous expense, exchange, etc	502.24
Refunds to local branches, Bisbee, Seattle and Spokane	365.50
Total disbursements	$12,335.68
Total receipts	12,580.92
Total disbursements	12,335.68
Balance on hand November 1, 1908	$ 245.24

Respectfully submitted,

JAS. F. CALLBREATH, JR., Secretary.

The report of the Auditing Committee was then read by the Secretary, as follows:

Denver, Colo., Nov. 1, 1908.

We, the undersigned, members of the Auditing Committee of the American Mining Congress, beg to report that the books of the Secretary show as follows:

Cash on hand last report	$ 193.12
Receipts as follows:—	
Life Memberships	1,230.00
Annual Memberships	3,315.00
Annual Dues	4,742.80
Contributions	3,100.00
Total receipts	$12,580.92

Disbursements, covered by Vouchers Nos. 396 to 592½, inclusive, excepting No. 420, not used.

Secretary's salary	$ 3,600.00
Stenographers' salaries	1,410.30
Organizers' salaries	1,497.76
Office expense	167.76
Printing and Stationery	942.47
Postage	590.00
Secretary's traveling expenses	1,437.35
Representatives' traveling expenses	1,822.30
Miscellaneous expense, exchange, etc	502.24
Refunds	365.50
Total disbursements	$12,335.68
Total receipts	12,580.92
Total disbursements	12,335.68
Balance on hand, November 1, 1908	$ 245.24

(Signed)

E. G. REINERT,
W. E. BRIDGMAN,
Members Auditing Committee.

It was thereupon duly moved that the Secretary's report and the report of the Auditing Committee be approved and placed on file, said motion being seconded, was duly put and carried.

MR. DANIELS: I desire to reintroduce here at this meeting of members the resolution presented by me which was read in general session, for your action. I wish, however, to say that in my opinion that resolution should be acted upon by the Congress itself, and it was because of that opinion that it was introduced in the Congress originally instead of at this meeting of members. It is a resolution that looks to the entire change in the personnel of the Congress itself in its membership. It looks to such a change in the by-laws as shall provide for membership only, and not for any representation by delegates appointed by commercial, municipal or state authorities. It does not look to the adoption of the laws themselves, but it simply provides for a committee to consider such a revision to report to the next meeting of the Congress.

I am still of the opinion that that resolution should properly go before the Congress, and not be acted upon by this meeting. I believe that the gentlemen who are members of that Congress by virtue of being appointed delegates have as much interest and should have something to say in regard to the disposition of a resolution of that character, but in order that it may not be finally defeated by a technicality, that it may not tomorrow when it shall be probably reported back by the committee, be defeated entirely by the fact that this meeting has been held, I introduce that resolution here tonight and move its adoption.

The resolution provides for the appointment by the President of the Congress of a committee of three, who shall take up the matter of a revision of our laws, and such changes in our laws as shall do away entirely with delegate representation in the Congress, that will provide for local and state organizations to be subordinate to the national organization, which shall consist entirely of representatives from such subordinate organizations, with an expression that in justice to those who have heretofore under our present by-laws, and who may hereafter before they may be changed, become life members, should be continued as members of the general Congress, with full rights of membership. I believe that is a fair and reasonable and complete explanation of the tenor of the resolution, and if the gentlemen who are present here, members of the Congress, believe with me that it should go before the general meeting of the Congress and be acted upon by the Congress and not by this meeting of members, I shall be entirely satisfied if action is not taken here to-night, and it is left for the Congress to pass upon it.

If, however, there is a majority opinion that it is for the members alone, I want to do the best that I possibly can to have the resolution adopted, because I believe it means the absolute life of this organization, and I believe that the time has nearly come, if it has not quite arrived, when the American Mining Congress should cast off its swaddling clothes, and should make for itself a permanent and real business organization and provide for representative membership in the national Congress that has control over the subordinate bodies.

MR. DEMPSTER: I would like to inquire if there is a constitution and by-laws governing this society.

SECRETARY CALLBREATH: Yes, sir.

MR. DEMPSTER: By what means are any modifications or amendments to be made, under that constitution and by-laws?

MR. RICHARDS: Mr. Chairman, if you will permit me I would make an explanation. I have attended every session of this Congress except one. In its inception, the Congress was known as the International Mining Congress, which had simply a representative or delegate system, with no definite purpose or plan for the future; something on the basis of the Trans-Mississippi Commercial Congress. That went along for several

years until we held our session at Butte, Montana. As the result of a controversy there, I was selected to preside over the Congress the next year, and the experiences at that time set me to thinking as to a definite purpose for the future. With the assistance of Dr. Buckley, who was very largely responsible, we devised a definite plan which was presented at Deadwood, South Dakota, at our next session there, and we there organized, and I was instructed as President of the Congress to incorporate the Congress as an incorporated body with a membership; but we felt it was best to still hold the delegate system until, as suggested by Mr. Daniels, a time should come when we should grow out of our swaddling clothes. That delegate system has been very useful in giving enthusiasm at least and energy to our annal sessions, and it has prevented us to some extent from getting into ruts.

We are incorporated under the laws of the State of Colorado, and we are governed by the incorporation laws of that state and the by-laws were drawn with reference to the statutes under which we were organized and incorporated. We have continued the delegate system thus far, and have found it quite useful because it spreads a larger interest over the nation. Now we are trying to nationalize this organization, as will be very clearly indicated to you when I have delivered what is called the President's annual address, at which time I hope to place before you in terms that are as clear as possible the purposes and aims, or some of them, at least, of this organization.

I do not want to do anything that would prevent the growth of this organization in a proper manner, but in my judgment, and I have been President of this organization now for six consecutive years, I doubt the wisdom of a change at this time, at least until we see the effect of this meeting in the eastern part of this country. My impression is that the Eastern people are coming to understand us a little better, and when they do we will at least command their respect if not their entire confidence. It is a matter of growth. My difficulty as a presiding officer over this organization for the last six years has been, to use a homely phrase, to hold the breeching tightly upon this organization, that it might not be too radical. It is a question of growth. We must first make ourselves respectable, and then we will be respected, and if we grow sanely we will finally command the confidence of the best mining thought of this nation. And that is my ultimate purpose so far as my influence has been over this organization.

I think you will notice before this session is over that the delegates here have been of service at this session, and in this way we gather a larger membership. What we need to help us do the work that should be done is an income of $50,000 a year, which would mean a membership of 5,000. We could expend that amount wisely, and you will notice at the session we had to-day the questions that were presented demonstrate this idea, that if you can bring together the best thought of this nation from all its great commonwealths, those interested in labor, and in all forms of industrial progress, where they can meet on a common level, we will yet get them into a higher form of co-operation. If we can exercise any influence in bringing together and harmonizing those great factors in industrial progress, labor and capital, our work shall not be in vain; and it was demonstrated to-day that these interests can meet with us and discuss those questions fairly and on a common level, and I believe it will have a great influence, but I do not think the time has yet come when we can leave off our swaddling clothes, as has been expressed. We need still the influence of those delegates, in my judgment. However, I am only expressing my own views. It might be well to appoint a committee to investigate this matter and report at the next session, and see what might be done, but certainly at this time I doubt the wisdom of this action.

Now, as to the nominating committee. We want to get as directors of this Congress for the coming year those three men who have the best minds and hearts that we can find in this Union, if we can get them here. We want to get men who will serve, and give their time and energy to the work of this Congress for the coming year. That is the purpose of the nominating committee, that it may report to this body of men who would agree to serve. That constitutes, briefly, my views upon the question.

MR. DEMPSTER: Mr. Chairman, there is some provision in our by-laws whereby those by-laws may be amended. I should like to have that clause read. That will give Mr. Daniels—

MR. DANIELS: Mr. Chairman—

CHAIRMAN BUCKLEY: Just a minute, Mr. Daniels, until I answer the gentleman's question. Will the Secretary read the desired portion of the by-laws?

MR. DEMPSTER: Just the amendment to the by-laws.

Secretary Callbreath read Articles 9 and 15 of the by-laws, as requested.

MR. DEMPSTER: There is a rule laid down there, I suppose, that governs this body?

CHAIRMAN BUCKLEY: Certainly.

MR. DEMPSTER: And any amendments that may be made must be made in accordance with that rule. If Mr. Daniels or any other gentleman has an amendment to offer, why, it ought to be offered in that way, and acted on in that way, just as is provided there, or else there is no use of having a constitution and by-laws.

MR. DANIELS: Is there any amendment proposed to be adopted by this meeting, Mr. Chairman?

CHAIRMAN BUCKLEY: No, sir.

MR. DANIELS: I thought not. Do I understand that the question on the adoption of my resolution is now before this meeting for debate?

CHAIRMAN BUCKLEY: No, sir, it is not. Gentlemen, what is your future pleasure?

MR. DEMPSTER: I would say just a word in reference to the remarks made by the Chairman, and the remarks by Mr. Daniels, that we have no doubt that the aims and the ambitions and the efforts and the accomplishments of those who have controlled and governed and cared for and guided this infant have been all that could be desired, and they know most about it; but we have an organization, and that organization has adopted by-laws by which it shall be governed, and we should respect those by-laws and act in accordance therewith in bringing in whatever amendments or modifications we want.

MR. DANIELS: Mr. Chairman, may I have the same privilege of debating the question that has been given to other members of the Congress?

CHAIRMAN BUCKLEY: I think there has not been any debate on the question further than what privilege has been granted to you, Mr. Daniels, already.

MR. DANIELS: Then I understand I am not permitted to speak on the question?

THE CHAIRMAN: I think the members of the Congress are perfectly willing to hear you speak at any time, Mr. Daniels, there is no objection. You will certainly be privileged to have the floor and speak on the subject the same as our President. We will be very glad, I am sure, to hear from you if you have anything further to say on the subject.

MR. DANIELS: Mr. Chairman, I do not want to trespass upon the patience of the Congress or the members here present, and if there is not sentiment enough in favor of trying to improve our present by-laws so

that I can obtain a second to my motion I do not believe I want to take it up at all, except to call attention to this fact, which I attempted to call attention to before, by a question. I have not proposed to amend the by-laws at this meeting in any way, shape or manner. All reference to amendment to the by-laws and reading the by-laws providing for amendments is entirely aside from any question which can be raised by the resolution that I have offered before this meeting. At a very slimly attended meeting of the members of the organization some weeks ago—months ago, perhaps—amendments were enacted to the by-laws providing for the establishment of local branches of this Congress. I was present at that meeting, and if I chose to test the legality of the adoption of those amendments there might be some question now as to whether or not they are in force. I do not choose to do that because I believe that the amendments were proposed and adopted in the spirit of betterment of the American Mining Congress, and that is the sole aim that is in my mind when I present this resolution providing, not for an amendment of the by-laws by this session of the Congress or by this meeting of members, but that a committee of three shall be appointed by the President to consider the matter for twelve months and report to you next year their findings, with a suggestion that they should prepare such amendments of such a revision of the by-laws as shall comply with the idea contained in the amendments already adopted and in force. Now that I am not trying to deprive the delegates of any right which they may have, or to abolish absolutely the delegate representation, it seems to me, is demonstrated by the fact that I want to put this question to the delegates, and give them just as much right to vote on it as the members. I do not like to attend a convention of any kind where I may stand in one meeting on an equality with the other man who is a delegate, and then say to him, "Well, now, we are going to have a meeting to-night that you cannot come into." It is true that that provision was made under peculiar conditions and under circumstances which seemed at the time to require it. I do not say that now is the time to change these by-laws and change the entire method of providing the personnel of the Congress. If I believed that now is the time I would not have introduced this resolution. I would have brought into this meeting some amendments providing for or making those changes. I still believe, as I said in the first place, that this resolution should go to the Congress and not to this meeting of members.

Now I do not attempt to take issue with the President in his statement that he does not think the time has yet arrived to make the change. I do not propose to make the change now. I do not think the time has arrived. But I do think the time will come, and the time to begin considering is now, as to whether or not we shall permit a saloonkeeper to sit in our American Mining Congress and represent our mining interests. We need the $50,000 that Judge Richards spoke about, but can we get it when you and I go to—

MR. RICHARDS: Mr. Chairman—

MR. DANIELS: If the Chairman will rule that the resolution is not in order and should come before the Congress I will stop right now.

MR. RICHARDS: The point is this, that Secretary Garfield has to leave in half an hour, and I know you would like to hear him before we adjourn, and I just thought we could take a recess until after we had heard Secretary Garfield, and then we can hear the discussion.

MR. DANIELS: That is all right; I will do anything.

CHAIRMAN BUCKLEY: What is the pleasure of the meeting?

On motion, duly seconded and carried, the meeting adjourned subject to the call of the Chair.

SATURDAY, DECEMBER 5, 1908, 11 O'CLOCK A. M.

PRESIDENT RICHARDS: The time has now arrived for the meeting of the members with a view of electing three members of the Board of Directors for the coming year. Is the Committee on Nominations ready to report?

MR. JAMES W. MALCOLMSON, OF MISSOURI: Your Committee on Nominations recommends for election as Directors for a term of three years Mr. A. G. Brownlee of Colorado, Dr. H. Foster Bain of Illinois and Mr. Samuel A. Taylor of Pennsylvania.

PRESIDENT RICHARDS: The Nominating Committee has reported recommending that A. G. Brownlee of Colorado, Samuel A. Taylor of Pennsylvania and H. Foster Bain of Illinois be selected as Directors. Before voting I will explain that this being a corporation, it will be necessary to select these directors by ballot of the members of the corporation.

MR. DANIELS: Inasmuch as there are but three vacancies the committee has reported but three names, and I move you that the Secretary be authorized to cast the ballot of the members of the Congress for the three gentlemen in nomination.

MR. STEELE, OF ALASKA: Mr. President, I would second that motion.

PRESIDENT RICHARDS: It has been moved and seconded that the Secretary be instructed to cast the ballot of the members of this Congress for the selection of the three Directors as recommended by the committee. Are you ready for the question?

The question was called for.

The motion prevailed and it was so ordered.

SECRETARY CALLBREATH: Mr. President, in accordance with the instructions of the Congress, I have cast the ballot of the members present in person and those represented by proxy for Colonel A. G. Brownlee, Mr. Samuel A. Taylor and Dr. H. Foster Bain for Directors for the ensuing three years.

PRESIDENT RICHARDS: The Secretary having cast the ballot I declare that these three men are elected Directors for the coming three years.

MR. DANIELS: Do I understand that the session of the members of the Congress or the meeting of the Congress is still open?

PRESIDENT RICHARDS: While it has not been formally adjourned, its purpose has been accomplished and really stands adjourned.

MR. DANIELS: I regret that I did not keep closer track of it.

PRESIDENT RICHARDS: It is not adjourned if you wish to present anything.

MR. DANIELS: I did not want Resolution No. 1 to get lost in the shuffle. I want some kind of action taken some way by either the members themselves or by the general Congress on Resolution No. 1.

PRESIDENT RICHARDS: Take it right up.

MR. DANIELS: I do not want to consume any time.

PRESIDENT RICHARDS: Take it up now.

MR. DANIELS: I am correct, am I not, in my understanding that the resolution has been presented to the meeting of the members, and that it is still pending before that meeting for further action?

PRESIDENT RICHARDS: It was presented to the members at the Schenley Hotel, and presented in general session here yesterday, and the Chair ruled it out of order before the general session.

MR. DANIELS: I appreciate that, and I believe that at the meeting of the members the other night the motion was not seconded. I therefore renew the motion now, that Resolution No. 1 be adopted by the members of the American Mining Congress.

PRESIDENT RICHARDS: I hear no second, so it is not—

COLONEL BROWNLEE: I second that motion.

PRESIDENT RICHARDS: It has been moved and seconded that the resolution presented to the members at the Schenley Hotel be adopted. Are you ready for the question?

The question was called for.

MR. DANIELS: Mr. President, I am surprised, I am astonished and astounded that there is any opposition to this resolution. I certainly should not have presented it at either of the meetings had I anticipated—

PRESIDENT RICHARDS: Mr. Daniels, just to make it clear, I understand now you are presenting it to the members?

MR. DANIELS: To the members only and not to the general Congress.

PRESIDENT RICHARDS: Not to the delegates?

MR. DANIELS: Because of the complex nature of the American Mining Congress I have taken the liberty of presenting it in both places, so that it might have action in one or the other. This resolution recites in its preamble some facts that I believe cannot be controverted.

The first is that the members have already adopted an amendment to their by-laws providing for the establishment of local bodies of the American Mining Congress. I believe that is a step in the right direction and that there ought to be such a provision. That which has been adopted, however, is very indefinite, and does not, in my opinion, provide a plan in sufficient detail to make it as effective as it ought to be. The next is a statement that the present laws of the Congress did not originally contemplate a representative organization with subordinate bodies, and I believe that is a statement of fact that will not be controverted.

Our by-laws as they stand governing the American Mining Congress do not contemplate the organization of local bodies. They contemplate and provide for the government of only national meetings, a national organization composed entirely of members and delegates. It is because of that condition of the laws that I am very earnest in my advocacy of a provision for a committee to take up the subject, consider it in all of its bearings, and report to the next meeting of the members either amendments or such a revision of the laws as will provide fully, clearly and practically for an organization of local bodies in any place where those interested in the mining industry may wish to organize them, and to provide for the national bodies to be ultimately composed of representatives from these local bodies, with such additional members as may be provided for in the wisdom of those who may perhaps in the future adopt it.

The by-laws at present are not in harmony; our organization, as I said a moment ago, is complex. I found myself the other day in a dilemma as to where I should make the effort to have this resolution considered. I am still of the opinion, notwithstanding the decision of the Chairman yesterday, that the proper place for the consideration is by all of the members, including the delegates, and because of that opinion I gave notice of an appeal. It has become unnecessary, I think, for me to take that appeal ,and I withdraw it now formally. I sincerely trust you will appreciate the present condition of our laws to such an extent that you will at least authorize the President to provide for this committee.

It does not for a moment consider the immediate amendment of our laws. It simply provides a committee for their consideration to report at the next meeting such changes as may be thought will best provide for the permanent future of the organization. And I might add a word of personal explanation.

The morning papers stated that I said last evening that I had felt the effects of the "steam roller." There was just a little misunderstanding, The idea that I intended to convey was that if I continued and made an appeal from the decision of so able and impartial a chairman as pre-

sides over this body I undoubtedly would feel the effects of a "steam roller," and without any reflection whatever upon the chairman, because I recognize fully the impartiality and fairness with which he presides over this body. But my prophetic soul brings before my mental vision now a picture of the mangled remains that would be left in attempting to prosecute an appeal against a decision under those circumstances. Usually I do not have sense to get out of the way of the "steam roller," but I am going to this time, and consequently have withdrawn the notice of appeal. Now, if there is any question in the minds of the members as to the advisability of some consideration being given to some changes in our laws to adapt the methods of the Congress to its future prosperity, I believe that any objection that you can make will be answered better than I can answer it, better than I can explain, if you will take those laws as they stand now and read them from beginning to end. It will take you but a moment, they are so short.

It is true, I believe, although I have not been able to find it in the law myself, but I believe it is true, that a provision has been made by which the Directors may at any time they deem it advisable, do away with the delegate portion of the American Mining Congress, but that is not the purpose of this resolution. That is only an incident in connection with the resolution. We want you who are here as delegates to become interested in the Congress and become members, and if it is my good fortune to attend future meetings of the American Mining Congress I do not want to have a voice and vote in any session of that Congress in which every one present does not have the same voice and vote. It has been understood by some that my attitude in regard to this is a criticism of the past methods. It is not.

I recognize fully that the delegate system has been absolutely necessary in the past, that in all human probability the Congress would not now be in existence at all but for the assistance that you gentlemen who are here as delegates and not members have given us. But we want your further assistance. I do not say that the time has now come when we shall change our attitude to you and say that you must become members or you cannot come in. I do say and I do believe that the time has come when it ought to be considered as to whether or not we shall not in the near future make some different provision.

I therefore appeal to you to provide for the appointment of this committee. You do not commit yourselves to the adoption of any amendment. You may reject in toto any report that committee may make to you a year from now. But I do believe that there is crying need that some attention be given to this matter. I believe it should be given in a deliberate way; I believe there should be ample time for consideration, that amendment should not be hastily adopted, and I therefore again appeal to you to adopt this resolution ,and that the President appoint a committee, and when the committee reports next year then will be time enough to say whether we want to make the changes that they recommend or not.

PRESIDENT RICHARDS: Are you ready for the question?

The question was put and on the vote the Chair announced that he was in doubt.

A standing vote was thereupon taken, and the Secretary announced that the vote stood 9 for and 9 against.

COLONEL BROWNLEE: Mr. Chairman, in view of the fact that this is a tie vote and that probably our President may have to decide it, if it is in order, I would like to say a word.

PRESIDENT RICHARDS: We shall be glad to hear it.

COLONEL BROWNLEE: I think, Mr. President, that Mr. Daniel's resolution is designed to assist the Congress. In Colorado we have what is known as the Colorado Mine Owners' Association. That association is

composed of local organizations in different mining camps. We are anxious to secure membership of these local organizations and also for our state association. Under our present by-laws it is almost impractical to do that. Such conditions exist also in other states. Now let me illustrate.

In order to become a member of the Congress at the present time, which prescribes for specific dues to be paid, there is no provision made whereby part of those dues will go to a state organization. They do provide for a part to go to a local association, but our local associations would come in without the state association and there is no provision made at all, so consequently we are held up there. Now, those conditions may exist in other states, and if this Congress is going to grow in membership it is very necessary that we secure those local associations, where they are being covered by local conditions, and then each respond to the state association, and then have the state association respond to the national association.

I believe that if the by-laws were amended along logical lines it would help us in our growth in membership. Mr. Daniels has that idea in view. We do not want to take any radical action. We want this committee to take up the question and investigate it thoroughly and find out the best way of accomplishing the desired results. Now, if that is done, then let that committee report to the next congress and if deemed wise let us adopt such by-laws as they recommend whereby those conditions may be improved.

MR. DANIELS: The organizer of the American Mining Congress went up into the Northwest to get men interested in the mining industry to join the American Mining Congress. They said "No, no, not any mining congress for us. If, however, you will change your laws so that we may have our local association and be connected with your mining congress in that way with our local associations to take care of our local matters, we will get you a big membership right away." Well, some local organizations were formed and got a whole lot of members. Then there were some hurriedly summoned meetings of the members for the purpose of amending the by-laws and legalizing the action of the organizer in getting those members. Now, the amendments adopted at that time were I believe—I make no reflection on anyone in what I say, I do not intend any—hastily and hurriedly drawn and they but partially cover the object designed to be attained. Mr. President, I spent eighteen years of my life in building up an organization which is to-day one of the best, in my opinion, and strongest, most capable and most conservative of the labor organizations in the United States of America. And I am egotist enough to believe that I know a little something about how organizations can be built up, and make of themselves a power in the line upon which they are organized. And whether you adopt this resolution today or not, I am prophet enough to say that you will come to the idea that I have presented and sooner or later you will be compelled to have an entire revision of your present laws.

DR. HOLMES: Just one word as representing the opposition to that resolution. I think there is a misapprehension with regard to the purpose of the resolution. The fact that this meeting, largely through the delegate attendance, has been such a magnificent success, makes all of us deprecate any agitation even at this meeting of doing away with the delegate membership. It is the first session of this great body in a far Eastern center, and I think we all agree that it has been a success. On the other hand, I do not think any of us object to the appointment of a committee that will consider the whole question of the by-laws without special reference to the delegate system at the present time. I understand that is the purpose of the resolution.

MR. DANIELS: Pardon me, the delegate question is an incident merely.

DR. HOLMES: All right, then; as one of those who voted against the resolution I am willing to withdraw that objection and let the matter go to a committee, to be brought up for discussion at a future meeting.

PRESIDENT RICHARDS: As the vote throws the responsibility upon me of deciding I vote in the affirmative and declare the resolution adopted. (Applause).

Thereupon the meeting of members was adjourned.

PAPERS AND ADDRESSES

OF THE

Eleventh Annual Session

OF THE

American Mining Congress

1908

PITTSBURGH, PENNSYLVANIA

December 2 to 5, Inclusive

Published by the Congress
At the Office of the Secretary
Denver, Colorado
1909

INDEX TO PAPERS OF 1909

OFFICERS FOR THE YEAR 1909

PRESIDENT,
J. H. Richards.

FIRST VICE PRESIDENT,
Dr. E. R. Buckley.

SECOND VICE PRESIDENT,
John Dern.

THIRD VICE PRESIDENT,
W. F. R. Mills.

DIRECTORS,

J. H. Richards, Boise, Idaho.
E. R. Buckley, Flat River, Missouri.
John Dern, Salt Lake City, Utah.
W. F. R. Mills, Denver, Colorado.
Geo. W. E. Dorsey, Fremont, Nebraska.
Thomas Ewing, Fenner, California.
H. Foster Bain, Urbana, Illinois.
A. G. Brownlee, Denver, Colorado.
Samuel A. Taylor, Pittsburgh, Pennsylvania.

ADVISORY BOARD,

Duncan Mac Vichie, Salt Lake City, Utah.
A. W. McIntire, Everett, Washington.
W. J. Elmendorf, Spokane, Washington.
L. W. Powell, Bisbee, Arizona.

EXECUTIVE COMMITTEE,

John Dern, Salt Lake City, Utah.
A. G. Brownlee, Denver, Colorado.
W. F. R. Mills, Denver, Colorado.

SECRETARY,

J. F. Callbreath, Jr., Denver, Colorado.

Annual Address of the President.

BY HON. J. H. RICHARDS, BOISE, IDAHO.

This hour has been set apart with a view to placing before you the reasons justifying the existence and support of such a national organization as the American Mining Congress. Whether wisely or unwisely, I have been selected to perform this duty.

At the dawn of our nation's life the American people set forth in clarion notes the purposes sought to be achieved by the aid of our form of government. These purposes, so noble in sentiment, can only be accomplished through availing ourselves of our opportunities, and when wrought out in harmony with such national purposes, they bring to our nation the enduring qualities of permanency and stability.

Our national upbuilding through industrial, political, educational and social activities, must ever rest upon the use we make of the natural resources abounding in the United States, such as soil, climate, forests, minerals and water. These resources are generally known to abound under two heads—first, agriculture, which includes production through growth; second, mining, which includes those products now ready for use.

Consider the declaration of purposes set forth in the preamble to the American constitution in connection with these forces of nature called natural resources, together with our relations to other nations of the earth, and a flood of light is thrown upon the use that can be made of these forces in bringing into actual expression these declared purposes underlying, overlying and encompassing the opportunities these conditions place before us. Other nations have sought progress through a destruction of their neighbors or by controlling them by force. But the character of our nation; the form and purpose of our government; our ideas of justice; our concepts of liberty; our understanding of the basis of enduring progress; the abundance of natural

resources; our love of knowledge; our genius in exercising dominion over the forces of nature; our respect for human rights, and the grandeur of our moral concepts as a nation, all demand that development through internal industry, and not through external plunder, shall ever be the basis of our country's hopes.

We are beginning to understand nationally and individually that

> "The drying up of a single tear has more
> Of honest fame than shedding seas of gore."

Internal industry should mean in our country such a scientific and co-ordinating use of our natural resources as result from a comprehension of our opportunities in the light of the purposes of our government and our relations to other nations. The purposes of our government we all understand, but no true and lasting national development can take place in our country that does not tend to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity. The spirit of these declarations of purpose should ever be the directing forces in all true national development. The peculiar character of our government in purpose and action keeps it so close to the people that from necessity it becomes a vital factor of co-operation in giving direction to effort.

The natural forces at our command, and through the use of which all development must come, are such as our relations to other countries; the markets of the world; our shore lines and inland water ways for commerce; abundance of fertile soil; vast forests; water for reclamation and power, and vast mineral deposits. In a general sense, all the raw material through the use of which all industrial development must take place, comes from the two basic sources of agriculture and mining. Agriculture produces those things that are constantly supplied through growth; mining produces those things which are not being renewed by growth. While agriculture is the primal impulse to hum-

an effort, because the source of food, yet the real vitality underlying all industrial development largely rests with mining, whose products are generally more enduring than the products of agriculture and afford such opportunities for varied and permanent development through manufacture and commerce, that the real progress of this nation largely finds its underlying impulse in mining. The impulse that followed the discovery and use of our great deposits of coal, oil, gas, zinc, copper, lead, iron, gold, silver, and water powers, has not only given vitality to agriculture but has placed our country first in wealth and capacity to achieve.

To the credit of the American farmer, he felt the need of governmental co-operation in bringing from the soil the possibilities which intelligence could reveal. The multitude of farmer constituents compelled such co-operation, and by this governmental co-operation through the Agricultural Department, agriculture is becoming a science; farming is becoming more attractive, because more profitable and success more certain; the treatment of the soil and its needs are better understood; plant and animal life are responding to intelligent care; insect pests are being destroyed; animal disease exterminated; waste prevented; quantity of production increased; quality improved; markets found; citizenship improved, and home life on the farm made more attractive. In fact, the purposes of our government as set forth in the preamble to our constitution, are finding expression through thus promoting the general welfare.

In mining a fearful waste is going on. Only a small percentage of the effective use of coal mined is obtained; millions of tons of coal are being wasted from false mining methods; unlimited quantities of natural gas destroyed and lost; great waste has taken place in placer methods; in concentrating processes, reduction systems, and mining methods; the health of the underground miners impaired; thousands killed; more maimed, and conditions making for bad citizenship permitted.

of those interested in mining, a sufficient constituency could be aroused to induce government co-operation in improving mining conditions in a manner similar to the improvement that has thus far been made in agricultural conditions?

The American Mining Congress has been thundering at the doors of Congress for years, trying to arouse it to the needs of the hour. How many years will it yet take to secure efficient action in this respect? The President recommended legislation; the House heeded his message; the Senate ignored it. Both the great national parties have recognized this issue in their national platforms this year.

Nature has been generous to the American people and it needs a generous heart to understand and co-operate with her in bringing to the American people that character of development which insures permanency and stability through intelligent co-ordination and co-operation. There would seem to be no reason why the nation, the states, cities, corporations and individuals, may not co-operate in bringing out of the conditions that now confront us, that permanent and stable national development which is so essential to enduring prosperity and happiness. The American people have arrived at that stage in human progress when less attention should be given to governing them than to directing their development. A busy people whose ever increasing wants are supplied, need little governing.

In his first inaugural address, President Jefferson in expressing his idea of the purposes of our government, used these words: "A wise and frugal government which shall restrain men from injuring one another, and leave them otherwise free." But showing people how to arrive at right methods of development in harmony with the purposes of our government as set forth in the preamble to our constitution, will be much more effective for good than in trying to restrain them from injuring one another through penal statutes.

The prodigal use of nature's bounties in this country has begotten wasteful habits and tendencies which have

entered into every phase of human effort. Those questions have their very fiber in the general welfare of the American people, and they embrace the whole reason for the existence of our government. The time has come in American affairs when scientific or intelligent development must displace the accidental or wasteful processes heretofore in vogue. A wasteful use of nature's forces, which has been so largely practiced in the past, cannot much longer be the mainspring of human endeavor. The time has arrived when this government must do more than be merely frugal and restrain men from injuring one another; it must co-operate with the American people in opening the way for them to help one another. In other words, its action must be more and more of a positive, rather than of a negative nature. There is a waiting people in this land possessing the capacity to comprehend, the genius to plan, the wisdom to direct, the courage to undertake, and the understanding to achieve an evolution through this co-ordination and co-operation worthy of our opportunities, but there must be some supreme and directing hand to guide this higher form of development.

The products of agriculture may be renewed; the products of mining never. A large percentage of the products of the mines when once used, is destroyed forever, while a large part is of a more permanent nature and may be used indefinitely. The products of the mines in this country during the year 1906 amounted to about two billion dollars in value. These products came from such a diversity of territory throughout our country that it was felt this fact justified a national mining organization formed to encourage the higher methods of co-operation and co-ordination—federal, state, local and individual—that there might be wrought out of this source of material wealth, not only the best results from a mineral standpoint, but also the best out of the men engaged in this occupation. To this end the American Mining Congress was organized, which held its last session in the zinc fields around Joplin, Mo.

Those who have been most prominent in this organization, realizing that the more enduring value embraced in

these mineral resources is not in these products themselves, but is in the development of human character and capacity to achieve and enjoy through a wise development and use of these bounties and in this light, have undertaken to so organize those interested in this great industry, that gradually all that is best in both the mines and the miner can be more fully realized.

It must be evident that in an attempt to develop our material resources in harmony with the purposes of our government, it will require the solution of great questions, such as finance, transportation and commerce. We have the genius to solve these questions aright if we but act in harmony with the true principles of our development—intelligent co-ordination and co-operation. Development through this form of co-operation must be the keynote of America's future.

I am impressed that the most important resource we are called upon to conserve and develop is the capacity of the American people to achieve and enjoy, through a correct understanding of how to make a right use of our opportunities. This is a union of states and our development must tend to form a more perfect union through intelligent co-operation in utilizing all our material resources which have no value in themselves, but are of infinite value in their relation to the development of the American people. We have heretofore to a large extent prospered in our career as a people by the prodigal use of nature's bounties amounting to wastefulness, and this course has begotten in the American people almost a habit of wastefulness in the use of physical, moral and intellectual forces. This habit has to a large extent crept into business methods and has created a gambling spirit or a mad rush for things we have not earned, which is a species of dishonesty. This is not intelligent co-operation, but more of the nature of destructive competition. There is no sound business logic in such competition. The only competition that has a sound foundation is a competition in service. He who serves best should succeed best. This applies to all phases of business enter-

prises. But there have been tendencies to succeed through destructive competition. As a national effect, this is a failure. This kind of competition should be obliterated through governmental regulation, where such regulation is applicable.

The only opposition that comes to the full use of navigation in the waterways of this country is the fear of destructive competition, and thus we see our waterways lifeless so far as their use for transportation is being made available. There must be a way to so co-ordinate water and land transportation and regulate the same that they shall both be benefited and rendered more stable as business enterprises, and the country thereby blessed. This country cannot afford to lose the benefit of water navigation or the crippling of land transportation through a wanton competitive system.

There is now being felt a great need to conserve our national resources. Why conserve them except to promote the general welfare? How shall they be conserved, and by whom shall they be conserved? By the people through co-operation with our government and each other, municipalities, such as states, cities, etc. The national government is not an end, but the means to an end, which is the general welfare.

In the noted case of Gibbons v. Ogden, Mr. Justice Johnson, speaking of the purpose of establishing our government, said: "The great and paramount purpose was to unite this mass of wealth and power for the protection of the humblest individual; his rights, civil and political, his interests and prosperity, are the sole end. The rest is nothing but the means."

There may be those who question the power of our government to undertake a system of conservation and co-ordination of our natural resources. While our government is one of limited powers, it is supreme as to the powers granted and I assume that the power to regulate all undertakings over which the national government has jurisdiction is un-

questioned, carrying with it those things which are necessarily incidental.

In structural work in this country we consume annually iron ore to the value of about one hundred million dollars, and we are informed that our iron ore deposits are being rapidly depleted. Then why should not our government co-operate in bringing into use such structural materials as building stone, clay products, cement, lime, sand, gravel, slate, and mineral paints.

They tell us that our forests, the greatest in the world, are nearly depleted, and we rejoice that our government, through the Agricultural Department, is now co-operating with the American people in an effort through the forestry service to produce annually the amount we consume. Almost eighty per cent. of the total cost in building in this country is expended annually and lost by fire and in maintaining fire departments. This great waste could be largely avoided and thereby saved, did we understand the use of building materials so widely distributed as above enumerated.

Vast quantities of coal produced are being wasted, blown out of locomotives unconsumed and in many other ways, and we rejoice to know that our government, through the Geological Survey, is making an effort to bring about a great saving in the use of coal. Since 1889 about thirty thousand miners have been killed by explosions and other accidents and many more injured and crippled. This great waste of life and limb should be and could be largely obviated by the co-operation of our government in this respect, and we rejoice to know that our government is becoming somewhat aroused to the great injustice being inflicted upon underground workers.

Why should not our government co-operate with the miner the same as with the farmer? This organization has labored for years to secure a Department of Mining, but Congress thus far has refused to give even a Mining Bureau. Why advocate a Bureau of Mines? Because we believe that the co-operation of the government with the

miner, the same as with the farmer, is absolutely essential.

We notice more keenly the blessings that flow by this form of co-operation in the West than you do in the East, because the great deserts of the West, through the co-operation of our government by the reclamation service, are being covered with trees, school houses, temples of worship, cities, towns and factories, and the sage-brush and wild animals replaced with a prosperous and happy people; and through this form of co-operation the waters that have passed untroubled to the sea for untold ages are now being used to bring the resurrection morn to the parched lips of the valleys and the withered breasts of the plains, and the forces of the falling waters in those great mountains are being converted into power to lift a part of the burden of toil from the shoulders of men; and we believe that this same character of uplift can be given to mining and the miner by similar co-operation. With a Mining Department, presided over by a man especially well equipped for that work, as Secretary Wilson is for the Agricultural Department, the results, in my judgment, would be even more astounding.

When we learn what Edward Goodrich Acheson has done in relation to clays and the conversion of waste coal into graphite, we are reminded that every such discovery is further proof of the unlimited possibilities of this old earth when it surrenders to man's dominion through his understanding of how to use these things.

Wonderful as are the coal deposits of the great State of Pennsylvania, they fall far short in value to the water power of New York when subject to man's dominion, as those sources of power being perpetually renewed will continue to turn the wheels of industry, bring light and comfort to the home, workshop and traveling palace, and transport freight and passengers long after the coal deposits of Pennsylvania have been exhausted and forgotten. Nature makes no mistakes. You may exhaust the coal and timber of this country, but you will never exhaust the power, resident in this old world, that understanding will reveal.

Owing to the abundance of visible fuel from forest and coal deposits, the water was permitted to ripple on to the sea in idleness, but when these sources of power began to show signs of exhaustion, electricity, apparently gathered from the very air, was harnessed to the wheels of industry, and as C. C. Goodwin says: "It is a wonderful thing that nature away back when this world was being freighted for its long voyage, took on board everything that the race of man which then existed only in the mind of God would need, that a few obvious things were put in sight for man while he was groping in the darkness of his primitive ignorance; that as his intelligence increased new doors would be opened to him, new lights would come to him; that his destiny was to keep advancing until at last he would indeed stand only a little lower than the angels."

The possibilities of the use of electric current with wire and wireless thansmission, have scarcely dawned upon the human understanding. But, assuming this to be true, it affords no justification for the great waste taking place in tne mining and use of coal, but it is through a right use of what we have that we learn and become qualified to discover the use of what we have not.

Some have come to the conclusion that the remnant of our mineral resources and our forests and our water powers must be retained in the keeping of the national government, but a very grave question confronts us at this point. The theory and the practice of our government thus far has been to give the land to the man who would take it and make a home upon it and use it; to give the mineral to the man who would discover it, extract it and convert it into forms of usefulness; to give the timber in limited quantities to the man who would take it and convert it into forms for human needs; to give the water power to him who would control it and compel it to serve mankind. Shall the government now abandon its theory so long practiced, or shall it undertake to give direction through appropriate legislation, regulation and co-operation to the use of these great forces?

In the light of these conditions the American Mining Congress was organized for the purpose of securing the co-operation of our national government and those concerned in the uplifting of mining and the miner, in placing the mining industry on a plane worthy of its importance. It is thought that this national organization, assisted by local branches, could be of inestimable service in such a work. Its plans are simple. Its annual session can be held at any point that would be of the greatest service in stimulating an interest in this work. Its permanent headquarters are located at Denver, Colorado, a central point and easily accessible from all directions. At this place the organization contemplates the construction of a building adequate in dimensions to meet the needs of the organization, in form and architecture worthy of such an industry, using material and plan of construction that would typify the enduring qualities of mineral production, embellished in a manner that will reveal the beauties of the mineral kingdom when harmonized with durability and usefulness. In this structure it is proposed that there shall be kept the records of this organization and gathered the statistics that will be useful in the work of the organization; also a complete library in relation to mining—legal, scientific and general; also that there shall be gathered there through the years, a collection of mineral products—scientific, beautiful and general.

This is a brief statement of the reasons we believe justify the existence and support of this national organization known as the American Mining Congress.

Relation of the Federal Government to Mining.

BY SENATOR CHARLES DICK, OF OHIO.

You may search the federal constitution through and find nothing therein giving Congress any authority or jurisdiction over mining. There is no grant of power to Congress to regulate mines and mining. The business of mining is not interstate commerce. Congress can regulate commerce among the several states, but cannot legislate on production or manufacture.

Congress exercises exclusive jurisdiction over the District of Columbia and has power to make needful rules and regulations respecting the territories belonging to the United States. There is no mining, as we know, in the District of Columbia, and there are only two fully organized territories, New Mexico and Arizona, both of which will doubtless be eventually admitted to statehood, at which time the jurisdiction of Congress over their mines and mining operations will come to an end. The only territory then left with valuable mineral deposits over which the Congress will have control will be Alaska.

Congress has absolutely no authority to pass any law regulating mining within the states. It cannot provide for federal inspection or supervision of mines, or compel the adoption of safety devices and improved methods which may tend to reduce the terrible annual loss of life in our coal mines.

These limitations on the power of the federal government must be well understood at the outset. What is there left then that the United States government can do for this great industry? For answer we say—Look at the Department of Agriculture. That great Department which touches more people directly, excepting only the Postoffice Department, than any other department in the federal government, for whose operations the present Congress appropriated eleven and two-thirds millions of dollars, an invest-

ment which will return greater dividends in the way of substantial benefit to the people than an equal amount appropriated for any other Department. This Department of Agriculture, inaugurated as a bureau in 1862, and enlarged to a Department in 1889, is established on as firm a foundation as the Treasury or Postoffice Department, and the constitutional warrant for its existence and continuance is no greater and no less than is the constitutional authority for the establishment of a Bureau or Department of Mines and Mining.

You are all more or less familiar with the scope of Secretary Wilson's Department. It exercises no direct control over farming; it cannot regulate the rotation of crops; it cannot compel a farmer to use any methods to exterminate scale, or blight, or rot, and yet its work is and has been of inestimable value to the agricultural interests of the country.

It has paid for itself many times over through what it has saved the American farmer, and through the valuable information it has afforded him. It is a strictly scientific Department; its chief function is to investigate, to experiment, to carry out original research work, and to disseminate information of value to farmers and stock raisers and others interested in its researches.

The establishment of the Department of Agriculture was strongly opposed in Congress when the proposition was up for consideration. It was said the measure was unconstitutional, that there was not a solitary feature in the bill calculated in any degree to benefit the farming interests of the country, and that what the farmers most desired from the general government, and what was most beneficial to them, was to be let alone; in short, that the proposed measure would not benefit agriculture in the least.

It is now twenty years since these predictions were made, and every one of them has failed absolutely of fulfillment. To be sure, this is not an appropriate time or place to set forth what the Department of Agriculture has accomplished for the good of the whole country since it

was organized, but a brief reference to some of its achievements will be of value by way of illustrating our contention that equal benefits can be brought about by the establishment of a Bureau of Mines and Mining.

The Bureau of Animal Industry has waged successful war on contagious animal diseases, decreased the ravages of all of them, and stamped out entirely some of the worst, saving millions of dollars annually.

The Bureau of Plant Industry has faced the problem of plant diseases which have literally destroyed millions of dollars annually, and has brought them under control and found remedies which have in many cases eradicated them entirely, with an actual cash saving of millions of dollars a year.

The Bureau of Chemistry, by its study of foods and preservatives and adulterants, made possible the passage of the Pure Food law, one of the most beneficent pieces of legislation of recent years, which has literally raised the standard of living of the entire nation.

The Bureau of Soils, by its investigation of soils in their relation to crops, and its suggestions of improved methods of fertilization of poor soils, and by showing what crops are best adapted to special soils, has enabled farmers to reclaim such waste land, and has increased the cash value of many millions of acres.

There are other Bureaus in the Agricultural Department that are doing equally valuable work, but we will refer to only one more, and that is the Bureau of Good Roads, which is performing a work of great educational value and instruction in the making of good roads.

What has been said here as to the scope of the work of the Agricultural Department, and the methods by which it has become so valuable in dollars and cents to the American people, shows that its great purpose is to educate the farmer and the people generally to better methods and to the prevention of waste.

If he is a benefactor of mankind who causes two blades of grass to grow where before only one grew, then the De-

partment of Agriculture has been a great blessing to the American people, because it has taught the farmer how to increase in a very appreciable degree his annual yield of everything that the soil produces.

We know that the average value of farm lands in the United States has increased greatly in the past ten years. How much of this increase, amounting in some instances to fifty per cent or even more, should be credited to the general prosperity of the country, and how much to the efficient work of the Agricultural Department, cannot be determined with any accuracy, but there can be no question that there are many cases where the increase of farm values must be attributed directly to the wise efforts of this Department, through the educational campaign it conducts.

While it may be the common impression that the federal government has not been doing any work bearing on the mining industry of the country, yet as a matter of fact, a great deal has been accomplished, and a vast amount of work is now being carried on in different bureaus and divisions of the federal service relating to this subject. The work is scattered, however, and much of it is of so unobtrusive a character that the results attained are not widely known outside the narrow circle of those directly interested.

There can be no question that it would be a great gain in efficiency to assemble these different divisions under one head, and to properly co-ordinate and systematize the different branches of the work. Such action would give an official status to the mining industry that the federal government does not now accord to it.

Most of the mining states maintain mining bureaus, whose business it is to inspect mines, and to prevent accidents and loss of life. Much of this state inspection service is of a high order of efficiency. Without it the loss of life in mines would doubtless be much greater than it is, but notwithstanding this state supervision, the death roll of our mines has mounted steadily upward year by year. Were all the states to investigate thoroughly and scientifi-

cally the causes of mine accidents, much unnecessary duplication of effort would result that could be avoided with work of this character conducted under the general auspices of a federal bureau, adequately equipped and supported. The great expense attaching to complete and scientific work along these lines also constitutes a serious and practically prohibitory objection to the plan of individual state investigation.

It is not alone in the coal mines that we are wasting human life. On the railroads, in our steamer travel, in street railway transportation, in conflagrations in our cities, in the workshops and factories, the big steel mills and blast furnaces, in the construction of our buildings and through numerous other channels of activity we are killing more men proportionately than any other country in the world.

As a nation we are yet in our infancy, and like the child we are learning by hard experiences. The infant does not know the difference between hot and cold until he has burnt his fingers. So it is with us, and so it has been with every other nation. In Europe the mines formerly killed as many men as we are now killing in that way. Years ago these countries had the same terrifying experiences that we are now having, and we should profit from their experiences, as well as from our own.

In the midst of a prosperity and development that have amazed the world we have not paid as much attention to the value of human life as we should, but we are now coming to a rapid realization of the true situation, and what is still better, we are seeking to apply the proper remedies. According to Census statistics for 1906, there were in the United States one hundred thousand deaths from violence. This not only includes the ten thousand killed on the railroads, three thousand killed in the coal mines, three thousand killed in street railway traffic, fifteen hundred burned to death in fires, the men killed in workshops, factories, building construction and many other lines of human endeavor, but also the murders, the suicides, the drownings and other casualties. Someone with an aptitude for figures

has estimated that twenty-five thousand should be deducted from the total of one hundred thousand as the number dying through accidental or premeditated personal violence. This means that the toll of deaths in the industries in 1906 reached the enormous total of seventy-five thousand. It is also estimated by the same authority that if we had the same proportionate rate of deaths in the industries as in Europe, this total would not exceed twenty-five thousand each year. Thus you see we are needlessly wasting each year in the United States fifty thousand human lives.

In favoring the establishment of a Bureau of Mines and Mining, those interested in the mining industry are seeking, with a most commendable display of patriotism and public spirit, to do their share in the efforts to promote better conditions, and to minimize those agencies so destructive of human life, incident to the evolution of our gigantic and ever increasing industrial and commercial enterprises.

There are numerous precedents for the appropriation of money by Congress to check the destruction of property through plagues and other causes. The cotton growing states of the South were greatly disturbed a few years ago by the cotton boll weevil, which caused damage to the cotton crop amounting to millions of dollars, and which appeared to be beyond the control of the states. Congress appropriated half a million dollars for the purpose of checking this waste and removing, if possible, the cause. At another time Congress appropriated a quarter of a million dollars in an endeavor to save the New England states from the gypsy moth, which had destroyed a great deal of property, and threatened to spread over that entire section of country. In both instances these pests were terribly destructive of property, and the states apparently were unable to cope with the evil, until Congress came to the rescue. In neither of these cases, however, was a single human life involved. Surely, if Congress is permitted under the Constitution to appropriate funds to destroy insects, it is vested with the right also to appropriate for the saving of human life.

In 1906, two thousand and sixty-one men were killed in the coal mines of the United States, and four thousand eight hundred were injured. In 1907 more than three thousand were killed. The death roll from this cause for the past seventeen years amounts to a total of twenty-two thousand eight hundred and forty, of which probably half have been killed during the past six years. The number of fatal accidents has increased steadily year by year, and is now double what it was in 1895.

John Mitchell well said, in commenting on this point: "It is a sad commentary upon our vaunted civilization that more men are killed or crippled in mining in the United States than in any other nation on earth."

The coal mines of the United States are killing over three times as many men per thousand men employed, as the coal mines of France and Belgium, and two and one-half times as many as are killed in the coal mines of Great Britain. In all the coal producing countries of the world the output has increased greatly in the past ten years, but the United States is the only country where the number of men killed, per thousand employed, has also increased. In every European country there has been a marked and steady decrease in casualties in coal mines. This decrease has not been due alone to the inspection and supervision maintained by mining bureaus, but has been made possible because those nations have maintained splendidly equipped testing stations, such as the federal government is installing here in Pittsburg, where exhaustive experiments have been carried on to test explosives and safety appliances.

In Belgium, when the government began these experiments, the death roll in the mines was practically as great as in the United States today. Today less than one-third as many lives proportionately are lost by coal mine accidents in Belgium as in this country.

Dr. J. A. Holmes, expert in charge of the testing station of the United States Geological Survey, said more than a year ago that, unless some action was taken, an increase in the number and in the seriousness of mine disasters in

this country might be expected to continue. His statement was followed by the terrible explosions in Pennsylvania, West Virginia and Alabama of last December, verifying his prediction.

The accidents which happen in coal mines can be attributed to a number of causes. They are due in part to lack of proper and enforcible mine regulations, in part to a willful disregard of such regulations, in part to the absence of exact knowledge concerning powder and other mine explosives, and the conditions under which they can be used with safety in the presence of mine gas and coal dust.

The further fact that the number of men engaged in this industry is increasing so rapidly constitutes an additional element of danger. Most of the coal mined in this country is removed from a comparatively short distance below the surface. In foreign countries most of the coal is taken from great depths. As mining conditions in this country more nearly approach those in foreign countries, the dangers attaching to the industry will increase, and to a greater degree more strict supervision will be necessary to prevent still greater increase in loss of life.

The fact that the real causes of many of our worst mine disasters are not known absolutely, has increased the demand that the federal government investigate the whole situation. One of the disheartening features about the worst coal mine disaster of last year, the one at Fairmont, West Virginia, was the fact that it took place in a mine counted one of the safest and best equipped and conducted coal mines in the country. Last January the coal operators of West Virginia and Western Pennsylvania adopted, among others, this resolution:

> "Resolved, That at the present time we are at a total loss to account for many of these disasters which have occurred in the best regulated mines in the country; such as have been regarded heretofore as absolutely safe by the owners and managers who have spared no expense, and by the mine inspectors of the several states."

The verdict of the coroner's jury contained the following recommendation:

> "There are many unsolved questions connected with coal mine disasters in the United States, and it is our recommendation that Congress make an appropriation for investigating the cause of these disasters, which are so destructive to life and to the resources of the country."

Congress made the appropriation and the investigation is being carried on. Much valuable information has already been obtained. Some brands of powder labeled "Safety Explosive" and generally believed to be so, have been conclusively proved not entitled to that designation. As a result of this discovery, the manufacturers of these powders have been at work modifying the ingredients, so as to produce powders that can be handled with safety by the miner. Many practical coal miners of long experience have long refused to believe that coal dust is explosive. Twenty specimens gathered in Ohio coal mines were submitted recently to the United States Testing Station, and every one was ignited by the powder and exploded with terrific force. It is by such experiments as this that a great many accidents can and will, in the future, be averted.

The function, then, of the federal government in relation to mining is, through thorough scientific investigations, similar to those which have proved effective in other mineral producing countries, to obtain and publish information concerning the explosives used in the mines, and the conditions under which they can be safely used in the presence of coal dust or gas, and also concerning other conditions which will make mining safer.

While such information can give no warrant to Congress to legislate on the subject, yet it cannot be questioned that it will, where necessary, compel the adoption of state legislation, as will result in mutual agreement and co-operation between the operators and miners for the accomplishment of the same end.

It is said that fifty per cent of all the fatal, and thirty-nine per cent of all the non-fatal mine accidents in the United States were the result of falls of roof and coal. With the growing scarcity of timber available for props, these accidents are liable to increase in number, unless excessive charges of explosives are prohibited, and the amount of such explosives which can be safely used is definitely fixed. The explosion of an excessive amount of powder or dynamite, while it may not bring down the roof at the time the explosion takes place, is very liable to so weaken it that it may fall without warning days or even months after, and cause loss of life.

There is no other country in the world where the natural conditions are so favorable for mining coal safely as in the United States. The death rate in our coal mines is perhaps in no greater ratio than on the railroads and in some other industries; but what we should realize, and realize at once, is that it can and should be greatly reduced, and I have great confidence that the investigation into this subject, now being made by the federal government, will be rewarded by many human lives saved from death, and men from being maimed and crippled.

The other great problems connected with coal mining directly affecting every one of us, and our posterity even more, and which is therefore of national concern and justifies the action of the federal government, is the great waste which is going on in our natural resources.

If a farm crop is a failure this year, the next year may under proper conditions see a large crop. Water which goes to waste today may be saved tomorrow, and forests may in time be restored; but a coal mine or mine of gold or silver or copper, once exhausted, can never again be restored.

At the Conference of Governors on the Conservation of Our Natural Resources, held at the White House last May, the attention of the American people was called in no uncertain tones to the great waste of our natural resources which is constantly going on. The American people have

earned the reputation the world over of being extravagant and profligate in many ways. It is said that we waste as much food as some other nations require for their entire subsistence. We have not been economical perhaps because our resources have apparently been so limitless that their exhaustion has seemed an impossibility.

In the case of our coal consumption, what we use is not so appalling as what we waste. Various estimates have been given as to the length of time our coal supply will last. It has been put as high as four hundred years and as low as less than one hundred years. The domestic coal supply is disappearing at the rate of four hundred million tons per year, and our experts tell us that in the mining operations of the present time nearly one-half of the yearly production is being wasted. Dr. Holmes says that at the present rate of increase in consumption the better part of the fuel supply will be gone at the end of the present century, unless proper steps are taken to remedy present wasteful methods. The problem of fuel supply has reached a point where there may be trouble within the life time of children now living. At the present rate of coal consumption, it is more than likely that the calamity of dearer fuel will face us inside of a quarter of a century. Deep mining and long transportation will certainly greatly increase the price.

The American supremacy in manufacture has been gained by the possession of cheap fuel. It is hard to realize the great increase in the coal output of the United States within the past few years. The production today is more than double what it was ten years ago; it has trebled since 1890 and has quadrupled since 1886. In a period of forty years the percentage of the total coal output of the world produced in the United States has increased from fourteen per cent to nearly forty per cent. It is only nine years since the United States became the largest coal producer in the world, but in that time it has so far outdistanced Great Britain, its nearest competitor, that at the present rate of increase it will be only a matter of two or

three years before our coal output is double that of Great Britain.

A train of cars which could transport our coal output of 1907, with an average of fifty tons to a car, would circle the earth at the equator two and two-thirds times.

We cannot check our magnificent industrial development to save coal for posterity; but, as previously indicated, the loss is not so much what we use, as what we waste. This waste arises not only in the coal that is left underground in worked out mines, partly as pillars to support the roof, partly as discarded coal of inferior quality, and partly because the working out of the lower and best beds of coal frequently breaks and renders impossible the subsequent mining of superincumbent veins, but it is because of the great waste of energy in coal actually consumed.

As has been pointed out time and again, we do not obtain for actual consumption more than five to ten per cent of the potential energy of the coal we burn. The rest goes to making steam and smoke and overcoming friction and inertia. Nearly one-third of the total coal supply of the country is used in railway operations, and not over five per cent of that is used in the actual work of pulling trains. We use a vast amount of coal to produce electric lights, and yet usually less than one-fifth of one per cent is actually converted into light. How best to conserve the energy of coal which goes to waste in this manner is a problem the federal government can well take up and devote its best energies to solving. Investigations already made by the Technologic branch of the United States Geological Survey show how it is possible to obtain two or three times as much energy from coal as is obtained by present methods, and still greater improvement is no doubt possible.

We have plenty of fuel supply in this country, both for our present needs and for all future needs, if we will stop the waste and practice increasing efficiency in the transformation of coal into power. Recent investigations conducted by the Geological Survey have demonstrated that low-grade coals which we have been in the habit of throw-

ing away, because they could not be burned in ordinary furnaces, can be used to great advantage in developing power by means of the gas producer and gas engine. As individuals we are prone to think only of the present and our present interests and desires. It is the duty of the nation to look to the future and to provide for coming generations, and there is no question which concerns the future more than the problem of an adequate supply of cheap fuel.

Many scientists and many practical men believe that processes will in time be discovered which will do away with practically all this immense waste of power and fuel, and the federal government can well afford to provide annually for investigations along this line of inquiry, under the direction of an efficiently conducted bureau.

The government has for several years past been engaged in performing important work in the analyzing and testing of coals and lignites of the United States and the investigation of structural materials.

The fuel bill of the United States government buildings now aggregates about ten million dollars yearly. The tests made of coal by the United States government, with the resulting grading of fuels according to their caloric efficiency, have already made a saving in the government annual coal bill of thousands of dollars. The government has investigated the smoke nuisance and the results obtained show that every type of coal may be burned practically smokeless, and the elimination of the smoke which now pours in a filthy mass out of our chimneys means not only greater comfort and greater cleanliness for each one of us, but it also means less waste and greater efficiency. Investigations of the government also show that much of the coal heretofore wasted can be conserved by making it into briquets. In this way great quantities of coal that are now wasted can be utilized for generating power and for railroad and domestic purposes.

Recent experiments at the government fuel testing plant at Denver, Colorado, show that many coals can be greatly improved by washing, at a nominal cost of from

three to ten cents per ton. The experts there have also succeeded in making coke out of a great variety of coals that have heretofore been regarded as non-coking. The United States is the greatest consumer of structural materials, the building and engineering construction work of the government now aggregating forty millions yearly, and while this work is being done for the government itself, the problems thus solved cannot fail to be of incalculable benefit to the entire country.

What I have thus briefly referred to relates to the prevention of accidents and loss of life and the prevention of waste in the coal mining industry. The same considerations, however, apply to all branches of the mining industry. The loss of life in the copper mines of the United States is said to be almost as great comparatively as in the coal mines, and we know the waste in gold and silver mining has, in the past, been so great that under improved methods of extracting the ore the tailings and refuse of former operations today furnish a splendid profit on reworking.

Aside from those purposes immediately apparent as most pressing for attention and pursuit under its regular and legitimate prerogatives, there are very many lines of educational, industrial and commercial effort, too numerous to admit of, more than passing mention of a few, that will be directly and materially benefited by information obtained through the investigations of a Bureau of Mines and Mining.

Congress makes appropriation annually for the support of agricultural colleges in the several states. A bill is pending to apply a portion of the proceeds of the sales of public lands to the endowment in connection with these agricultural institutions of schools or departments of mines and mining. The Senate Committee, of which I have the honor to be Chairman, reported the bill favorably, and the Senate has passed it. The following paragraphs appear in that report:

"The splendid success which has in every case attended the establishment of the agricultural and mechani-

cal colleges, and the invaluable work they have done in developing and increasing the agricultural wealth of the nation, have abundantly justified the wisdom of the act which founded them. Your Committee believed that the passage of this bill will do for the mining interests of the country what has been so well done under the original act for our agricultural interests. It is a matter of common knowledge that notwithstanding the great value of our mineral product, amounting in 1900 to the stupendous aggregate of $1,070,108,888, there is yet an enormous waste in the present process of extracting both precious and common minerals. There can be no doubt but that scientific research, investigation and experiment will eventually develop methods and processes by which a large part of this waste can be avoided, and the aggregate wealth of the nation thereby vastly increased.

"It is a well recognized fact that the science and art of agriculture in the United States have been revolutionized through the agency of the agricultural experiment stations established under the act of Congress of 1887. Your Committee believe that the same methods which have produced such fruitful results in the field of that great industry will be equally productive when applied to the development of our untold mineral wealth, and it seems incontestable that it is as much the right and the duty of the federal government to extend aid in the latter case as in the former. The amount appropriated by the bill to forty-eight states and territories is for the first year $480,000, and will amount at the end of ten years to $960,000 per annum. If this expenditure should result in increasing by only one-tenth of one per cent our annual mineral product, the country would be more than repaid in the direct increase of wealth, of tax-paying power, and above all, in the widely diffused increase of intelligence and skill; for every dollar of mineral wealth wrested from the soil is new wealth, which goes into general use, permanently increasing the volume of metallic circulation and contributing ready ma-

terial for the arts, sciences, and the conveniences of civilized life."

The problems which are being presented to the members of the mining and metallurgical profession are increasing in complexity year by year. It is becoming necessary to conduct mining operations at greater length, and this involves new problems in hoisting, pumping, drainage and ventilation. The necessity for making closer savings in all metallurgical processes is resulting in the invention of new methods and the improvement of old ones. In many branches methods are now in use which have not undergone any change or improvement for periods varying from a decade to a century, and we can scarcely look to any other source than technical education for leaders to attack these problems. The day of accidental discovery is largely gone by, and the greatest advances of the future must be made by approaching the problems from a scientific point of view and conducting experiments in a more systematic manner than is customary with the hit-or-miss operators whose experiments are conducted without rhyme or reason.

Of the total mineral products of the country, nearly one-third, or a total value of 657¾ million dollars, are produced in Pennsylvania, while the three states of Pennsylvania, Ohio and Illinois furnish more than one-half of the entire output. Every state and territory, however, appears in the recapitulation by states, and the value of the output in every state except Delaware equals in value about one million dollars and upwards.

In the past decade great progress has been made in the clay working industries of the country, both in quality and quantity of ware, the total value of the output having doubled in that time. There have been improvements in processes of manufacture and great economies in production, and undoubtedly there is a large field open for further improvement.

The great range in prices the country over of many clay products indicates as well as figures can tell, the field of usefulness of a scientific bureau which will do much

needed work in analyzing clays, in pointing out the possibilities of known deposits, and in showing how economies can be practiced in manufacture.

The pottery business of the country suffered more in 1907 than did any branch of the clay-working industries, the total value of pottery products decreasing from over thirty-one million dollars to thirty million dollars, or 4.13 per cent, although the value of the output in this country has doubled in the past ten years. The home production is now equal to nearly three-fourths of the consumption, and is steadily gaining, with promises that before long the domestic ware will supply the entire demand. The quality is improving also and there is no reason why American pottery will not, in a short time, be admitted by all to be the equal of the very best imported ware. White ware is produced in nine states, but it could profitably be produced in many of the Western states, where there is an abundance of accessible and suitable material.

New Jersey and Ohio are now the leading pottery producing states, turning out sixty-eight per cent of the total product, and Trenton and East Liverpool are the great pottery centers. Their total output in 1906 was nearly thirteen million dollars in value, which was slightly less than the value of earthen ware, china and porcelain, decorated and undecorated, imported the same year into the United States.

The statistics of the clay-working industries of the United States in 1907, issued by the Gelogical Survey, show the number of permits issued, or of buildings erected thereunder in the leading cities of the United States, together with the character of the buildings. From the fifty cities reporting it appears that of the permits issued or buildings erected, over sixty per cent were for wooden buildings, and nearly forty per cent were for brick and stone construction. A number of large cities in the country report the construction of fire-resisting buildings exceeding in value the construction of wooden buildings, but the relation of sixty per cent to forty per cent shows the continuance of the practice

in this country of furnishing abundant material for the fire demon. For illustration, we have only to think of the Iroquois Theater fire, with its six hundred lives lost, and even within the past year of the heartrending catastrophes at Collinwood, O., and Boyertown, Pa., in each of which some two hundred school children perished. This brings us naturally to the consideration of the annual fire losses of the United States, which we all know are prodigious. I have seen it stated that the fire losses of the United States in 1907 aggregated some two hundred and fifteen million dollars, or a loss of some two dollars and a half for every inhabitant of the country. When we compare this loss with the reported fire losses suffered in European countries, which average only some thirty-three cents per capita per annum, we cannot fail to be impressed with the gravity of this problem, and the necessity for a scientific investigation.

When we consider that the amount of money expended annually by the states and cities and the people of the country in building and construction work exceeds one billion dollars, and that over half of this sum goes for structural materials, the importance of an investigation of this character, carried out by competent and impartial inquirers, is of the greatest value. The investigation of this character carried on by the government has been largely into the constituent materials of concrete and the concrete itself, but the work is now being extended to other structural materials. Without taking time here to go into details as to what these tests have shown it is sufficient to say that they indicate the possibility of reducing the amount of materials necessary, thereby producing economies of ten per cent and upwards in structures put up, wholly or in part, with reinforced concrete.

Two of our mineral resources which are wasted with the greatest prodigality are natural gas and water. The State Geologist of West Virginia, Dr. I. C. White, says on this point:

"No one can even approximate the extent of this waste. From personal knowledge of conditions which exist in every

oil and gas field, I am sure the quantity will amount to not less than one billion cubic feet daily, and it may be more. The heating value of a billion cubic feet of natural gas is roughly equivalent to that of one million bushels of coal. What an appalling record to transmit to posterity.

"There can be no doubt that for every barrel of oil taken from the earth there have been wasted more than ten times its equivalent in either heating power or weight of this the best of all the fuels, and also that much more than half of this frightful waste could have been avoided by proper care in oil production and slight additional expenditures."

The supply of natural gas and petroleum is not renewable, as is the water supply. Water power is our greatest natural resource and the one heretofore least utilized. As the past has been an age of steam, so we are today just entering on an age of electricity, and that means, engineers say, the beginning of the age of water power. One of the speakers before the Conference of Governors, held at the White House last May, said that the United States now has thirty million horse power available in its streams, which is equivalent to the total horse power utilized for all forms of production and transportation throughout the country. Thirty per cent of all the horse power now used is utilized electrically, and this electrical use of power is the growth of twenty-five years. By 1920, if the increase of electrical power continues steadily, it will equal or exceed the power mechanically applied.

There is a great field then, for the federal government in investigating and experimenting in the methods of all kinds of mining and allied industries, and in studying thoroughly the science of metallurgy. Just as a comparatively small investment annually in the way of appropriations for the Department of Agriculture has resulted in greatly increasing the value of our farms, so a small investment for the purpose of investigation and examination into matters pertaining to the great mining industry of the country—an industry which in output ranks next to that of agriculture—

will result in an actual saving of millions of dollars annually.

The relation of the federal government to mining is therefore a very important one, and the function of the government in the premises is plain. An industry whose output is worth over two billion dollars annually, and is steadily and rapidly increasing, is worth greater attention than it now receives from the central government. This Congress can devote itself to no more worthy object than to help create a public sentiment which will result in the federal government doing as much in behalf of mining as it now does for agriculture, and we may be assured the resulting benefits to the industry and the country at large will be as great.

Transportation of Mineral Products.

BY EDWARD H. HARRIMAN.

Pittsburgh is the approprite place for the discussion of problems connected with transportation for the products of the mines. It is the greatest industrial center for utilizing these products; and the aggregate tonnage of the incoming and outgoing freight, consisting largely of such products, is larger than the aggregate tonnage of any other three of the world's greatest cities.

There is ample reason, therefore, why the people of Pittsburgh should be proud of their city, and there is still more reason why the men in charge of these industries, through a more efficient use of raw materials and an increasing diversity of manufactured products, should strive to perpetuate the greatness which they have achieved.

Mine Products as a Factor in Transportation.

The mineral production of the United States during the past year had an aggregate value of more than $2,000,000,000, and the crude and manufactured mineral products of the country gave an aggregate tonnage of more than 525,000,000 tons.

The total tonnage reported by the Interstate Commerce Commission as originating on American railways in 1906 was 820,000,000 tons. Of this the crude products of the mine aggregated more than 435,000,000 tons, or 53 per cent of the total tonnage. Add to this 89,000,000 tons of manufactured mineral products, such as cement, lime, steel, etc., and we have a total mineral production transported by the railways of approximately 525,000,000 tons, or 64 per cent of the entire freight business of the country. In addition to this the railroads hauled for their own use about 100,000,000 tons of coal during the year, or 275,000 tons each day.

Of other freights during the year, the products of the forest, agriculture, merchandise, animals, and manufactures

(excluding the 89,000,000 tons of manufactured mineral products) make 36 per cent of this total haulage.

When we classify the mine products transported on the American railways, measuring the tonnage by that originating on each road, we find that the largest of these products is bituminous coal, of which 206,000,000 tons were transported during 1906. The other products were anthracite coal, nearly 60,000,000 tons; coke, 33,000,000; ores, 69,000,000; stone, sand, and other like articles, approximately 58,000,000; miscellaneous mineral products, more than 9,000,000.

Adding to these the manufactured mineral products we have, petroleum and other oils, 6,500,000 tons; iron, pig and bloom, 21,000,000 tons; other castings and machinery, 13,500,000 tons; bar and sheet metal, 15,000,000 tons; cement, brick, and lime, more than 27,000,000 tons. Besides these, as stated above, the railroads hauled for their own needs more than 100,000,000 tons of fuel and other materials.

The generalized classification of the freight traffic of the country is given in the following tables taken from the reports of the Interstate Commerce Commission for 1906:

SUMMARY SHOWING FREIGHT TRAFFIC MOVEMENT, BY CLASS OF COMMODITY, ORIGINATING ON LINE OF REPORTING ROADS IN THE UNITED STATES FOR THE YEAR ENDING JUNE 30, 1906:

Class of Commodity	United States: Tonnage reported as originating on line Tons	United States: Per cent of aggregate	
*Crude products of mines	435,450,476	53.09	64.00
*Manufactured mine products	89,523,200	10.91	
Manufactures other than from mine products	31,935,538	3.90	14.81
Products of forests	92,187,351	11.24	
Products of agriculture	70,201,721	8.56	
Merchandise	33,319,615	4.06	
Products of animals	19,002,825	2.32	
Miscellaneous	48,543,902	5.92	
Grand total	820,164,627		

*To this total of 524,973,676 tons may be added 100,000,000 tons of coal transported by the railroads for their own use.

Increase in Mineral Freights.

The products of the mines constitute the heaviest freight and are charged the lowest rate. They are usually non-perishable, and their quick delivery is, as a rule, not urgent, except in a shortage of coal during the winter seasons.

As a rule the mine products are more constant in their production than any other large items of freight. As will be seen from the figures given, coal is by far the largest single item; and while the production of coal varies from year to year, oniy nine times since the beginning of our records of coal mining in the United States (in 1814) has the production of any one year been less than that of the preceding year, the greatest falling off recorded being a drop of 12,000,000 tons in 1894 from the production of 1893. On the whole, the increase in production has been so rapid and so marvelous, that on one of the important coal handling railroads (Baltimore & Ohio) the coal transported during each of the past several decades has equalled the aggregate of that transported by it during all of the preceding decades; and the ratio in the increase of production of coal for the entire country has come near following this rule for the past eighty years.

There has been a correspondingly large increase in the tonnage production of many other important mineral materials, though in some of these the increase has not been so striking as in the case of the coal.

The Railroads as a Factor in the Country's Development.

, No man who has not participated in and watched the pioneer work of the railways in opening up the new country of our middle and western states has any conception either of the enormous task undertaken and accomplished by the early railroad builder or of the work accomplished by these pioneer railyay lines in the rapid westward extension and in the subsequent development of this great country. The railway construction across the plain and the desert, with no immediate freight or passengers in sight—this opening up

of vast sparsely settled regions and awaiting the coming of passengers and freight—has required not only a faith on the part of the thousands who risked the investment of their money in the future of undeveloped and in many cases of undiscovered resources, but has also required their confidence in the future fair treatment by the American people of these railways as the development of the country proceeds.

Fortunately, there were people willing to take the extreme hazard of investing their capital in railroads which were bulit not to handle traffic already existing but to create traffic by making it possible for people to live and prosper in undeveloped parts of the country.

Many of the original investors lost a large part of their capital. The risk was greater than they thought. But while these investors lost, the country profited. The early transcontinental railroads and the lines that were built after them made freight rates that enabled the farmers of Kansas, Minnesota, and of the Dakotas to sell their wheat at a profit in all the markets of this and other countries, despite the relatively long distances that it had to be hauled. They made rates that enabled the people of the Mississippi valley, as well as the people in the Western states, to use, at reasonable prices, the lumber from Oregon and Washington. They made rates that enabled the people of every town and hamlet in the country to obtain the fruits of California at a cost but little below that on the Pacific coast. They have transported coal and other heavy mineral products for distances so great and at rates so low as to be inconsistent with economic management of the railroads but for the fact that at those distant points these crude materials had developed new industries, which have in turn been the means of increasing traffic of a higher grade.

The supplies of these raw materials and cheap railroad transportation have been, and still are, the foundation of the wealth of this great country; and on no other foundation could this prosperity have been builded or be maintained.

In many parts of the country new territory is still being

opened and its development made possible by the construction of railways. But even while this pioneer work is still in progress in the larger part of the country, the struggle on the part of the railways during the past few years has been, and is now, to keep pace with the rapid growth and the rapidly increasing needs for larger, faster, and in every way more ample transportation facilities.

The Necessary Growth of Transportation Facilities.

For years the railways of the country have been endeavoring to meet this great need of transportation facilities. The undertaking has been one of enormous proportions. The following figures will indicate somewhat the magnitude of this problem and the extent to which the demand is being met:

The total mileage of railways in the United States was 6,535 miles in 1840; 30,626 miles in 1860; 93,267 miles in 1880; 159,271 miles in 1890; 192,940 miles in 1900; and about 230,000 miles in 1907.

Recent railway development, as indicated by the attached tabular statement, shows that there was in use in 1896, 182,000 miles of single track; 20,000 freight locomotives, and 1,222,000 freight cars; whereas during the year 1906 there were in use 222,000 miles of single track, nearly 30,000 freight locomotives, and more than 1,800,000 freight cars, showing an increase during that period of 40,357 miles of single track road, 9,497 freight locomotives, and 616,000 freight cars.

Meanwhile there has been a still greater increase in the weight of the locomotives and in the capacity of the cars. Thus during the past ten years on the Union Pacific Railroad the freight cars have increased in capacity 69 per cent; and the locomotives have increased in weight nearly 40 per cent. On the Southern Pacific System during the past nine years there has been an increase of about 100 per cent in the capacity of the cars, and 56 per cent in the weight of the locomotives.

SUMMARY SHOWING THE INCREASE IN SINGLE TRACK MILEAGE; FREIGHT LOCOMOTIVES AND FREIGHT CARS IN TEN YEARS.

Years	Total mileage operated (single track)	Total freight locomotives	Total freight cars
1896	181,982.64	20,351	1,221,887
1897	183,284.25	20,398	1,221,730
1898	184,648.26	20,627	1,248,826
1899	187,534.68	20,728	1,295,510
1900	192,556.03	21,596	1,365,531
1901	195,561.92	22,839	1,464,328
1902	200,154.56	23,594	1,546,101
1903	205,313.54	25,444	1,653,782
1904	212,243.20	27,029	1,692,194
1905	216,973.61	27,869	1,731,409
1906	222,340.30	29,848	1,837,914

Increase in mileage from 1896 to 1907: 40,357.66 miles.
Increase in number of locomotives: 9,497.
Increase in number of freight cars: 616,027.

Even these striking figures do not tell more than half the story. Enormous expenditures have been made in straightening these tracks, improving the grades, putting in better bridges and culverts, improving the roadbed, and in increasing the weight of the rail, the size of the freight car, and the hauling capacity of the locomotives.

The competition between the weight of the rail and the capacity of the locomotive has been as acute as that between the armor plate and the projectile in modern battleships.

The following statement of railway equipment at the present time may convey but little idea to the general public, but it means a huge outlay of labor and money on the part of the railway companies of the country.

On June 30, 1906, there were in the country 222,340 miles of single track railways. Including double tracking, siding, etc., there were in operation a total of 317,000 miles; 51,672 locomotives; 1,837,914 freight cars, with an aggregate capacity of more than 59,000,000 tons.

Of these freight cars, 686,717 were used for the transportation of coal; and they had a capacity of nearly twenty-five million tons.

The railroads employed at this time 1,521,355 persons.

The average distance that each ton of freight was carried during 1906 was about 241 miles.

As illustrating further the extent of the equipment necessary for the transportation of the mineral production of the United States, I may add an estimate from Mr. Parker of the United States Geological Survey, that with an average of thirty cars of coal to the train, and fifty tons to the car, 332,330 trains would be required to transport the product of the coal mines of the United States during 1907; and the combined length of these trains would extend two and two-thirds times around the earth at the equator.

So much for the past and present demand for transportation facilities. A little further on I shall call attention to the needs of the immediate future.

Freight Rates and Mineral Production.

Both the producers and consumers of mineral products are naturally interested in any and every factor which enters into the question of the cost of these materials. It is natural for the consumer to think that they cost too much; and he may divide the responsibility of the supposed excessive cost between the miner and the railroad. The producer, on the other hand, is apt to lay the supposed excessive cost at the door of the railroad. And there is a widely circulated expression that the railways charge for transportation all that the traffic will bear. It is equally true that they do not charge what the traffic will not bear, as the figures heretofore quoted showing the marvelous growth of traffic proves.

It must be remembered that even in the long settled portions of this country the railroads are still doing development work, and at great cost; building over again, trying to keep up with the demands for better transportation facilities.

I am not here to make or deny any specific charges as to freight rates. I realize the fact, as do you, that inequalities may sometimes get into freight rates as well as into other forms of business; but these are being eliminated as fast as the situation in each such case is realized.

You gentlemen connected with the mining industries of

this country know from your standpoint, as well as I do from the standpoint of the railway man, what prospecting and pioneer work mean.

The miner and the railroad have been the two greatest advance agencies in opening up and developing the country. You gentlemen understand, as well as does the railway expert, the cost in money and labor of this advance work, and you also know something of the uncertainty of the results, because, in view of the large share which the products of the mine make in the transportation of the railroad, it is apparent that in a large measure the success or failure of the miner makes the success or failure of the railroad.

You understand further how the railroads, instead of making the freight charges all that the traffic will bear, have placed their rates on these mineral products at the lowest figure that the railroad could bear, in order to render possible the development of the mining industry. Without the railroads and without the fair co-operation of the railroads, great industrial development in this country would have been impossible, and the enormous developments of the last half century in every part of this country is the best possible evidence that on the whole the railroads have dealt farily with those directly connected with and directly responsible for these developments.

Opening of markets by railways makes possible industrial developments and the use by railroads of fuel in the first instance gives impetus to such development.

The managers and the stockholders of railways in this country realize that they must make rates that will enable the industries located along one railway line to compete with those located along other railway lines. They also realize that even the great trans-continental systems of rates must be such as will enable the industries of this country to compete with those in other countries. They also realize—and you will admit the justice of the claim—that the freight charges must be such as to permit the railroad to do its work properly and yield fair returns to the

men and women of this country whose savings have helped to build and improve the railroads.

Let me call your attention also to the fact that as the country is developing, and as the railways are developing, freight rates have been diminishing. Thus the freight rates per ton per mile on the railways of the United States were 1.89 cents in 1870; 1.2 cents in 1880; .94 cents in 1890; .84 cents in 1895; .73 cents in 1900; .76 cents in 1905; and .75 cents in 1907.

The transportation conditions in European countries are quite different from those in the United States. Nevertheless, reference is often made to the low freight charges in other countries. It may, therefore, in the present connection, be worth while to call attention to the fact that during the year 1906, in the larger European countries the freight receipts per ton mile were nearly twice those in the United States during the same year; and during that year the lower rates per ton mile at which the American railways carried freight, contrasted with the rates per ton mile received by the European railways, was equivalent to a saving by the people of this country of over $1,000,000,000.

Fair Treatment of Railroads Essential to Their Own Development and to that of the Country.

The people of this country desire to be fair, and they desire to see all interests treated fairly. But owing to a lack of information concerning many of the fundamental factors in transportation, there is danger that this needed development of transportation facilities may be retarded or prevented through the unjust treatment of the investors in railroads.

The impression exists that the railroads are owned by a few rich men, and it is contended that because these men are rich they can stand a restriction to a small return on their investments. But the fact is that the railroads are not owned by a few rich men, and even if they were, it is as contrary to the spirit of American institutions and the American spirit of justice for the law to discriminate

against a man because he is rich as it is for the law to discriminate against a man because he is poor.

The railroads of the United States had, on June 30, 1907, 328,000 miles of track and about 350,000 stockholders, or more than one stockholder for every mile of railroad operated, and these stockholders are scattered throughout the entire country.

The opinion that those who invest their means in a railroad should not be permitted to earn more than a "fair rate of interest" upon the actual cash value of its property, and that four per cent is a "fair rate of interest," and hence the maximum permissible interest on such investments, is inconsistent with the higher rates of interest from other kinds of investment.

Thus, as shown by the statistics of the United States Department of Agriculture and other government agencies, in the year 1900 the farmers of this country received a return of nine per cent on the value of their farms in that year; that the manufacturers enjoyed in the same year a net return of 19.4 per cent., while the average net return upon railroad investments was scarcely four per cent. The same source of information showed that in the year 1905 (another prosperous year) the average net returns of the farmers was 9.8 per cent on the value of their farms, and that of the manufacturers was 15 per cent; while the average return upon the railroad capital was but 4.4 per cent. Investments in the railroads west of the Mississippi have been usually even less satisfactory. The dividends on one of the important western transcontinental lines from 1882 to 1906 averaged 2.9 per cent; that of another, from 1883 to 1906, averaged 2.3 per cent; that of another, from 1885 to 1906, averaged 1 per cent; that of still another, from 1884 to 1906, averaged 1.5 per cent.

As a single additional basis of comparison I may add that during the last forty years the dividends of national banks in the United States have averaged 8¾ per cent. In no year has this average gone below 6 per cent. During the last few years these national bank dividends have averaged 10 per cent.

After the investors in railroads have been disappointed for so many years by not receiving as large returns as they had hoped for—returns that they felt they were entitled to when they made their investment—it is now proposed to limit by law the maximum dividends possible in railway investments, at what might be considered a mininmum return in other industries (about four per cent), on the grounds that the railroads, being quasi-public corporations, the public has the legal right to reduce these rates as low as it pleases, if it does not make them confiscatory. But mind you, nothing in this proposal suggests that some outside party should bear the losses and guarantee four per cent minimum return on railway investments.

The question which the public should consider in this connection is not its right to fix these rates so low that they will barely avoid confiscation, but it is the broader questions of equity and the public welfare. If investors find that they can get continuously higher rates of interest on investments in connection with other industries, they will not invest in railway securities, and hence funds needed for providing better transportation facilities will not be forthcoming, and the development of the country itself will be checked.

Transportation Needs in the Immediate Future.

In this connection let us not forget that we are just beginning to realize the possibilities in this country's growth, and the transportation facilities should be such as to aid rather than retard this development. I have already referred to the recent rapid increase in the demand for transportation facilities. I wish to refer to the future just sufficiently to impress upon you the magnitude of our railway problems of the next twenty years.

There are too many factors of uncertainty to permit our dealing in specific prophecies, but the best statisticians of the country give the United States twenty years hence (1927) a population of 114,000,000 people, and a yearly coal production at the time to be handled by the railways of about 1,200,000,000 tons.

You who produce this coal realize how essential it is to the mining industry that adequate transportation equipment be at your disposal, but I do not believe the general public realizes the fact that the railroads must not only furnish the equipment necessary for hauling this coal, but also that, owing to the lack of local storage facilities, they must have these cars placed at the mine with such regularity as to render continuous mining possible. The figures are not available for predicting with similar accuracy the increase in production of other products which enter into the traffic of the country, but the intimate relation of coal production to that of the production of iron and steel and other manufacteured products justify the use of the above figures as indicating the enormous freight traffic which the railroads of this country must be prepared to take care of during the immediate future.

Water Transportation for Mineral Products.

The people of Pittsburgh are naturally and especially interested in the improvement of inland water transportation facilities as a means of enabling you to receive your heavy raw mineral products and to distribute over the country your heavy manufactured mineral products at the least possible cost of transportation. This is a commendable purpose. If it can be accomplished at a reasonable cost, I extend my best wishes for its accomplishment. Everybody knows that these heavy, crude mineral materials can, under favorable conditions, be carried more cheaply by water than they can by rail. The fact that these materials are non-perishable and need not be subject to the demands for quick delivery, renders them, of all freight, best adapted to the necessarily slow water transportation. Perhaps nowhere is this fact demonstrated more clearly than in your present irregular transportation of coal from Pittsburg down the Ohio and Mississippi Rivers, by which you can transport coal from Pittsburg to New Orleans at a cost of less than one dollar per ton, even under the existing unfavorable conditions. I can but wish that such water trans-

portation facilities existed throughout the great West, as I would be glad to have this Pittsburgh coal delivered in boats at different points along the Southern, Central and Union Pacific Railway Systems, so that our locomotives could be supplied with coal without our having to carry it two thousand miles in our own freight cars.

We have another good illustration of cheap inland water transportation on the Great Lakes, where the record shows that during the fiscal year ending June 30, 1907, there have passed through the Sault Ste. Marie Canal more than 54,000,000 tons of freight, of which more than 47,000,000 tons were of heavy, crude mineral materials.

Railroad men, like other men, are not in the habit of inviting competition; but we all recognize the increasing need for greater transportation facilities of all kinds, and the railway men of today should welcome such improvements of the inland waterways of this country as can be made at a reasonable cost and maintained by the government on a business like basis.

Similarly, every one should welcome and encourage the building of good wagon roads. Just as great saving will in the future be made in the economic cost of railroad transportation through double tracking, reducing grades and improving road beds; so also a similar and in some cases a greater local saving in the cost of transportation can be brought about through improvements in the public highways which connect the farm with the railroads and the smaller markets.

In Conclusion.

Let me impress on you the fact that the interests of producers, of consumers, and of the transportation agencies that bring them together in the markets of this country and of the world are mutual and interdependent. We cannot afford to so adjust our rates as to place undue burdens on your business, for that would arrest the development of our traffic. You cannot afford to cause law makers and railroad commissions to continue unduly to increase our operat-

ing expenses and reduce our earnings and thereby hinder the expansion of our facilities; for that will arrest the growth of your business and the increase in the value of your properties. As our interests are mutual and interdependent, we will all gain by recognizing frankly one another's legal and moral rights and co-operating in a broad and intelligent spirit for the promotion of the development and progress of this marvelously promising country.

No other country has so rich a heritage of mineral and agricultural wealth as has the United States. No other country is so wasteful in the use of those resources. No country has ever had so phenomenal a growth. This growth is yet in its infancy. In order that this development may be wise and permanent, we must quit our habit of waste and develop the habit of efficient use of our resources. We must encourage and enlarge our systems of transportation, both by rail and water, in such manner as will build up appropriate industries in every part of the country, and as will best develop the country as a whole.

REFERENCES.

From Mineral Resources, United States Geological Survey, 1907.
Interstate Commerce Commission Annual Report, 1906.
Coal Production, United States, U. S. Geological Survey, 1906.
Interstate Commerce Commission Annual Report, 1906.
Records U. S. Geological Survey.
Statistician, B. & O. R. R.
Slason Thompson, Bureau of Railway News, Chicago.
Union Pacific Ry.
Railway Statistics for U. S. for years ending June 30, 1907, prepared for General Managers' Assn. of Chicago by Slason Thompson, Bureau of Railway News.
Manuscript notes, Union Pacific Ry.
Annual Report Comptroller of the Treasury, 1907.
United States Geological Survey.
Annual Report, Chief of Engineers, U. S. War Dept., 1906.

The Importance of Arbitration as a Factor in the Advancement of the Mining Industry.

BY HON. CARROLL D. WRIGHT, CLARK COLLEGE, WORCESTER, MASS.

The most important and emphatic illustration of the importance of arbitration in any industry, so far as this country is concerned, was when the operators and miners in the anthracite region of Pennsylvania accepted the award of arbitration of the Commission appointed by the President at the request of the operators to adjust the questions existing between them and the miners.

It is of no consequence now how this commission arose or was created. It was appointed by the President, as stated, on the request of the operators themselves, not on the initiative interference by the President.

The strike of 1902 was a very severe one and with vast ramifications, its influence affecting not only domestic life, but the industries of the country. It had continued from May of that year until October, when the appointment of the commission was requested, and the two parties to the great strife consented to abide by the decision of the commission.

That commission, after five months of hearings and deliberation, made an award fixing the conditions which were to be the rule for three years. The award related to the demand for higher wages for contract miners, the demand for a reduction in the hours of labor, the demand for payment by weight, the demand for an agreement with the United Mine Workers of America, the subject of check weighmen and check docking bosses, the distribution of mine cars, the sliding scale, discrimination, lawlessness, boycotting and blacklisting, direct payment, and lastly the life and conditions of the awards.

The last award provided that the awards made should continue in force until March 31, 1906, that is, three years. In the fourth award the commission provided that any difficulty or disagreement arising under the award, either as

its interpretation or application, or in any way growing out of the relations of the employers and employees which cannot be settled or adjusted by consultation between the superintendent or manager of the mine or mines, or is of a scope too large to be so settled or adjusted, shall be referred to a joint committee, to be called a board of conciliation, to consist of six persons, three of whom should belong to the miners' organizations, representing a majority of the mine workers, and three other persons to be appointed by the operators, etc.

This board of conciliation was to take up and consider any question referred to it, and if the board was unable to decide, an umpire should be appointed at the request of the board by one of the Circuit Judges of the Third Judicial Circuit of the United States, whose decision should be final and binding in the premises.

Here lies the fundamental basis of trade agreements and arbitration preceded by conciliatory methods. The award was accepted by both parties and very faithfully observed during the whole three years. Near its expiration the miners thought they were entitled to some modifications and organized a strike to secure them. The operators would not yield and the result was that the complete award was extended for three years more, that is, to March 31, 1909.

During the first three years various questions arose relative to the interpretation of the award, extra demands of miners, etc. These were referred to the conciliation board, the results of whose decesion was accepted by the miners and operators. Several questions, perhaps fifteen or twenty, were referred to the umpire, and in every instance the decisions of the umpire were accepted by both parties and faithfully adhered to by them. During the second three years of the award, which became a voluntary agreement by the action in March, 1906, there has been little for the conciliation board to do, and so far as information goes the affairs of the anthacite regions have been running along smoothly and with fair satisfaction to all parties.

The result of the award of the commission appointed by the President put several millions of dollars into the

hands of the miners which they would not have received otherwise. The sliding scale has worked satisfactorily, so far as the writer knows, and the whole result has been beneficial in the extreme. The public has had full confidence that mining operations would go forward and the whole benefit of arbitration has been realized.

The previous history of the mining industry, so far as strikes are concerned, taken in comparison with the history in the anthracite regions since 1903, shows clearly, and, it seems to me, most emphatically, that the spirit of arbitration has been carried out during the past five years or more, and leaves no doubt of the desirability, even the necessity, of some such machinery as that which exists in the anthracite regions.

Peace is desirable, but not peace with dishonor, even in industrial affairs, and peace has prevailed with honor to both parties. A very careful canvass of the situation shows clearly that both parties have endeavored to abide by the award of the commission.

The mining industry is peculiar. There are very many irritating complications, resulting from necessary conditions that do not pertain to other industries. If therefore a system of arbitration and conciliation can be carried out, it is for the interests of the whole country, and especially becomes a most important factor in the advancement of the mining industry itself.

The award accepted by both parties constituted a trade agreement. The trade agreement concerns the ethical and economic characteristics of men. It has been in practice nearly forty years in England, and fifteen or twenty years in this country, and the instances of a breach of faith or a violation of the terms of the agreement are so rare that they need not be specified.

The action of the bituminous coal miners during the strike of the anthracite miners is a splendid illustration of this. The bituminous operators were making money more rapidly than ever, on account of the anthracite strike, but they were not paying any higher wages. The men were working under their trade agreement. The proposition was

made that they break this agreement and insist upon an increase in wages, a convention being called for this purpose, but it was voted nearly unanimously that the trade agreement should be held sacred. This did much to steady conditions in the mining industry of the country, but it did more. It emphasized the beneficence not only of trade agreements, but of industrial arbitration itself.

What will happen when the term of the award expires in March, 1909, no one can predict, but the existence through these years without a break in any of the terms of the award is something very remarkable indeed, and again emphasizes the beneficence of that method of adjusting difficulties.

But there is another side which appeals to many, and that is the advisability of some method which can be adopted for the settlement of trade disputes before the necessity of arbitration is reached. Arbitration is resorted to after war is declared, after the parties have exhausted their patience and their common sense. The lines of argument are clearly marked, the terms fairly stated, but the preliminary steps to arbitration ought to be avoided if possible. There should be a conciliation board, or a board of arbitration constituted through the provision of the trade agreement and looking to the avoidance of a resort to arbitration and the settlement of all the difficulties which arise, or the chief ones, by the very parties who are most interested, that is, the employers and the employees. Their reciprocal relations are thus brought out in a way that cannot be done otherwise. So the trade agreement holds out the greatest hope for industrial peace in the future; and the advancement of the mining industry that is so largely at the basis of our material prosperity, demands the recognition of these high principles of morals and economics combined.

Another method is now projected in Canadian law, providing for compulsory investigation. The Canadian law is not a new idea. Hon. Charles Francis Adams, for years president of the Union Pacific railroad and interested in all such matters, many years ago projected the indea of compulsory investigation. It grew out of his experience on the board of railroad commissioners of the

Commonwealth of Massachusetss, wherein he held that when the facts were known and given to the public, public opinion would force the desired result. It was a recognition of the public opinion in a great dispute, as well as the interest of the disputants themselves. In the report on the Chicago strike by the commission appointed by President Cleveland, this method of dealing with industrial disputes was recommended, and again the Anthracite Strike Commission not only recommended something of the kind, but published in its report in full a plan by Mr. Adams, which he called a proposed bill providing for compulsory investigation and publicity, but so far no state in this country has adopted the principle or the method outlined. The Canadian government has, and the work is being carried on there, so far as the writer is informed, with satisfaction on the whole.

The point is that, when a great strike occurs or is threatened, there should be some body with official authority to investigate all the facts relating to it in a broad, impartial and non-partisan manner, and give the facts to the public. Public opinion will then, as in Canada, settle the matter in most cases, and thus avoid the long-continued strike or the necessity for a court of arbitration. When the actual facts of a great strike are known it is not difficult for public opinion to place the responsibility for the strike where it belongs. This is the ethical element of any such method.

Every step which the American Mining Congress can take that will emphasize the necessity of considering these questions of arbitration and conciliation and of investigation will be in the right direction, and will of themselves constitute an important factor in the advancement of the mining industry.

The Duties of the Federal and State Governments in Relation to the Mining Industry.

BY GEO. HARRISON, CHIEF INSPECTOR OF MINES OF OHIO, COLUMBUS, OHIO.

In a city renowned as the center of one of the greatest mining industries in the world, and addressing an audience composed of Governors of various states, or their direct representatives, United States Senators, Congressmen, and many other eminent statesmen, officers and members of the American Mining Congress and United States Geological Survey, scientific, technical and practical mining experts, mining engineers, mine inspectors, and many others assembled to promote mining interests and no doubt endeavor to devise ways and means whereby the enormous list of fatalities can be reduced and greater protection given to life and limb of those employed in the mines in this great mining country, we are forcibly reminded that the dreaded seanson of the year is at hand, when lifting our morning newspaper, we hold our breath, fearful that our vision may fall on some news item announcing in large head lines: "Great Mine Explosion and Appalling Loss of Life."

One year ago, when a number of mine calamities followed in the wake of each other with such rapid succession and great loss of life, the human sympathy of the people of all classes was aroused beyond description for the bereaved and sorrowing wives, children and relatives, whose means of maintenance had been so suddenly cut off by the sad fate of their bread-winners.

A portion of the general public, often more ready and capable of tearing down than of building up, without considering the unprecedented prosperity, the rapid development of mining properties, the great demand for, and increased production of coal, the introduction of mining machinery, the advent of electrical power, the changed systems of mining and the incessant influx of utterly unskilled, non-English-speaking labor into the mines with all their

attendant hazards, was cruel and unjust in its unfriendly criticisms of what it termed "incompetent mine inspectors," "indifferent state and federal governments" and "inhuman mine operators," thus dividing the responsibility and rendering their verdict without knowledge of the true conditions and circumstances, making such disasters highly probable, if not absolutely certain.

As often repeated in past mining history, the great sacrifice of human life in the mines in so short a time, taught its lesson and left its imprint on the minds of all deep and careful-thinking men, especially mining men.

Anxious to learn the cause and devise remedies for such awful catastrophes, a series of very thorough investigations was conducted by scientific and practical experts, and while no definite or final conclusions were reached as to the initial or primary cause of such occurrences, much valuable information was gained regarding the many new dangers incident to new methods of mining and producing coal, the accumulation of which is gradually but surely exposing those who work in the mines to much greater peril. There is very little doubt that the researches referred to had the effect of convincing nearly every one who took a part in them that the most effective way, if not the only way, to avert such calamities, was by the enactment and judicial enforcement of uniform mining laws and customs in every mining state where similar conditions exist. This conclusion is fully sustained when we hear the strong protests, and in many instances, logical arguments advanced by mine operators against the enactment of stringent mining laws by state legislative bodies, not because they are opposed to such laws, or do not deem them necessary in the protection of life, but because any restrictions put upon them that will increase their cost of coal production, will practically exclude them from their natural markets in competition with coal from other states, the operations of which they claim are less incumbered with cost-increasing legislation. This argument, whether a sincere one or not, we presume is met with in every state, and is a severe

stumbling block in the way of securing much-needed mining legislation.

On June 9th last, a gathering of mine inspectors from various mining states convened in the city of Indianapolis, Indiana, and after considering the seriousness of the situation from increasing fatalities in mines, decided to organize an Institute of Mine Inspectors of the United States, with the object in view of mutual assistance and more complete co-operation and concerted action in securing better and more uniform mining laws. While a movement of this kind is in the right and proper direction and should be encouraged and sustained, there is no doubt a large number of those who favor it go further and believe that any step in the direction of better and safer regulation of the operation of mines, to be general and successful, should be of a national character, having the moral and material support and carrying with it the impetus of the federal government.

There may be some difference of opinion as to whether representatives of the federal government can exercise any jurisdiction and authority in mines in the various mining states, or what the effect would be on state mining departments, but there is no need for such questions to arise. A Federal Bureau of Mines could do very efficient work by investigations in many directions and in co-operation with state mining departments, without breaking down any of the state constitutional barriers, or in any way interfering with the authority of state mine inspectors in the proper performance of their duties. Standardization and uniformity of methods, customs, respective duties of persons, application of motive power, and many other things in connection with mine operation are highly essential, but cannot possibly be accomplished satisfactorily in the various mining states, only through unity of State Mining Departments and Federal co-operation and influence.

The subject of electricity as a motive power in the operation of mines, and the dangers accompanying its application, is becoming one of very serious import, and the diversity of opinion amongst electricians and students on

the subject as to methods of application and danger resulting from the various systems are so varied that they are extremely confusing, and many of them far from being sustained by actual results.

Many electrical engineers and persons looked upon as eminent authority, take the position that a 650-volt system can be applied in mines with "ordinary safety," and that there is little more danger, if any, in persons coming in contact with a 650-volt wire than a 250-volt one.

Last year (1907) about 80 per cent of the total production of coal in Ohio was produced by electric mining machines and haulage motors. The following quotations are taken from an article headed "Electric Wires," page 30, Ohio Mine Inspector's Report for 1905:

> "The careless and unsystematic placing of wires in mines for the purpose of conducting that invisible, deadly power, electricity, and the number of accidents resulting from employes coming in contact with them, is a matter which will sooner or later force itself on the attention of the law-making power of the state and compel the enactment of stringent legislation.
>
> "That electricity as an element of power in the production of coal is not only necessary from a standpoint of competition, but that its use in every legitimate way in the advancement of civilization is justified, is acknowledged by every progressive man. It is, however, highly essential that the greatest caution be exercised in its application so as to avoid loss of life or injury to persons coming in contact with it.
>
> "There were six fatal accidents during the year, resulting from contact with electric wires in the mines of the state. This may not seem a very large number of fatal accidents considering the amount of coal produced and handled by electricity, but if proper care and foresight are used in the construction of wires, which can very easily be

done, especially in the opening of new mines, this department is of the opinion that fatal accidents from this cause can almost entirely be eliminated. It is also very noticeable that, with few exceptions, the fatal accidents from coming in contact with electricity are where a higher power of five hundred (500) or five hundred and fifty (550) volts is carried, which also seems unnecessary, as it is fatal to those whose misfortune it is to come in contact with them.

"Some manufacturers of high power electric machinery, and mine operators who desire to use such, may take exception to this department raising the question of limited voltage, but we feel that it is but fair to the 95 per cent of the mine operators in the state to say that they are successfully operating their mines with a power not to exceed 250 volts, which, in few cases, proves fatal where persons stumble against the wire, and those operators ought not to be charged in common for the loss of life with those who use an unnecessary and excessively dangerous power, and under whose operation these accidents almost exclusively occur."

Until August 10th of the present year, there has been no law on the Ohio statute books in reference to the application of electric power in mines.

Taking the tonnage reports of Ohio mine operators, made last January, covering the previous calendar year (1907), out of the total product mined by electric power, less than ten per cent was produced by the 500-volt system, and over 90 per cent by the 250-volt system. Last year (1907) eleven men lost their lives from accidental contact with electric wires. Eight of them, or 72 8-11 per cent, by the 500-volt wire, and three of them, or 27 3-11 per cent, by the 250-volt wire.

During the present year five men have been electrocuted by coming in contact with live wires, four of them,

or 80 per cent, by 500 volts, and one of them, or twenty per cent, by the 250 volts.

These statements are made from careful investigation by the department immediately following the death of each man, and from records in the office, the accuracy of which cannot in any particular be questioned.

We are loth to disagree with our foreign experts (who recently visited this country) on the question of danger from high voltage, and with many expert electrical engineers, and shall certainly not question their judgment, but, considering that our mine inspectors have been especially vigilant for three years in having high voltage wires exceedingly well guarded, and that men are very much less liable to carelessly come in contact with high voltage wires, this record is indeed significant, and does not speak very well for the safety of high voltage, convincing us that there must be some mistake in recommending a 650-volt current in mines as "ordinarily safe," unless there is a much safer method of applying it than has yet been demonstrated.

A 250-volt system is acknowledged by most mine operators in Ohio to be sufficient power to successfully carry on the operation of all present day mines, and if properly utilized, capable of mining and hauling coal two or three miles underground. The largest and most extensive and best regulated mines in Ohio, having the greatest production of coal, are operated by the 250-volt system, and have never had a fatal accident from electric shock.

The secret of high voltage in many cases in our state is simply a question of transmitting electric power into the mines at the least possible cost, and having a surplus of power to overcome losses caused by a cheap, careless, defective and dangerous method of conducting it, thus unnecessarily pitting human life against careless, incomplete methods of applying the power.

A number of fatalities referred to, occurring during the last two years, were from contact with wires supposed to be thoroughly insulated. The present general system of insulating electric wires is a complete failure in mines.

It soon becomes defective and is a delusion and, instead of being a protection and safeguard against danger, is a danger in disguise.

In four years 33 men in Ohio mines have met death by electric shock, and if the installation of high voltage systems is permitted to continue without the assurance of greater safeguards, the time is not far distant when it will be one of the greatest sources of danger that the miners in every mining state are exposed to. This invisible power is destined to revolutionize mining methods in every mining state, and its legitimate use should be encouraged, but the whole subject of electricity, especially as a motive power in mines, and the dangers incident to its application, should be thoroughly investigated by a Federal Bureau of Mines or Commission of scientific and practical experts representing the federal government, and the information gained imparted to those interested, in reliable form.

The time is at hand when in a great many mines, the lives of the whole force are in the care and custody of every individual who enters the mine. The dangers from gaseous mines, from the excessive use of blasting powder, from blasting coal off the solid, from the great army of unskilled miners as well as from the carelessness of those in charge of the mines and wanton recklessness of employes, are daily increasing, and in consequence must augment the roll of fatalities. The cry of competition from mine operators, and other causes, prevents the securing of necessary uniformity in laws and customs by individual states. The absence of an established central body is a "missing link," an immovable stumbling block in the way of effective concert of action by the various State Mining Departments.

The only way to bring about the necessary reform without doing injustice to the industry in any state is to seek co-operation with the federal government by and through the establishment of a National Bureau of Mines, employing the best scientific and practical expert talent that the states can produce, an institution that the various mining states could look up to with pride and confidence and seek information on any or all matters pertaining to

mining. Such a bureau, with a staff of good, competent men, or a permanent Commission, could make such investigations and collect and compile such information as would be of benefit and interest to the various state governments, and those connected with mining.

It is not necessary that such a Bureau should be endowed with any power or authority over state mining departments, or the operating of mines in any state. It ought to have right of access to mines for the purpose of ascertaining general conditions and securing information for general purposes, co-operate and advise with state authorities regarding needed changes of laws, methods or customs; it should promote the erection and maintenance of experimental testing stations, scientific and practical, and encourage any object that would elevate those connected with the management of mines to a higher standard of efficiency. State governments and state mining departments should be pleased to render any assistance in their power to those connected with a Federal Bureau of Mines.

The question of solid shooting, or blasting coal before being properly prepared, and all its attendant dangers to life and destructiveness to property; the reckless waste of coal by baneful systems of mining and by careless management; the excesive use of blasting powder; the dangers from unskilled labor; the serious results that have occurred and may occur from connecting mining properties; the causes for so many mine catastrophes and the best way to prevent them, and a great many other matters of equal seriousness, are well worth the consideration, and we believe are entitled to the most earnest consideration of every member of our National Congress and Senate.

The mine disaster and such serious loss of life at Marianna, occuring just at the time it did, has cast a pall of gloom over the city and a cloud of solemnity over the proceedings of this Congress. While it may not have been the hand of Providence that ordained it, we trust that the thoughts of the harrowing scenes at the mine and the sorrow of the bereaved ones, have left such an impression on the mind of every statesman who has attended this Con-

gress, that there will be no further doubt about the establishment and maintenance of a Federal Bureau of Mines, and that it may be truthfully written on the tombs of those poor victims: "Lives given up in sacrifice for better mining laws and greater protection to our craftsmen."

On behalf of the members of the Mine Inspectors' Institute of the United States, we desire to thank the officers and members of the American Mining Congress and the United States Geological Survey for their kind invitation to us to attend and take part in their proceedings, and wish to assure them that we are with them, heart and soul, in the inauguration of any movement that will bring greater success to the mining industry, better protection to the miner, and more comfort and happiness, with less grief and sorrow, to those dependent on him.

Conservation in the Mining Industry.

BY FRANK M. OSBORNE, CLEVELAND, OHIO.

Since the early part of the Nineteenth century great inroads have been made on the fuel resources of this country, and especially has it been true during the last two or three decades, during which time the increased production has been rapid. During this period the fuel supply in Pennsylvania has been drawn on for more than half of the entire total production in the United States, and at the same time great waste prevailed, and when it is considered that we have produced half of the coal our state has shared half of the waste that has been going on since the beginning of the coal mining industry in this country. Each year the output was increased and but little attention paid until late to mining methods and production that would tend to greatly lessen this economic waste.

Our past shows that the idea was prevalent that we had plenty of good black carbon in the hills and that it would last forever, but our industrial progress has proven that our best coals are being rapidly depleted and that a curb should be placed upon the reckless and uneconomic methods in both mining and consumption of our fuel resources, not only proper methods of taking the coal from the hill and saving the entire amount of fuel that nature has given us, but such methods of consumption of coal that will enable us to secure for our welfare and position in industrial progress the benefit of as large a percentage as possible of the high heat values and by-products in the coal as it goes under the boiler as fuel and into the ovens for the making of coke.

Great Britain, Belgium and other countries, and many states in the Union have not been blessed with such a magnificent deposit of high grade coal as has western Pennsylvania. Various countries observe that their supply is quite limited, that they are compelled to go deeper into the

bowels of the earth and at the end of their efforts find compartively thin beds of coal, compared with the coal of the Pittsburgh or Connellsville bed, which is the best and most persistent bed of coal yet discovered. It stands prominently in the forefront, not only because of its quality and great regularity, but because of the natural and commercial position which it occupies.

During the past twenty or thirty years we gave but little concern to the great loss entailed in the operation of our coal mines and our coking plants, but modern methods, machinery, and equipment make us observe the fact that we can lessen the loss by a different system of mining the coal, whereby almost the entire bed of merchantable coal is extracted.

Until recently almost every one believed that there was an unlimited amount of coal. They have been very little troubled or concerned relative to the future, and it is only of late that our industrial interests and others have begun to realize that they have been mistaken, and nowhere else is the fact more clearly pointed out than in the great Pittsburgh field. Because of the immense deposits and the fine quality of coal and the easy conditions under which it is mined, the merit of the field was not properly regarded.

There was great waste, much coal being left in the hills, the miner going to another part of the bed where the underground haul would be less in distance. This was quite frequent. The coal more remote from the pit mouth being unmined, and the intervening spaces falling in, and no effort made to keep up the roof that it might be taken out in the future; thousands of tons would thus be barred from ever reaching the surface because of the great expense that would be incurred in attempting to reach the lost coal. Such policy might be likened to the present situation, that of using the coals nearer our markets and the points of large consumption, and at later date in order to secure proper fuel supply we will be compelled to pay for a longer haul in the transportation of coal to market, and in most cases secure a poorer quality of coal at greater expense in mining.

Our industrial interests in this country should consider all these conditions from an economical standpoint. We should make the most of our natural resources. The time is now here when we are paying for product on the basis of quality. Is it possible or probable that the future will bring about conditions that will cause us to be satisfied with a poorer grade of fuel than we now secure from our coal beds which nature has so kindly provided?

The question is frequently asked, "Have we reached our zenith in the production of coal?" To my mind, not until our industrial activity has reached its zenith, not until our country is crowded because of its population, will our fuel production begin to wane; in other words, if our population doubles in fifty years and our production of iron and steel and other products increases as our population increases, our coal production will increase in similar proportion. It is plainly evident that our future must look for its increased supply of building materials, not to lumber but to iron and steel, which means extended use of fuel.

The use of gas will not long continue to be from a natural source of supply, but that of artificial. With the depletion of the better grades of fuel, the poorer quality more remote from market might mean higher prices in fuel, which would mean a greater price paid for the product made in the use of coal and coke. With these facts before us it certainly behooves our industrial interests to get the entire value out of the fuel to whatever use it is placed.

In every quarter there is a large field for study, research, and the putting into force proper action as to what course should be pursued to secure the desired results.

At present and in the future every new method of conserving nature's resources should be considered. Every year we discover something new that is an advantage to our natural resources, enabling us to procure more perfect finished product from our natural resource. At the same time our iron ore, our coal, our timber, our gold, and all other nature products will be drawn on in a greatly increased way as our industrial position progresses. Extended use of coal

in our large industrial centers will cause rapid depletion of those fields located nearest these centers of consumption.

The Pittsburgh bed of coal and the Connellsville coke produced from same is of such quality as has made development of our iron and steel industry possible. Almost the entire industrial situation surrounding Pittsburgh is due to the presence of this great bed of fuel. It was ideally located. From the West Virginia line to Pittsburgh the Monogahela river cuts through its bed and leaves it exposed on either bank, the outcropping shows at intervals throughout the entire distance. Our early settlers used but little of it, but today in the Counties of Fayette, Greene, Westmoreland, Washington, and Allegheny there is a production of more than 75,000,000 tons per annum. During the past twenty years the increase in production in this district has averaged ten per cent per year. At that rate at the end of ten years the five counties mentioned will be depleted of a total of 200,000 acres from their area.

It is our worth of fuel that has, in the main, aided us in having our nation lead. The absence of so fortunate a supply of coal or the depletion of that supply would show quite a different industrial situation in the Pittsburgh district. The easy accessibility of our coal means cheap fuel. The advantage of quality, the decided benefit of the freight rate, and the comparatively remote location of other fields, makes our Pittsburgh bed of coal the most available.

In the depletion of our choicest beds of fuel we should use proper and economic methods. The foundation of all these industries and the force and power which moves the wheels of commerce is in the coal, which goes into the furnace and releases the stored up energy. This is the fundamental basis of power, and let us use it in the most economic manner. Manufacturers, gas producers, transportation companies, power plants, and numerous other industries draw heavily upon our fuel reserve.

The conservation of our coal fields as proposed, together with prevention of all kinds of accidents, will mean considerably increased cost in the production of coal, for

which the consumer should be willing to pay, as at the present prices to the large consumer it is about on the same basis as what it would cost to handle and haul a load of dirt from your back yard.

Let us bend our energies to conserve our resources and stop the extravagant waste.

Transportation in Its Relation to the Mining Industry.

BY DR. JAMES DOUGLAS, OF NEW YORK.

Nothing can express more emphatically the immense importance of mining to the railroads and of railroads to mining than the fact that of the total traffic of the United States, 53.09 per cent was in 1906 the product of the mines. We are supposed to be a great agricultural country, but from the table which I have copied from the Statistics of Railroads of the United States of the Interstate Commerce Commission, we see that agriculture supplies to the railroads only 8.56 per cent of its traffic, the animal industry 2.32 per cent, and forestry only 11.24 per cent. Nor is this a purely accidental occurrence, for if we go back to the year 1900 we find that the figures correspond by only a slight difference with these. In 1906 there was one-half of one per cent more manufactures carried by the railroads, and nearly one-half of one per cent less, as the product of the mines. Recollect that these figures do not include metals in manufactured form derived from minerals. The following is the summary showing freight traffic movement by class of commodity, originating on lines of reporting roads.

Class of Commodity	1900 Tonnage reported as originating on line	1900 % of aggregate	1906 Tonnage reported as originating on line	1906 % of aggregate
Products of agriculture	53,468,496	10.35	70,201,720	8.56
Products of animals...	14,844,837	2.87	19,002,825	2.32
Products of mines.....	271,602,072	52.59	435,450,476	53.09
Products of forests....	59,956,421	11.61	92,187,351	11.24
Manufactures	69,257,145	13.41	121,457,738	14.81
Merchandise	21,974,201	4.26	33,319,615	4.06
Miscellaneous	25,329,045	4.91	48,543,902	5.92
	516,432,217	100.00	820,164,627	100.00

This interdependence of the transportation and mining industries has been brought about by the great distances which separate the largest deposits of iron and other metals from the fuels necessary to their reduction. If we go

back to the first industrial statistical records published in the census of 1840, we find that in that year there were 286,903 tons of pig iron made in 1804 furnaces located all over the inhabited country, from Maine to Minnesota, the average production per furnace per day being only 2,170 pounds. At that time the 2,818 miles of railroad built in the United States were confined to the eastern and southern States. There were, therefore, no means of transportation except over bad roads from place to place, and wherever there was a little iron ore, some water power, and wood to make charcoal, there a little furnace, with sometimes a forge, was erected for the purpose of making iron for local use.

Now all this is changed. There are now in blast less than one half the number of furnaces that existed then, say, on June 30, 1906, 323 furnaces, to enable us to produce in 1906 25,307,191 tons of pig iron. But this large figure of finished product does not express the service which the railroads extend to the iron interests, for this tremendous quantity of iron could not be made if adequate facilities were not provided at a cheap rate for the transportation of ore to the fuel, or of fuel to the ore, and of the finished product to the market. The quantity of iron ore mined during 1906 was about 55,000,000 short tons, of which 40,000,000 tons came from Lake Superior, and most of this was transported a thousand miles to Pittsburg for reduction, simply because the best coal for metallurgical purposes is in the neighborhood of your good city. In round numbers it takes two tons of iron ore to make one ton of pig, and this is made with one ton of coke. As long as the market for the ton of pig is where the coke is made, the iron ore will be shipped for treatment to the coke and the market; but were the market to be at or near the iron mines, it would be eminently more advantageous to ship the fuel to the ore. In any case the ore and the fuel are so widely separated, there must be three tons of freight moved to make one ton of pig iron, even out of such extraordinarily rich ores as those of Lake Superior.

The East affords, however, no longer the exclusive market for pig and the products of pig iron which it did. The

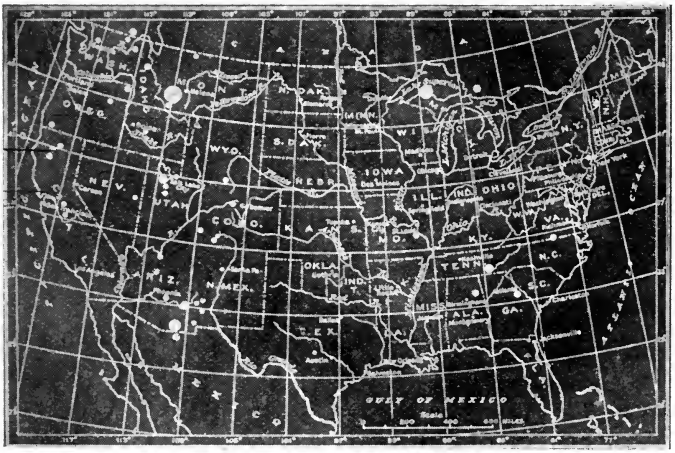
market is shifting westward, and westward it will continue steadily to shift, and the centers of trade will move westward with the movement of population in that direction. In response to this inevitable condition, the United States Steel Corporation is building at Gary, Indiana, on Lake Michigan, the largest iron and steel works ever erected. But even they are not built upon a coal bed; and therefore the volume of crude material handled will have to be the same, though the finished product will be nearer the source of consumption. On the accompanying maps the principal regions where coal and iron are mined are indicated, though not their relative importance. It will be seen that in the neighborhood of the largest iron deposits—those of Lake Superior—there is no fuel, but in carrying the Lake ores to either the shores of Lake Erie, to Buffalo, Cleveland and elsewhere, or to Pittsburgh, they are carried to points in the vicinity of coking coal. In carrying them to South Chicago, the new works at Gary, Indiana, or even to Joliet, they are carried to another fuel yielding area.

But when you look to the southern states, which made between 13 and 14 per cent of the total pig iron product of the country in 1906, you will see that the iron and the fuel are in close juxtaposition. There are even instances where, within eight miles of one another, coal, iron and the necessary limestone for flux are mined. Similar conditions exist in limited districts elsewhere, as in Bradford County, Penn., but there the ore exists in limited quantities. Nowhere, except in the southern states, does iron ore exist in sufficient quantities near to coal to influence the price of the metal and eliminate transportation. But in the southern iron regions, as a counterbalance to this advantage, the iron is of a lower grade, besides being of poorer quality, and the coke is inferior, both in structure and in ash contents, to the best cokes of Pennsylvania and the neighboring states.

The westward movement of population, and of the market for all commodities, has as yet created only one large iron manufacturing center within the Rocky Mountain region. The Colorado Fuel & Iron Company's furnaces and mills at Pueblo turn out about two per cent of the country's

total product. They are built nearer the coal than their iron supplies, which come partly from southern New Mexico, Wyoming and distant parts of Colorado. Here again the railroad is an essential factor to their very existence.

In the case of the only other metal in which this country pre-eminently leads the world, namely, copper, the met-

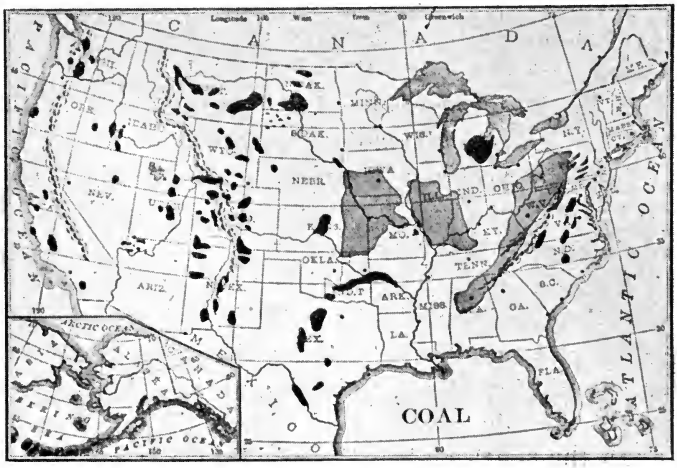


The Distribution of Copper in the United States.

allurgical conditions are different. While the average iron ores of the United States contain nearly fifty per cent of metal, the average copper ores contain only about 2½ per cent. And therefore, to make the 900,000,000 pounds of copper a year which we turn out, there are mined about 11,250,000 tons of ore, or about one-fourth the quantity of iron ore mined. From this point of view the copper industry does not bear an insignificant proportion to the iron industry. The small amount of only fifty pounds of copper to the ton of ore is recovered partly though mechanical and partly through metallurgical processes, which require fuel for generating power and fuel for reducing the ore to metal. In both cases the quantity of ore to be handled, namely, forty tons of ore to make one ton of metal, necessitates treatment at or near the mines; and therefore inevitably the transportation of fuel to the ore instead of the transportation of ore to the fuel. In the case of the ores of

The Distribution of Iron Throughout the United States and Alaska.

Lake Superior, which average less than 2½ per cent, the fuel, both for concentration and for smelting, is transported 700 or 800 miles from Ohio and Pennsylvania. Arizona looks to Colorado or New Mexico for its fuel supply, which has to be hauled on an average 700 miles. The Montana copper mines find an inferior fuel nearer home, which supplies most of their needs, and in that respect they enjoy an advantage



The Distribution of Coal Throughout the United States and Alaska.

over the other two competitive regions, but the copper industry is as dependent as the iron industry upon railroad transportation for its prosperity in these regions so remote from the markets where copper is bought, sold and turned to special industrial uses. The freight rate on copper bullion from the smelters of Montana, Utah and Arizona to New York is $8.00 a ton.

When we come to distribute the coal mined in this country, which amounts, roughly speaking, to 400,000,000 tons a year, we find that nearly 25 per cent of it, or 100,000,000 tons, is consumed in transportation purposes; that is to say, used by the railroads and steamers in inland waters; 60,000,000 tons are consumed in the manufacture of iron and steel; 10,000,000 in the metallurgy of copper; about 5,000,000 in reducing other metals from their ores; nearly all the anthracite, which amounts to about 70,000 tons, and say 20,000,000 tons of bituminous coal, goes into domestic use; and the balance of the 400,000,000 produced may be assumed to be consumed in the general industries of the country.

Important as is the bearing of the iron industry on the prosperity of the country, it is small as compared with the influence of coal. As has often been pointed out, coal is our national unifier. Its wide distribution and its cheap transportation removed those dangerous industrial differences creating political dissensions, which at one time went far towards threatening the unity of the country. As long as New England monopolized the manufactures of the country and the south depended upon cotton raised by slave labor, and the west was the wheat garden of the country, the tariff for instance was the area within which the battles, not only of trade selfishness, as now, but of sectional interest, were fought. Free trade or low tariff was almost a necessity to the southern planter. High tariff was essential to the existence and growth of the struggling manufacturing interests of the New England and Middle States. Now, through the abundance and cheap distribution of fuel, through the south and in the middle west, coupled with its absence in New England, the south is spinning its own cot-

ton, and manufactures of every description are moving towards the shores of the Great Lakes. This is most emphatically illustrated by a comparison of the activity of general manufacturing as evidenced by the density of railroad traffic with the quantity of coal mined within any given region. In the following table I have arranged the states of the union into the groups used in the report of the Interstate Commerce Commission for 1906, and in the two last columns, from the same source, extracted the number of tons of freight carried one mile, which expresses the density of traffic and the per cent in each group. From the reports of the United States Gelogical Survey I have taken the coal produced and used in the states and territories included in the Interstate Commerce Commission groups.

(See Table I, Pages 78-79.)

In Group One, including the New England States, no coal is produced. While this section draws a small quantity from the martime provinces of Canada, it looks chiefly to the states of Group Two for its fuel supply. You will perceive that of the total quantity of coal mined in the country, Groups 2 and 3 contribute 59.7 per cent, and Groups 1, 2 and 3 consume 49.8 per cent. The difference probably goes largely into fuel for ocean navigation. Groups 4, 5 and 6 produce 30.4 per cent of the total product and the density of traffic within those states is 31.3. Group 7 shows a coal production of only 1.9 per cent, but the most active of the great trans-continental railroads run through these states, hence the density of traffic does not correspond closely with the coal production. But the parallel is recovered when we come to Group 8, where the coal production is 6.4 per cent and the density of traffic is 7.2 per cent. It cannot be accidental that these figures so closely correspond. It means that manufacturing is attracted by cheap fuel, and that the railroads have responded to the demands of industry by giving to the fuel and the products of manufacturing industry, rates which have stimulated instead of repressing the enterprising spirit of the country.

This brings us to the consideration of railroad rates.

COAL PRODUCTION.

TABLE I.

Density of Railroad Traffic.

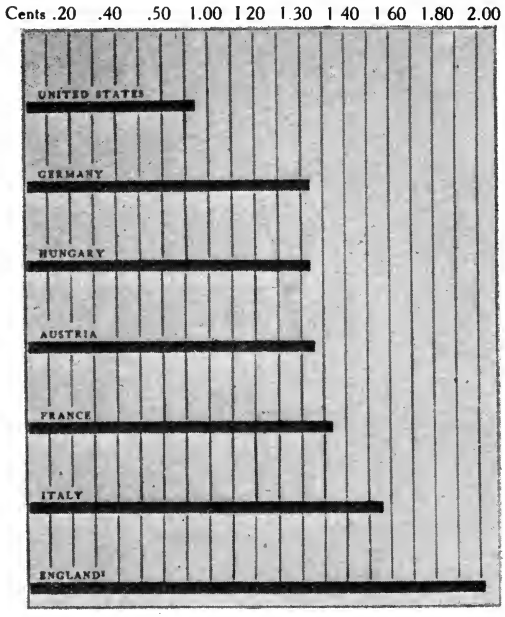
States as Grouped by Interstate Commerce Commission	Loaded at Mines for Shipment	Sold to Local Trade and Used by Employes	Used at Mines for Steam and Heat	Made into Coke	Total Quantity Coal Produced	Per Cent	Number of Tons of Freight Carried One Mile	Per Cent
Group 1 Maine	.....	.....	.....	.....	.....	.....	.....	.....
New Hampshire	.....	.....	.....	.....	.....	.....	.....	.....
Vermont	.....	.....	.....	.....	.....	.....	.....	.....
Massachusetts	.....	.....	.....	.....	.....	.....	.....	.....
Rhode Island	.....	.....	.....	.....	.....	.....	.....	.....
Connecticut	.....	.....	.....	.....	.....	.....	.....	.....
Total for Group 1	.....	.....	.....	.....	.....		5,991,440,339	2.8
Group 2 New York	.....	.....	.....	.....	.....		.....	
New Jersey	.....	.....	.....	.....	.....		.....	
Pennsylvania	156,609,600	3,325,274	9,614,549	31,026,194	200,575,617		.....	
Maryland	5,331,321	50,306	53,826	.....	5,435,453		.....	
Delaware	.....	.....	.....	.....	.....		.....	
Total for Group 2	161,940,921	3,375,580	9,668,375	31,026,194	206,011,070	49.7 to 59.7%	57,639,505,324	26.7 to 49.8%
Group 3 Michigan	1,189,972	106,538	49,828	.....	1,346,338		.....	
Ohio	25,915,172	1,392,350	422,094	2,024	27,731,640		.....	
Indiana	11,106,753	647,432	338,375	.....	12,092,560		.....	
Total for Group 3	38,211,897	2,146,320	810,297	2,024	41,170,538	10.	43,857,669,079	20.3
Group 4 Virginia	1,940,524	50,275	91,666	2,172,414	4,254,879		.....	
West Virginia	36,389,483	633,487	589,844	5,677,536	43,290,350		.....	
North Carolina	.....	.....	.....	.....	.....		.....	
South Carolina	.....	.....	.....	.....	.....		.....	
Total for Group 4	38,330,007	683,762	681,510	7,849,950	47,545,229	11.5	11,146,450,627	5.2
Group 5 Kentucky	8,829,501	441,729	246,894	135,523	9,653,647		.....	
Tennessee	5,208,054	87,335	118,051	845,835	6,259,275		.....	
Mississippi	.....	.....	.....	.....	.....		.....	
Alabama	9,409,005	131,881	446,712	3,120,365	13,107,963		.....	
Georgia	194,881	850	8,324	128,052	332,107		.....	
Florida	.....	.....	.....	.....	.....		.....	
Total for Group 5	23,641,441	661,795	819,981	4,229,775	29,352,992	7.1 to 30.4%	16,106,391,865	7.5 to 31.3%
Group 6 North Dakota	189,739	111,638	4,312	.....	305,689		.....	
Minnesota	.....	.....	.....	.....	.....		.....	
Wisconsin	.....	.....	.....	.....	.....		.....	
Iowa	6,461,208	633,652	171,364	.....	7,266,224		.....	
Illinois	37,273,693	2,778,141	1,418,197	10,073	41,480,104		.....	
Total for Group 6	43,924,640	3,523,431	1,593,873	10,073	49,052,017	11.8	40,227,623,886	18.6

Group 7	Montana	1,621,291	65,858	73,727	69,045	1,829,921	.....	.....	.....
	Wyoming	5,801,623	59,656	271,060	1,655	6,133,994	.....	.....	.....
	South Dakota	.....	.....	.....	.....	.....	.....	.....	.....
	Nebraska	.....	.....	.....	.....	.....	.....	.....	.....
Total for Group 7		7,422,914	125,514	344,787	70,700	7,963,915	1.9	8,757,167,231	4.
Group 8	Colorado	7,697,481	202,579	252,115	1,959,043	10,111,218	.....	.....	.....
	Kansas	5,547,213	313,150	163,241	1,171	6,024,775	.....	.....	.....
	Missouri	3,300,867	386,067	71,074	.....	3,758,008	.....	.....	.....
	Oklahoma	.....	.....	.....	.....	.....	.....	.....	.....
	Indian Territory	2,629,731	38,535	122,299	69,635	2,860,200	.....	.....	.....
	Arkansas	1,792,242	14,362	57,664	.....	1,864,268	.....	.....	.....
	New Mexico	1,605,798	35,109	34,706	289,107	1,964,713	.....	.....	.....
Total for Group 8		22,573,332	989,795	701,099	2,318,956	26,583,182	6.4	15,589,838,577	7.2
Group 9	Texas	1,264,218	22,386	26,269	.....	1,312,873	.....	.....	.....
	Louisiana	.....	.....	.....	.....	.....	.....	.....	.....
Total for Group 9		1,264,218	22,386	26,269	.....	1,312,873	0.3	6,410,603,778	3.
Group 10	Washington	3,008,148	61,146	110,669	96,221	3,276,184	.....	.....	.....
	Idaho	.....	6,165	.....	.....	6,165	.....	.....	.....
	Oregon	55,232	7,398	17,101	.....	79,731	.....	.....	.....
	Nevada	.....	.....	.....	.....	.....	.....	.....	.....
	Utah	1,142,127	21,004	57,012	552,408	1,772,551	.....	.....	.....
	Arizona, California, Alaska	11,878	15,942	3,011	.....	30,831	.....	.....	.....
Total for Group 10		4,217,385	111,655	187,793	648,629	5,165,462	1.3	10,150,860,535	4.7
Grand Total		341,526,755	11,640,238	14,833,984	46,156,301	414,157,278	100.	215,877,551,241	100.

The following table shows how favorably our average freight rates compare with those of any other country.

Last year the average rate charged per ton per mile over all the lines of the United States on all classes of

AMERICAN RAILROAD RATES
Comparison of Average Rates per Ton-Mile
(1902)



[1]British statistics do not show ton-mile earnings. The estimate in the table is based upon the concensus of expert opinion that the average ton-mile rate in England is a little over two cents. The North Eastern Railway which alone gives ton-mile statistics reports the following average ton-mile receipts in 1903: on minerals, 1.93 cents; on merchandise and live stock, 2.94 cents; on all commodities, 2.53 cents.

freight was 7.8 mills. But the rates on fuel and mineral, which are everywhere classed as commodities, were considerably below the average. The rates charged, however, were far from uniform, nor should the public expect that they would be the same everywhere. The cost of transportation depends upon several factors, as upon density of traffic, upon length of haul and upon the character of the country. Those of you who are bicyclists know how rapidly

the energy necessary to propel your bicycle uphill increases with the steepness of the grade. You can thus appreciate the increased power, and therefore the increased fuel, necessary to carry a railroad train uphill. Favorable conditions cannot possibly be secured in every section of the country, but the tendency is towards cutting down grades, reducing curves, and putting the railroad systems of the country in still more favorable position to continue to serve the public, even in the face of higher cost of maintenance and transportation. The lowest cost is over eastern roads, where the traffic is heavy and the grades level. The highest rates are naturally in the Rocky Mountain region, where population is scanty, traffic comparatively light, and grades necessarily steep. The custom of the railroads has been to grade the rate of freight in part upon the value of the material carried, but also with a view to favoring any given industry within reach of the railroad, to give low rates upon what are classed as commodities. In every tariff coal, coke and the ores of the commoner metals, which have intrinsically very low value, are carried at very cheap rates. Coal itself is often carried at less than the average cost of transportation. The Chesapeake & Ohio Railroad reports that their coal rate is slightly over four mills per ton mile. The Baltimore & Ohio and the Pennsylvania railroads, so far as we can gather from their tariff, carry coal at about 3.4 to 3.5 mills per ton mile. The New York Central, whose average freight rate is only a trifle over six mills a ton mile, carries coal at between three and four mills. When we get further west, where traffic is less dense, rates are slightly higher. In the neighborhood of Chicago, coal and coke rates are over four mills. In the Kansas City region they are about five mills. In the Rocky Mountains the cost of transporting coal runs up to between five and seven mills. The same is true of the transportation of ores. Transportation of the iron ores of Lake Superior by rail is somewhere between four and five mills per ton mile. In the west the transportation I believe of the ores from Bingham Canon to Salt Lake City over a very difficult piece of grade, is as

high as 7.5 mills per ton mile. But if you take the enormous tonnage which Butte offers to the railroad, we find that the ore is carried for 12 cents a ton from Butte to Anaconda, a distance of 26 miles (4.6 mills per ton mile) and is carried for just about four mills a ton mile from Butte to Great Falls, 176 miles, by the Great Northern. In the Southwest we have to charge a little more than that, but railroad transportation on ore from Bisbee to Douglas, a distance of 28 miles, is 20 cents. On short hauls the rates must necessarily be high. The time wasted by the crew (and the interest on the rolling stock while the freight is being loaded and discharged) is sometimes almost as great as that occupied in the transportation of the ore itself. No reasonable man can find fault with the average cost of railroad transportation throughout the country at large, nor with the very low figure at which such commodities as coal and ore are carried. It is, however, an open question as to whether the railroads are altogether wise in charging such a high rate on articles in the higher classes, and charging such low rates on commodities. It might be fairer to charge a little more to the great industries of the country and charge a little less to the great body of the shipping public, who grumble because their railroad bills are large and the tariff is so high on certain classes. The average rates are certainly not too high, if the railroads use their revenue for the proper maintenance of their roads and equipment; but it might not be unfair to raise commodity rates and lower class rates while maintaining the average. Our railroads, especially those whose traffic consists largely of fuel and mineral, have to contend with tremendous fluctuations in traffic. This both the railroads and the public have experienced to their serious inconvenience during the boom and since. The traffic of the country rapidly rose during 1905, 1906 and 1907, then suddenly dropped. As indicated by the car supply when the boom was at its height, there was a shortage of over 8,000 cars. In May last there were over 400,000 empty cars. Today, when the industries of the country are reviving, there is still a car surplus of 222,000. One can appreciate the affect on the railroads of a

shock to public confidence by taking a single instance as an illustration. Last year there were being erected in New York nine buildings, counting the McAdoo building as two, into whose framework there entered approximately 95,000 tons of steel, an average of over 10,000 tons to each building. Assuming, therefore, 10,000 tons to be the quantity entering each of these large skyscrapers, every such building, for the supply of its framework alone, contributes to the traffic of the country the following items:

Twenty thousand tons of iron ore.

Twelve thousand tons of flux and fuel.

Ten thousand tons of freight shipped to the shops where the steel is assembled, and

Ten thousand tons from the assembling shop to the point where the building is erected; making a total of 52,000 tons of freight handled by the railroads for the steel skeleton alone of a single one of the many buildings of that type being erected throughout the country.

The following table expresses significantly the growing activity of the country:

The percentage of increase in the tons of coal mined between successive decennial periods could not possibly be maintained. For instance, between 1850, when there were only 6,000,000 tons mined, and 1860, when the total rose to 16,000,000, there was an increase of 150 per cent, though only 10,000,000 tons more were produced in 1860 than were produced in 1850, whereas the quantity mined in 1906 was 145,000,000 tons in excess of that mined in 1900, though that made only 53 per cent increase. So likewise in the population; the increase of population during the decennial period from 1850 to 1860 was 35.6 per cent, and during the decennial period from 1890 to 1900 it was only 21 per cent, despite the heavy immigration. But if we take the coal consumption per head of population, that has gone on in a steadily increasing ratio. So far as statistics can be relied on, in 1850 less than one-third of a ton was consumed per capita, whereas during 1900, when the population was a little over 75,000,000, 3.53 tons were consumed per person.

TABLE II.

TONS COAL MINED, AND PER CENT. OF INCREASE IN UNITED STATES.
POPULATION, AND PER CENT. OF INCREASE IN UNITED STATES.
RAILROAD MILEAGE, AND PER CENT. OF INCREASE IN UNITED STATES.

1850-1906.

	Tons of Coal Mined in U. S.	% of Increase	Population U. S.	% of Increase	Consumption Coal per Capita	R. R. Mileage U. S.	% of Increase
1850	6,445,681		23,191,876		.28	9,021	
1860	16,139,736	150.4	31,443,321	35.6	.51	30,626	239.5
1870	36,806,560	128.	38,558,371	22.6	.96	52,922	72.8
1880	76,157,944	106.9	50,189,209	30.2	1.52	93,262	76.2
1890	157,770,963	107.2	63,069,756	25.7	2.50	166,703	78.7
1900	269,684,027	70.9	76,303,387	21.0	3.53	193,345	16.0
1906	414,157,278	53.6	*84,000,000	10.1	4.93	224,363	16.0

*Estimated.

Assuming the population in 1906 to have been 84,000,000, the consumption per head was 4.93 tons per annum. This increased per capita consumption represents, not the fuel used per head for domestic purposes, but represents the prodigious increase in consumption of fuel in meeting the rapidly increasing demands of the national industries. The much greater increase in coal consumption per head over the percentage of increase in population shows, moreover, how machinery is supplanting hand labor.

These figures, illustrative of the intense national activity in using up with terrific speed the natural national resources, may well excite some anxiety as to their duration. That there is waste, and that the waste is inevitably aggravated by the headlong speed with which the great industries of the country have been developed in order to keep pace with the national demands, cannot be denied, and must be deplored, and it is high time that some corrective be applied. At the same time, while some of the waste is reckless, some is undoubtedly attributable to ignorance and inexperience, due to the backwardness of our knowledge. In the anthracite regions the heaviest waste used to be due to the crushing and screening of the coal, to an accumulation of mountains of breeze, which at one time was waste, as the proper devices for burning it had not been invented; now it is utilized.

As to underground waste generally in coal mining, the subject opens up so many controversial points which will be discussed at other meetings, that I will not touch upon them. It is unfair, however, to assume that everyone is maliciously wasteful and, in estimating waste, to go back to earlier periods and quote instances in the past, when and where the best was being done that the existing experience and appliances permitted. And there can be no doubt that the past generation has seen tremendous efforts made by the engineer, and seconded by the manufacturer, to generate power at reduced consumption of fuel. The old slide valve engine consumed from five to seven pounds per horsepower hour, and yet, though the first large Corliss engine was exhibited

at the Philadelphia Exposition, few establishments have hesitated to throw out the old type and introduce at any cost the newer fuel-saving engines. Since then the gas engine and turbine engine have been introduced and greatly improved in structure and in efficiency.

The terrible waste of coal under the boiler is recognized by everybody, but being recognized, the engineering and manufacturing community do not sit idly deploring the waste, but have combined to steadily reduce it by improved types of boilers, or by converting the coal into gaseous fuel. Of all the fuel wasters, the locomotive is probably the greatest, but it is in order to minimize this waste, and the cost of the waste, that railroad companies are electrifying their roads, and using high class stationary boilers and engines and electrical transmission at the expenditure of prodigious sums of money.

It is unfair, therefore, that the public should be led to suppose that from sheer cupidity and recklessness the mining and manufacturing classes are indifferent to waste, which in most cases they are doing their best to minimize, but are powerless to summarily stop. In truth, remedies are only applied when disease is recognized, and therefore, whether in agriculture, mining or manufacturing, the losses incidental to waste can only be reduced after they are recognized as existing, and then by the application of science, ingenuity and no little toil and self-denial; for it is so much easier to jog along by the old route than to spend time and trouble and money in tracing out and building a better. But no one can look back over the past half century without admitting that, despite all the shortcomings and the selfishness and ignorance of the few, immense technical progress has been made by the great leaders in the mining and manufacturing industries, and that every step forward has been in the direction of economy and reduction of waste. Because there is so much still to be done, that is no reason why some credit should not be given for what has already been accomplished. The most inexcusable waste is that of the by-products in the coking of coal. The first by-product

ovens were built in 1893, and until 1901 every year showed a notable increase in the substitution of by-product ovens for the usual beehive type. Since then the annual construction of beehive ovens has diminished, and only 413 new ovens were built in 1905, as against 1,533 in 1901. Only about 4,500,000 tons of coke is now made in by-product ovens. The complaint made by the by-product coke makers is that there is no market for the by-products, especially the tar. The contention cannot be groundless, and yet it is an opprobrium on our chemical industry that, considering the high price of creosote for the preservation of our timber, especially when used for ties, and the enormous demand for aniline products, that such should continue to be the case. Even however, when these chemical by-products cannot be utilized, it seems a reckless waste that the power which can be generated from the waste gases should not be conserved. This is done to a certain, but a very slight, extent in underflue ovens in Pennsylvania, and at the Dawson coal fields we are running our washery and underground transportation and certain subsidiary plants by transmission power from a power plant operated entirely by our waste gases. The saving to us amounts to about 2,000 tons of coal a month. Taking our proportion of coal to the total mined throughout the United States, the total saving in coal at the mines would be about 8,000,000 tons, if the waste gases from such portion of that coal as is coked were converted into power.

The Federal Government in Its Relation to the Mining Industry.

BY HON. JAMES RUDOLPH GARFIELD, SECRETARY OF THE INTERIOR. WASHINGTON.

Mr. Chairman, Ladies and Gentlemen: This meeting of the American Mining Congress is one of the most noteworthy meetings that has been held for many years, for the reason that it has brought together from all sections of our country the men who are actually engaged in the development of our mining resources. Very fortunately the representation has been not only from the various sections of the country, but as well from different kinds of mining interests; from those who are the owners as well as those who are working in the mines. For these reasons the results of this conference should be of very great value. As I said this morning, it is through conferences of this kind where reasonable men get together and discuss the facts, free from passion or prejudice or partisanship or a desire to obtain some special point, that we reach the most just and the most permanent conclusions.

I have been asked to speak for a few moments on the subject of the relation of the Federal Government to the mining industry, and what the Federal Government has done and may do hereafter for that great industry. I have heard it said at some meetings—not here, but at other times—that the Federal Government has not done anything for mining as an industry. But those who have made such remarks have not considered all the various agencies of the Federal Government that have been engaged upon the study of mining and of mineral resources. We too often think that the action of a Government on any given subject means some active participation in the doing of a specified thing or direct interference with or regulation of a specific industry or work. But that does not cover the field of activity of the Government, and it is particularly true with the work of the Federal Government in the matter of mining and mineral resources.

The Geological Survey from its inception has had charge of and had to do with the study, careful examination and investigation of our mineral resources. The study of the geological formations of our country necessarily involve the study of ores and other mineral deposits as well, and covers the broadest possible field of investigation of mineral resources. Of course, it must be remembered that the Geological Survey has never attempted to pick out special localities where great strikes might be made. But its scientific men, its trained and skillful investigators have been going throughout this broad land expressly for the purpose of studying its geological formations and of giving us some definite ideas about the minerals that may be expected to be found. This study has at times in a very remarkable way developed special deposits that have been of tremendous commercial value; but such has not been the prime purpose of those particular investigations. They have gone hand in hand with the scientific investigations made by the survey.

Then again, the Geological Survey has had as part of its work the classification of the public domain. This work of classification has not been carried on in the years past with that degree of activity which I hope will mark its work hereafter. The classification of the public domain means a very great gain to the mining industry. The classification involves not merely the classification of the surface, whether timber or agricultural, but it goes further and will give a just and fair classification of what may be the mineral deposits under the surface. This work of classification during the last two years on the question of coal and other fuels has been of enormous value to the mining industry. We are delimiting in a way we have never been able to do before the coal area, the area of gas and the area of oil.

As our men make their regular tours of investigation either in topographic or geological work, there is kept constantly in mind every phase of the National resource problem. They are endeavoring to locate all these great sources of National wealth, to describe them, and then finally to

map them in such fashion that they may be of practical use to those who are going to develop them. As you study the reports of the Geological Survey, as you look for special topics, on special subjects that have been investigated, you will find that the Federal Government through that survey has done an enormous amount for the mining industries of this country. Those who are collecting this information, as it is being collected in any of the great scientific libraries, or in the hands of experts in industrial life, in trying to find out what those resources have been, have found to their astonishment that the survey has been a long ways ahead of the practical man in delimiting and defining and investigating the mineral resources of our country.

Now, along with what we ordinarily term the mining industry, when we think of it as referring to the minerals, there has also been the very careful study of the water resources of the country. The water resources are closely connected with the mineral resources. In fact they are defined as mineral resources, and they are not only connected with the mineral resources in the development of the water power itself, but the use of water power means the development in many areas of mines themselves in such manner as we had not hitherto contemplated. Every horse power that is created through the development of water power may be put into a form to dig from the earth the mineral that is deposited there. Therefore all the resources of the country, the water, the timber, the coal, the fuel, all must be used together, must be studied together, must be considered as one great problem to be handled in a way that is both scientific and at the same time thoroughly practical.

Now the Geological Survey has for its great work this classification of the resources of our country, the presentation of the classification in such manner that the practical mining man may know how best to use those resources, how best to conserve them, using what we actually need without unnecessary waste; and handing down what we do not use in condition as available and accessible as they ever were. When I say "hand them down," I recognize there are certain classes of our resources that cannot be handed down

better than we received them, for their very use means destruction. Yet, on the other hand, we can, by the proper use, by the avoidance of waste, conserve even those destructible resources so that we may very greatly lengthen their life to this nation.

Those are some of the questions that the Geological Survey, through its technologic branch, a portion of the plant of which we were examining this afternoon, is giving the closest attention to. Those are some of the essential points in the further study of the mining industry of our country, namely, the prevention of waste, the prevention of unnecessary loss of these great resources. Every ton of coal that we save, every ton of coal that we prevent from being wasted, means that that ton of coal will in some year hereafter be put to some good use. Every investigation that leads in the end to higher heat efficiency from a ton of coal means that we are conserving by preserving hundreds of tons of coal that would otherwise be immediately used, and hence lost. Therefore in the study of the question of waste, every man interested in mining must recognize that all the scientific work of the Government that has for its purpose the development of methods that will prevent waste is a work that he should co-operate with, to the end that that work may be made more practical every year.

In connection with this there is another element of waste. We know that mining brings in the sociological side of the work of the Government; and we heard that discussed this morning, namely, how are we to preserve the lives of the men who are working in the mining industry? Whenever we save a man's life we thereby save commercially in the industry; we prevent the shock of that man's death from being charged either against the community in which he lived or the special industry in which he has been working. Even putting the question of the saving of life and the prevention of injury upon the lowest of all planes, namely, that of dollars and cents, we find that the study of every device, of every method that means the prevention of accident, is a commercial saving.

But aside from the commercial side we must recognize

that in this great industry, and it involves not only the mining of the fuel but all classes of mines, the question of how we are to improve the conditions under which men work under ground is one that the Government ought to give most careful consideration to. As I said this morning, and in this we all agree, that in changing from doing work as individuals to organized societies, either in the form of partnerships or corporations, each individual gives up something of his own individual right or privilege which he formerly exercised, and assumes obligations towards the community or towards the associates with whom he is working. Therefore, as in the mining industry the operators who are employing hundreds and thousands of men, understand that the method of dealing with the underground are not to be measured in dollars and cents; and men will understand that their profit is not to be measured merely in the wage that is gained. The miner and the operator and the state and the Federal Government must all co-operate in endeavoring to devise methods by which this tremendous waste of resources and loss of life may be prevented. We must have intelligent and fair regulations; and these regulations must be obeyed by the men in the mines.

It is too often the case that great loss of life is brought upon large numbers of laboring men not because there has been any failure on the part of the mine owner to provide the proper regulation or methods, but because some single individual has failed in his duty, in his obligations that he owed to his fellow-workmen. Both the miner and the operator should understand that it is useless for the Federal Government to conduct investigations and discover methods; and it is useless for the state to enact fair and wise laws for the prevention of mine accidents, unless the operator provides the needed equipment and other facilities and proper supervision; and unless the men who are doing the work in the mine recognize to the full their obligation to obey those regulations to assume each for himself the full duty of obeying and recognizing that he as an individual cannot do as he pleases, but must act in concert, in harmony with those with whom he is associating.

Then again, the Federal Government is studying constantly the questions which have been raised in some of the discussions this morning regarding the cost of production. I believe that one of the curses not only of the mining industry but as well of all industry in this country, has been the desire upon the part of both the manufacturer and the consumer to get a cheap product. Nothing is so great a curse to our industrial life today as that cry of cheapness, cheapness, cheapness. It is not cheapness that we want, but efficiency in the work, honesty of product; and then charge the price that is commensurated with the service given, and the character of the product that is put forth. (Applause.)

That same idea is applicable to the transportation question, and that has been touched upon. We clamor for lower rates of freight. We must recognize that if we ask for too low rates, we necessarily involve the company that is forced to give those too low rates in a position where it is necessary to cut down on some of its expenses. We cannot cut off the source of earnings and at the same time impose additional burdens that mean additional expense and expect that company to transport and otherwise give the service that it ought to give to the public. We should recognize that what we as a people must demand is efficiency of service, a service on the transportation highways that gives us freedom from accident, more trains, safer service, and then as cheap a rate as is consistent with all of that, plus a fair and reasonable profit to those who have invested their money in those enterprises. (Applause.)

Now the relation of the Federal Government to this industry has been, as I have indicated, a studying of all of these various conditions. Now are we going to continue this work without overstepping the powers and duties of the Federal Government? I have no doubt many of you have heard it said that this present administration has been guilty of many acts of usurpation of executive authority, that it has extended the activities of the Federal Government beyond the powers that seem to have been given it under the Constitution. And yet I am confident that when

history is written, that when we as reasonable men consider what has been done, we will find that there has been no undue extension of executive authority or of Federal authority in dealing with matters of trade and commerce. (Applause.)

Fortunately for our people we had on the Supreme bench in the early days of our history as a nation, the master mind of Marshall. He foresaw the danger of a strict definition of the commerce clause of the Constitution. He recognized that what was commerce in those days might not be commerce ten years hence. He recognized that there were means of transportation, methods of commerce, between the States which were undreamt of by the men of his time, and therefore he and those associates of the court with him, refused to define what commerce is. In the development of our country year by year new methods of transportation, new systems of industry and extension of our trade throughout the States and into the foreign countries, have necessarily changed the definition of the word commerce. And therefore under that great clause of the Constitution, the Federal Government has had placed upon its shoulders obligations to the people of this country that they have been fulfilling in these latter years.

We have by no means reached the limit of Federal authority in dealing with these industrial questions. And yet when I say that, I do not wish to be misunderstood. I recognize very clearly that we must always have equally in mind the division between the state and the nation. The state within its sphere is supreme, and the Federal Government must not interfere with those questions and those matters that are wholly within the jurisdiction of the State. But the very moment that industry oversteps the State boundaries, the very moment that the conditions of trade are such that one single state cannot control those activities in any special industry, that very moment it steps into the jurisdiction of the Federal Government, and then the Federal Government has a right to exercise its power over that industry, and in the exercise of those powers it lies within the wisdom of Congress to say how far the Govern-

ment shall go, and within the wisdom of the executive to what extent the powers granted by the special acts of Congress shall be applied.

It is along those lines of future development that we must look for relief in studying and in acting upon many of these problems that are connected with the mining industry. I for one hope that Congress will determine that it is the part of wisdom to establish a mining bureau. I believe that the time has come when a mining bureau should be made a component part of the work of the Interior Department. and that all the various governmental activities that have hitherto had to do with the industry shall be brought together under that bureau, to the end that it may be a better bureau, a better instrument in the hands of the executive for the purpose of carrying out the things which you gentlemen here may determine to be the right things to be carried out. (Applause.)

One can already see the tremendous work that lies ahead of such a bureau in the development of the problems that are now before us. Many of the problems presented in the experiments we witnessed today are such that the individual cannot afford to work out, which not even any one State can afford to do, but which the Federal Government can do splendidly, and can do without any interference with any State activity or with any individual enterprise. It can be done by the kind of co-operation that has been shown by you here in dealing with these problems thus far. The whole work there is first one of study and investigation, then of conference, and finally with helpful suggestions certain great abuses may be corrected, certain steps in advance may be taken and certain better methods can be used for the conservation of our resources, and for their better daily use.

Now it has been asked of me several times whether in this work it is intended that the Federal Government actively take up the work of inspection and interfere with the local conditions in special mines. I have always said no; it does not mean that, and it ought not to mean that. Those special regulations must of necessity be adopted by

the States. They come within the police power of the States, but the Federal Government by careful investigation of conditions in all the States and in foreign countries may be able to set a standard which would be accepted as the proper standard, and then the various States will one by one adopt that standard, come up to it, if it is rightly chosen, and in that way we will have uniformity of regulation within the States by co operation. But it does not at all mean that the Federal Government will try to reach out its arms and attempt to do the things which, as I say, the State ought to do.

On the other hand we must recognize this, that there is no force more potent in our country today than an intelligently aroused public opinion. If a great body of men such as you here reach conclusions that are just and right for your industry, if you announce those conclusions in the form of resolutions, if those are acceptable to the great mass of the people whom you represent, then public opinion is crystallized in an intelligent way, and you may be sure that that form of suggestion will of necessity compel action by the various bodies from whom action may be asked. Now what is included in the work of a Federal bureau? By wise suggestion, based upon the fullest consideration and knowledge, by conferences with men actively engaged in any great industry, reports may be made, suggestions may be adopted, that will by the force of their reasonableness compel either Congress to act, if it be a matter of Federal legislation, or the State to act, if it be a matter of State regulation.

It is along these lines that the Federal Government is going to work. We have made, we know, many mistakes. Our work necessarily has been of a tentative character. We bespeak from all of you the heartiest, most sympathetic co-operation, suggestion and criticism. No public officer should be afraid of criticism. We are working in the open. We have nothing to conceal. We simply are trying to join with you in this great industry in endeavoring to give its workers and its owners better opportunities than they have

ever had before for the proper development of the industry itself.

The Chairman advises me that the time has come when I must stop. I am sorry; I should like to talk with you further about some other questions which all of us have in mind. I thank you very much for the cordial reception you have given me here today, and I trust that many of you may come to Washington next week to take part in the conference for the conservation of national resources, and I shall look with a great deal of interest to the results of this conference here. (Applause.)

Problems of the Coal Mining Industry.

BY DR. J. A. HOLMES, WASHINGTON, D. C.

Mr. Chairman, Ladies and Gentlemen: This evening I surprised one of the ladies who have honored us with their presence here, by telling her how much pleasure it gave me to come from a quiet residence city like Washington into a busy, smoky, industrial center like Pittsburgh. I qualified that statement, she seemed so surprised at it, by saying that one of the purposes of the investigations which we are making in Pittsburgh is to get rid of smoke. (Laughter.) But it is industry itself that an active man is always pleased to get close to and into, especially when it presents so marked a contrast with the clear, quiet atmosphere of a residence city like Washington.

There is another thing which we are trying to do, not only for Pittsburgh, but also for the country at large, and that is to demonstrate how to use our mineral resources with less waste. One of the things which we are trying to do at this testing station, where most of you have been this afternoon, is to burn the low grade fuel, which in this Pittsburgh district and many other parts of the country, is being left underground and permanently lost because, it is said, there is no market for it. We are going to try to help you find a market for this great waste product of coal which you are now leaving in the ground, and which now approximates 250,000,000 tons yearly. However, the main purpose for which we are now conducting investigation, and for which this great meeting is being held, is the prevention of mine accidents. This mining experiment station located here in Pittsburgh, as was told you by the Secretary of the Interior, is the first step which this Government has taken to help the man who works in the mines. For years we have been spending millions of dollars on investigations to help the men who work in the sunshine of the farm in the safety of the open day; but we have all this time neglected the health and safety of the

million men who work underground, in the midst of its darkness and in its mysteries, which they cannot solve, or which none of us have solved, and which in our ignorance we are now trying to solve.

I want to say just a word further with regard to the work of this Pittsburgh station. It has been rapidly installed and developed during the past six months, and for that I want you to give the credit to Mr. Wilson, Mr. Roberts, Mr. Rice, Mr. Paul and others, who in season and out of season for several months have worked to get this station ready, so that we could begin the investigations that we hope will help the coal operators solve the difficult problems involved in mine disasters; and these are the men who deserve credit for that excellent exhibition which you witnessed at the station this afternoon.

With reference to the future progress of that work I want simply to ask the patience and the indulgence of the people who happen to know about it. When a great new work of that sort is started the public is apt to expect too much. We hear of these terrible mine accidents, and we are all wondering whether they can be prevented, or why they cannot be prevented. A few days ago there was one of these dreadful accidents in Germany, where they have been trying to solve these problems for a number of years. While I was in England during the past summer studying the mine safety appliances there, I had the misfortune to witness the most awful disaster in English coal mines which they have had for many years. I mention these things not to add to the sadness of that great problem, but simply, as I said a moment ago, to caution you to be patient.

I believe that every operator in the United States is trying the best he knows how to prevent another accident from happening in his mine. I believe that the miners themselves, and the great miners' organization, the United Mine Workers of America, will co-operate most heartily in every effort which is made to accomplish this great purpose.

And it is a great purpose to accomplish. It is worthy of the co-operative and combined effort which the intelli-

gence of America can put into it, because, as America claims to be leading in many of the great problems of civilization, and we are well advanced in many of them—we are far behind in effort to save life; and we realize that it is the duty of this, the wealthiest country in the world, the country which we believe has the best government in the world, through its federal government, the state governments, the mine operator and the mine worker to do the best that can be done to solve these great problems, and to help to make the men underneath the ground as safe as is the farmer on the surface.

The hour is too late for me to say more to you, because I know we are all anxious to hear the words which our worthy president of the Mining Congress, Judge Richards, has to say, and I shall have an opportunity again at tomorrow's meeting to speak to you on this and other subjects; while our president, Judge Richards, may not be so fortunate.

I only want to say this word for the American Mining Congress. It has had an uphill struggle, but the mining men of this country realize the good work which it is accomplishing in their behalf; how it is benefiting the mining industry; and is in every way deserving their fullest support and co-operation. I hope that everybody attending these sessions will realize that it is the one place in this country where men connected with all branches of mining, the operator, the miner and the owner and the well-wishers of mining may come together on common ground, in a good-natured friendly way to discuss the problems for the betterment of this great industry.

Some Utah Mineral Deposits and Their Metallurgical Treatment.

BY ROBERT H. BRADFORD, PH. D., PROFESSOR OF METALLURGY, STATE SCHOOL OF MINES, UNIVERSITY OF UTAH.

In the comprehensive paper on the "Mining and Mineral Resources of Utah," read at the Denver meeting of this Congress two years ago by our esteemed Director from Utah, Mr. John Dern, the mining resources of the state were fully outlined. It will be the aim of the present paper to give briefly the present status of Utah's mining and metallurgical industries, with especial stress upon the developments of the last two years.

Utah's Standing Among the States.

In the production of the four important metals—lead, silver, gold and copper—during last year, 1907, Utah stood third in lead, third in silver, fourth in gold, and fourth in copper, among the states of the Union, having made a decided advance in copper output over former years, with an advance also in lead and silver.

Her copper output for 1908 will be far in advance of last year with the promise of greater increase for other years yet to come. The rapid development of the mines of Bingham has brought our state rapidly to the front as a copper producer, and further exploitation in this camp bids fair to place her in the ranks as first instead of fourth in copper.

BINGHAM.

Mineral Deposits.

As a preface to the consideration of some of the larger mines of Bingham, I quote from the summary of the geology of this area in the Monograph on Bingham by the United States Geological Survey. "Between carboniferous and late tertiary time monzonite intrusives invaded sediments in the Bingham area, metamorphized them, and introduced metallic elements which replaced marbleized limestone with pyritous copper sulphides. After the superficial portions

of the intrusives had cooled to at least partial rigidity, they and the enclosing sediments were rent by persistent northeast-southwest fissures.

"Heated aqueous solutions from below then ascended, producing alterations, and introducing metallic minerals. Later the original sulphide ores, altered by surface waters, were oxidized in the upper layers, and secondarily enriched below by changing to black copper sulphides with the addition of gold and silver."

As a result of this process of mineralization there is found in the camp three types of deposits, namely: (1) the disseminated ore of the monzonite laccolith and the contiguous quartzite; (2) the sulphide lode or vein ores; and (3) the replacement or bed ores in limestone. The first type is known in the district as "porphyry ore," and the others as the "sulphide ores," since they contain pyrite or iron sulphide as the predominating mineral. Important mines are now producing from each of these classes of ores.

THE UTAH COPPER COMPANY.

The Ore Deposits.

This company owns about 200 acres of ground in the heart of Bingham, besides 1,000 acres near the mouth of Bingham canyon and 2,400 acres at Garfield. The ore bodies of the property in central Bingham consist of an altered siliceous porphyry containing small grains of copper minerals, very uniformly disseminated throughout the mass, both in fracture seams and in the body of the rock. The ore averages about 2 per cent copper, 0.15 of an ounce silver, and 0.015 of an ounce of gold. The primary copper mineral is chalcopyrite, but as a result of secondary enrichment from above, practically all of the copper sulphide minerals are now present, the principal one being chalcocite. The developed area covers 72 acres of ground, and although the thickness of the ore body has not been fully determined, yet existing developments show an average depth of at least 310 feet. This area and depth of ore figures up to the equivalent of 1,000,000 tons of ore per acre. Below the depth included in the above estimate is a zone of lower

grade ore averaging about 1.5 per cent copper and containing about 40,000,000 tons of ore as indicated mainly by diamond drill holes.

Besides these 72 acres now developed or partially developed, there are 88 additional acres of mineralized porphyry in the company's property that is undeveloped, although a portion of this area is known to contain ores of profitable grades.

Methods of Mining.

Open cut work with steam shovels is employed in the extraction of 80 per cent of the tonnage of 6,000 to 7,000 tons of ore per day, the remaining 20 per cent being taken out by the underground caving system. The caving system, although costing slightly less than 60 cents a ton of ore produced, is being abandoned wherever possible in favor of steam shovel work. In great part the benches of ore need but little shattering by blasting, as much of the ore is already loose enough for direct shovel work.

Equipment.

At the mine the company has in operation fifteen steam locomotives, mostly of 100,000 pounds weight; 125 stripping dump cars of six yards capacity; two 40,000-pound electric locomotives; three smaller electric locomotives and the necessary cars for underground haulage; six steam shovels; about ten miles of standard gauge railway laid with 65-pound rails; a 300 horse-power compressor plant; a completely equipped machine shop, capable of handling and repairing the heavy locomotives and steam shovel work, besides the commodious offices and quarters for employees.

About 75 per cent of the ore produced by the caving system is transported by the Copper Belt Railroad to the Utah Copper Company's concentrating mill at Copperton, about three miles down the canyon. This mill has a capacity of 900 tons per day. It was built originally for the purpose of developing the best process of concentration, but has been trebled in its capacity and now is an important unit in the company's commercial mills. The Mammoth

concentrating mill is located at Garfield, where the company has an abundant supply of water.

Ore Concentration.

The ore is transported 15 miles northward by the Rio Grande Western Railroad Company to the Garfield mill on the shores of the Great Salt Lake, and there concentrated, 22 tons of crude ore into one ton of concentrates. The object of concentration is to get rid of the silicious waste material, which is expensive to smelt, and to collect the values into less than 5 per cent of the original tonnage. It is then only necessary to pay for the smelting of the one ton of ore instead of 20; and it costs a lower price per ton for it also, because of its higher iron content, than for the original monzonite rock with its high percentage of silica.

The process of concentration consists in crushing all the ore fine enough to sever the valuable minerals from the waste particles. With this ore it is necessary to crush everything to 40 mesh before the separation of the heavy valuable particles from the light waste material is commenced. Concentration is carried on with jigs, shaking tables and vanners, and the concentrates average 28 per cent copper, 15 per cent iron and 30 per cent silica, a very desirable smelting mixture. The losses in concentration, occasioned in great part by sliming, caused by the fine grinding through which all the ore is carried, are considerable, amounting to 25 to 30 per cent of the total copper. But since, under the present smelting conditions, the crude ore could not be smelted direct, concentration even with its attendant losses is absolutely necessary.

Smelting the Concentrates.

The concentrates from the monzonite ore form a very desirable smelting mixture. It may be smelted direct in the reverberatory furnace or roasted preliminary to smelting. The fine concentrates containing high sulphur values are roasted in pot furnaces or in mechanically rabbled furnaces for the partial elimination of the sulphur. If the pot furnace is used the roasted product is in a sintered but porus condition, and hence in good condition for the copper

blast furnace. Matte and slag are run from the blast furnace continually and these separate from each other by gravity in a large settler. The slag with less than .5 per cent copper is discarded, and the matter is further treated to obtain metallic copper. When the fine ore is roasted in the mechanically rabbled furnace (the McDougal) and taken out in a loose powdery condition, the reverberatory furnace is employed to smelt the roasted material. Furnaces with upwards of 2,000 square feet hearth area are employed at the Garfield Smelter on this fine, powdery material, and 350 tons of this roasted ore are run through each furnace each 24 hours. The products of the reverberatory furnaces, like the products of the blast furnaces, are slag and copper-iron matte.

The slag from both kinds of furnaces is run into large pots arranged on trucks, and transferred by locomotive on tracks to the slag dump, where it is run out in a molten state as waste.

The matte from the settler of the blast furnace or from the reverberatory furnace is run into ladles of 10 tons capacity, operated by electric traveling cranes, which span the converter house. At the Garfield works there are two such cranes, each of 60 tons capacity, which run the full length of the converter building. The ladles of molten matte are quickly carried to the converter and the contents poured in and the ladle returned for more matte. When the converter has received its charge of ten tons the air under a pressure of 12 pounds is turned on and the shell is tilted back to position. When the blow begins there is rapid oxidation of iron and sulphur. The iron having the stronger affinity for oxygen is finally all oxidized, forming with the siliceous converter lining an iron silicate slag. The slag is then skimmed and the remaining copper sulphide, after being replenished by the addition of molten sulphide of the same copper content from other converters, is again blown, to oxidize the remaining sulphur and produce metallic copper; 98 per cent pure, known as blister copper, carrying the gold and silver that were in the original ore. The bars

of copper bullion cast from the converter are 24 inches long by 18 inches wide by 2 inches thick and weigh 300 pounds.

The metal is shipped away to the refineries in this crude condition. As the centers of consumption of the refined products are at a great distance from the smelting plant, and as the costs of transportation of the refined metals is much greater than that for crude bullion, no effort is made at refining the bullion in Utah.

THE BOSTON CONSOLIDATED.

The Porphyry Mine.

Adjoining the Utah Copper mine on the south is the Boston Consolidated. The porphyry mine of this company covers about 156 acres of territory. A large portion of this area is underlaid by mineralized monzonite porphyry, similar to the Utah Copper ore, but running slightly lower in copper content. This ore is estimated by the company's engineers to average about 1.5 per cent copper. The capping, or over-burden, to be removed in order to mine the deposit by steam shovel, is about 100 feet in thickness. The profitable ore over this area as indicated by extensive sampling and assaying, is about 300 feet deep. Very extensive equipment employed for stripping and disposal of the capping and for the mining of ore for the concentrating mill has been in operation for three years. This equipment is said to be ample for handling 15,000 tons of rock daily.

The Boston Consolidated's concentrating mill is located at Garfield, 15 miles air line or 27 miles by railroad to the north. When all the units that are now commenced are in commission the mill will have a capacity of 3,000 tons of porphyry ore per day. At present but eight units are in operation. The concentrates are somewhat lower in copper and higher in iron than those from the adjoining property. They make a very desirable smelting material and are contracted for by the Garfield smelter on very favorable terms.

Besides the porphyry mine this company operates an extensive sulphide mine, covering 103 acres of the limestone belt. The ore, carrying a high percentage of iron

pyrite, is not susceptible to concentration, but is sold to the smelter. The mine is fully equipped for the production of 750 to 1,000 tons of ore per day by square set stoping.

THE OHIO COPPER COMPANY.

Disseminated Quartzite.

This property adjoins the Utah Copper on the east and the Boston Consolidated on the north, and covers an area of 120 acres. The ore is quartzite, mineralized with copper and iron sulphides. The quartzite merges into the laccolithic mass of monzonite porphyry of the two adjoining properties. The ore is much shattered and broken. Disseminated throughout the shattered rock, and especially along the cleavage planes is the copper ore in the form of a clean chalcocite, associated with chalcopyrite and pyrite. Many crevices in the shattered quartzite have been filled by the metalliferous minerals forming stringers and veinlets of rich copper sulphide.

Larger fissure veins traverse the deposit and these contain much ore of higher copper content, due to secondary enrichment. In these veins, along with the predominant chalcocite, there is found much red oxide as well as some metallic copper.

From careful and conservative calculation of ore reserves there is estimated to be 13,500,000 tons of ore in the mine above the present transportation tunnel. The average copper content of the ore, as obtained from abundant sampling, is 1.6 to 1.75 per cent copper, with some 10 cents in gold and 3 cents in silver per ton.

The concentration of this ore is a simple matter, as the copper minerals are not so finely disseminated through the rock as they are in the porphyry of the neighboring properties. The absence of any clay or talcy decomposition products of the rock make this quartzite an exceedingly favorable ore for concentrating. The mill tests have given an extraction of 75 to 80 per cent of the values.

A concentrating plant of 2,400 tons per day capacity is now built at Lark, three miles to the east, for treating

this quartzite. The main features of difference between this plant and those of Utah Copper and Boston Consolidated plants are due to the difference in the ores. This mill will crush all ore to 12 mesh only, and will make its principal savings with the copper minerals in larger pieces, using jigs and shaking tables, but no vanners. It has, however, provided a slime plant, with settling tanks, slime tables and buddles. The ore is extracted by the caving system and dropped through winzes to the ore bins, 400 feet long, built 1,000 feet underground, just above the transportation tunnel, which reaches the property 1,000 feet below the bottom of the Bingham canyon. This tunnel runs eastward 13,000 feet to daylight on the east base of the Oquirrh mountains, where the concentrating mill is located. The ore is transported at a cost of 15 cents per ton, mined for 50 cents and concentrated for 50 cents per ton. With copper at 15 cents, the net income per day on 2,400 tons of ore is estimated at $3,864, or an income of $1,400,000 per year.

The company has built the present mill with the idea of enlarging its capacity to 4,000 tons per day in the future.

THE UTAH CONSOLIDATED.

The Highland Boy mine of the Utah Consolidated Company was one of the early producers of the high grade sulphide ores. The ores of this company were smelted for a number of years at their own smelter at Murray, Salt Lake county. The ore averaged high in copper and the output of the smelter in copper bullion was large for the ore tonnage treated. The high grade ore and the favorable conditions of mining and smelting were indicated by the dividends disbursed. These amounted to more than one million dollars per year. Since the closing of the Murray plant by the injunction by the farmers of the valley, the ore has been treated by the American Smelting and Refining Company's plant at Garfield.

The Utah Consolidated has let a contract for smelting its ore for the next ten years to a private party, who will

immediately begin operations of building a modern copper smelter at Pine Canyon, just over the Oquirrh range to the west, in Tooele county. The smelter is to be ready to treat the ores of the company by April, 1910. The mining company, in the meantime, will construct an aerial tramway from the mine over the mountain range and down Pine canyon to the smelter, a distance of six miles. Eight hundred to 1,000 tons of ore per day will be transported from the mine over this aerial tramway when completed.

THE YAMPA MINE AND SMELTER.

One of the large producers of the sulphide ores of Bingham is the Yampa mine. The ore is practically self-fluxing with the exception of needing a small amount of limestone. The mine is now putting out a tonnage of 700 to 800 tons of ore per day, which is transported about one and one-half miles to the Yampa smelter, in Bingham canyon, the cost of transportation being 7 cents per ton.

The smelter treats the total tonnage of the mine, besides about 200 tons daily of custom ore. The furnaces of the plant consists of nine McDougal roasters, three reverberatory furnaces, two having dimensions of 17 feet by 55 feet, and one 17 feet by 45 feet; three blast furnaces, two 42 by 160 inches and one 42 by 184 inches; two converter stands, with six converter shells of 84 by 136 inches dimensions. The production of metallic copper by the Yampa smelter with its present capacity is slightly over 10,000,000 pounds per year.

THE UNITED STATES PROPERTIES.

The extensive properties of Bingham canyon owned by the United States Mining Company are producing a large output that is all smelted at the United States smelter at Bingham Junction, in Salt Lake county. Their ores are transported by aerial tramway to the Rio Grande Western Railroad cars at the Bingham terminus and then hauled to the smelter, 12 miles away.

The properties described are the most important in Bingham from the standpoint of present development.

Nevertheless, there are many other important producers of copper as well as of lead ore in the West Mountain district, in which Bingham is situated.

THE TINTIC DISTRICT.

Tintic has achieved and still holds the enviable distinction of having more dividend paying mines than any other district in Utah. Eighteen of her mines are credited with having paid dividends of $17,000,000. The exact figures of bread money distributed are hard to ascertain, as many of the mines have been operated by individuals and close corporations, concerning whose income the public has learned little or nothing.

The Centennial Eureka, one of the richest mines of the United States Smelting, Refining and Mining Company, has of late years been the heaviest shipper. The Bullion Beck, one of the oldest producers of the district, has recently gone into the hands of the United States Company, and will be exploited even more actively in the future. The Eureka Hill leasers have been very active during recent years and have produced large quantities of good grade ore. The Mammoth and Grand Central seem to show no limit to the depth at which they obtain very profitable ore.

East Tintic, around Godiva mountain, has shown greatest activity during the last two years. The May Day and Uncle Sam have both benefited by the union they effected during 1907. During 1908 there have already been paid out by these companies near $150,000 in dividends. The Knight properties, consisting in the main of the Colorado, Beck Tunnel, Black Jack, Crown Point and Iron Blossom, controlled by Mr. Jesse Knight of Provo, Utah, have made a phenomenal record since their exploitation commenced some three years ago. The Colorado has taken the lead by producing nearly a million dollars' worth of ore in 1907 and paying an aggregate of nearly $800,000 in dividends during that year. Her ore averages from $75 to $100 per ton in lead, silver and gold. The Beck Tunnel has been a close follower with ore values averaging somewhat less, but with a total dividend record near the $700,000 mark, but

distributed over a considerably longer period of time. As evidenced by the miniature dumps at the shafts of these two mines, there has been very little dead work. Practically everything taken out has been shipping ore. This lime formation of East Tintic has responded so abundantly to the efforts of the miner that now a circle of dividend paying mines is found around Godiva mountain, including the above mentioned properties, the Yankee Consolidated, the Gemini, the Giroux Consolidated and some others.

Tintic suffered considerably by the closing down of the Salt Lake county smelters and a consequent cutting off of the market for her ores. At present, since an amicable agreement between the farmers and the lead smelters has been entered into, relief has been furnished. Mr. Jesse Knight and his associates have organized the Tintic Smelting Company and have started up, during the present year, a lead smelter of 350 tons capacity. This plant is located right in Tintic and furnishes a ready outlet for the products of many of the nearby mines.

PARK CITY.

Owing to the recent very unfavorable metal market this lead and silver camp for the first half of the present year marketed practically no ore. But during this period much development work was done, which opened up ore bodies that make it possible for some of the largest companies to ship, when metal prices improve, even better ore and larger tonnage than ever before. Little stir is made as the development opens up new bonanzas, but that such are opened up is always shown as the metal market warrants big tonnages. The persistence of the rich ore in the Park City mines as depth increases makes it important to provide proper drainage. The Ontario drain tunnel, three miles long, was constructed for this purpose.

The caving in of this drain tunnel a few years ago caused the lower levels of some of the large mines to become flooded. By intelligent and untiring effort this tunnel has, during the last year, been again opened. It has also been extended back under the Daly and Daly West

mines. The tunnel will cut the Daly West shaft at the 2,100-foot level, giving this mine 600 feet additional vertical depth. The Daly West main shaft is being deepened to meet the tunnel and is now near the 1,700-foot level.

The Silver King mine has made important strikes of high grade ore during recent developments that put it in possibly better condition than ever before. It, with the Daly Judge and Daly West, is shipping fair tonnage at present.

The new developments of the Park City district have been made recently in Thaynes canyon, toward Brighton. Prospects that are showing great activity there are the Copper Apex, Keystone, Uintah Treasure Hill, New York, Wabash and Silver King Consolidated.

MERCUR.

Utah's famous gold producer, the Consolidated Mercur Gold Mines Company, is the leading gold producer in the state. During the past fifteen years there have been many millions in gold produced by the properties of this company. The total dividends to date paid by the present company and by the old De La Mar and Mercur Companies run up to the handsome sum of $3,385,312.97. This amount shows the success that has attended the persistent efforts of Mr. John Dern and his associates.

The ore was early known to contain gold, although the prospector was unable to even get colors by the use of the gold pan, and the prospector often had difficulty in interesting the investor in the properties of the camp because no gold showed up in the pan. Mr. Dern and his associates from Nebraska took hold of much of this ground, but found great difficulty in extracting the gold values. The ore refused to give up its wealth by any metallurgical methods, although the owners systematically and persistently experimented with all the commercial methods of extraction then known. At that time the cyanide process was just being developed and the Mercur operators quickly took up with this new process and had their ore carefully tested. The results showed but meager success at first. The oxi-

dized ore gave fair extraction, but much of their higher grade sulphide ores gave little promise of ever responding. By careful work with the roasting furnace, under the efficient direction of Mr. D. C. Jackling, now general manager of the Utah Copper Company, the sulphide and arsenide ores were brought into a condition for effective cyaniding. Still another difficulty remained to be solved. The slimes were large in amount and no method for successfully treating them had been perfected. This problem the present owners have solved, and the tailings of sands and slimes now carry over the dump but slightly over 50 cents in gold per ton. The Consolidated Mercur mill has a capacity of 800 tons per day, and the Holderman Filter Tank Company is now operating by sliming and vacuum filtering at a daily tonnage of 200 tons on the Manning dump of the early Mercur tailings.

The Boston-Sunshine Gold Mining Company have reconstructed the mill of the old Sunshine mine of Mercur and are adding much new equipment preparatory to cyaniding the very clayey refractory ores of the once famous Sunshine mine. The mill will have a capacity of 200 tons per day and will be put into commission during the coming month of January.

OTHER IMPORTANT MINING DISTRICTS.

Time will not permit of more than passing mention of other important mining districts of the state. Alta, Big Cottonwood, American Fork, Deep Creek, Beaver County, Kimberley, Park Valley, Gold Springs and others have produced much ore to increase the yearly output of the state.

NONMETALLIC MINERALS.

Salt.

The waters of the Great Salt Lake are furnishing yearly about 40,000 tons of salt, supplying most of the states west of the Missouri river. The saturated brine of this great body of salt water contains an almost unlimited supply of this mineral, so essential to human life.

There has recently been explored a most important

salt deposit in the form of an immense salt bed in the Great American desert, about 110 miles west of Salt Lake City and 15 miles east of the Utah-Nevada state line. The Western Pacific Railroad has built its track directly through these beds. This salt covers an area of 60 square miles. The deposit varies in depth from six inches to seven feet or more, in places where poles were set. It is almost perfectly white and absolutely free from dirt, rubbish or growth of any nature. Providing the deposit only averages one foot thick, the amount of salt to the square mile will amount to more than one million tons, or sixty millions of tons in the whole deposit.

The United States Congress, by the provisions of the Enabling Act for Utah, gave to the University of Utah all saline lands of the state. Notwithstanding this fact, prospectors have staked out their claims over the deposit and are contesting their rights in the courts. The Supreme Court of Utah, during the past week, gave its decision in favor of the State University, but the case may not be finally disposed of until the United States Supreme Court gives its decision. With this immense deposit of pure mineral as an asset the University will be well provided for.

Coal.

There are four extensive coal fields being operated at present in the state of Utah. These include the Book Cliffs, the Weber River, the San Pete and the Iron County fields. The Utah Fuel Company, operating all the mines of the Book Cliffs field, produced in 1907 near 2,000,000 tons of coal. Their product is of excellent quality, remarkably homogeneous, with low ash and sulphur content. The coal from the Sunnyside mine burns to a superior grade coke, which is used in large quantities by the large smelting plants of the state.

Hydrocarbons.

The asphalt deposits of Eastern Utah are world famous for their extent and purity. The principal minerals consist of uintahite, wurtzilite, elaterite, ozocerite and

maltha, besides a variety of asphaltic limestones, sandstones and shales. Uintahite, or the gilsonite of commerce, is the most important. It occurs in true veins, cutting the sedimentary rocks of the region. In extent and purity these deposits far surpass any other recorded occurrence.

The limitations of the present paper will allow of but passing mention of other mineral deposits of great promise in the state. These include deposits of fire clay, gypsum, phosphate rock, sulphur, antimony, limestone, cement rock, petroleum, building and ornamental stone, uranium, vanadium and radium minerals that up to date have been but partially developed.

Iron Ore.

But a description, though brief, of Utah's mineral deposits would be incomplete without mention of her enormous iron ore deposits. One out of a number of occurrences will be referred to. The deposit in Iron county, in Southern Utah, occurs as a mountain of ore, 15 miles long by three miles wide. Hundreds of acres of this mountain of ore will require no stripping, and in greater part will respond readily to the steam shovel. Analyses of numerous samples by United States Geological Survey officials show averages of from 59 to 65 per cent metallic iron.

SALT LAKE CITY AS A SMELTING CENTER.

Salt Lake City is at present the most important smelting center in the world. The tremendous ore supply of the three great mining camps so near at hand, namely, Bingham, Park City and Tintic, giving a combination of easily smelted mixtures, and the unlimited confidence in the continuance of the supply, has justified the building of exceedingly large smelting plants in Salt Lake valley. The favorable position of Salt Lake as a railroad center enables the smelters to draw large supplies of ore from all parts of Utah, from Idaho and Nevada and even from California.

With the galena and lead carbonate ores from Park City, Tintic, the Cottonwoods, from Idaho and Nevada;

the copper iron sulphides of Bingham and Beaver county; the siliceous copper, gold and silver ores of Tintic and scattered camps, and from Nevada, the ore supply is more diversified than anywhere else in the United States. Large custom copper smelters and lead smelters, with their competition for custom work, have brought very favorable smelting rates to the ore producer. Nowhere else in this country can the producer dispose of his ores at so favorable figures.

The smelters now in operation, with their capacities, are as follows:

		Tons Daily
Murray Plant, American Smelting and Refining Company	lead	1,500
Garfield Plant, American Smelting and Refining Company	copper	3,000
United States Smelting Company, Bingham Junction	copper	1,500
United States Smelting Company, Bingham Junction	lead	1,000
Yampa Smelter, Bingham Canyon	copper	1,000
Utah Smelting Company, Ogden	copper	250
Tintic Smelting Company, Tintic	lead	350
Tintic Smelting Company, Tintic	copper	150
Total Capacity Daily		8,750

SMELTER SMOKE.

The decision of United States District Judge Marshall in favor of the farmers of Salt Lake county against the smelters of Murray and Bingham Junction, whereby the smelters were not allowed to smelt or roast any ore containing over 10 per cent sulphur, seemed a severe blow to the smelters. The decision did not affect the plants at Garfield or Bingham canyon. Two of the smelter companies abondoned their plants. These were the Highland Boy and Bingham Consolidated copper smelters. The former immediately took options on land about 20 miles west, just over the Oquirrh mountains, in Tooele county, and the latter negotiated for land somewhat farther west.

The American Smelting and Refining Company came to an agreement with the farmers, whereby they would remain at Murray, by installing a bag house to filter all solids from their smoke, and by instituting some minor changes.

The United States Smelting Company, as a result of untiring experiments with its smoke to determine a method

of abating the nuisance, apparently succeeded, and now are able to run all the smoke, not only from their lead furnaces, but also from their copper furnaces, through bags, and collect all solid particles. As a result of this success they have been given opportunity to resume their entire plant and continue so long as no bad effects are suffered by the farms. The company seems to have perfect confidence that they shall be able to go on in the future undisturbed, for they are remodeling their plant and increasing the capacity of their bag house at a very great expense. It is anticipated that no further trouble will ensue between smelter and farmer.

Utah's Steady Advance.

Utah's prominence as a mining state has been gained gradually as a result of the extensive development of enormous medium and low grade deposits. There have been no spasmodic and temporary gains in her metallic output, neither have there been serious losses, as the years of prosperity or adversity in mining arrived. No decline in lead and silver or slump in copper has caused collapse. Her advance has been rapid but regular. The prospects are brighter now for increased output in future years than they ever were before.

The dividends from her mines and smelters indicate the substantial nature of these industries. For 1907 the reported dividends amounted to more than $5,000,000, and this was no exception, as the bread money distributed for a number of years has hovered around this flattering figure.

Security of Investments in Utah.

There have been fewer labor troubles in Utah than in any mining state in the West. Seldom have the mining and metallurgical operations in the state been interfered with by conflicts between capital and labor. The sentiment of the people of Utah is against strikes and lockouts. Laborers have never demanded exorbitant wages. Mine and smelter managers have acceded to the request for increased pay during especially prosperous years, and the workmen

have allowed this increase to be taken off at times of depression. Capitalists are now appreciating this favorable relation between capital and labor in Utah, and are showing a preference for our state as a place to invest their money.

Mining and the Mineral Resources of Arizona.

BY COLONEL FRANK COX, PHOENIX, ARIZONA.

To every bar of precious metal produced, not only in Arizona, but in any mining region, there is a personal history attached. From the ambitions and hopes of the sturdy prospector, down to the calculations of the largest mining operator, is the story woven. Interesting as these stories are, however, and much as we owe to the men that broke the ground, individual mention of them must be here omitted. But, though even the names of the men have been forgotten, we do not forget the fact that it was the brave, the stout-hearted pioneers that made possible such mines as the Detroit and the Arizona, the United Verde and the Copper Queen—mines known all over the civilized world—mines without which we could not make our proud boast that, with her yearly output of something like 253,000,000 pounds of copper, Arizona today leads the United States in the production of this royal metal.

The manufacture of copper is the most important industry in the territory. Mining was substantially commenced here long before Arizona was known as a political subdivision of the United States. In the early part of the eighteenth century, it was carried on in a crude way, and there yet remain, in the southern part of the territory, many evidences that silver mines were worked there hundreds of years ago. When I first came to Arizona, mining on the improved and modern plan had just begun, although, years before that, stamps had been dropping at the Vulture and at the Silver King. The Vulture was a gold, the King a silver producer. Both have records of many millions in production, and both, on account of expensive transportation, were shut down long ago. Now railroads have made possible their working at a profit, and they are to be reopened, companies for the purpose having been already organized. At the Vulture and other mines the original

houses were built of gold ore, so rich that afterwards they were torn down and milled at a large profit.

It was shortly after the Gadsden purchase that the first smelter—an adobe plant at the old Ajo mine—was operated, by Peter Brady, a well-known pioneer. In 1873 a similar smelter was at work in Pinal county, and this plant it was that made the first assay of the ore of the famous Silver King. In the early sixties mills were at work in Arizona, but among the first of the modern ones constructed here was the 20-stamp mill on the San Pedro river, near Tombstone, erected in 1879. This mill worked ores from the famous Tombstone mines.

Now, great roaring furnaces have supplanted the crude roaster; stamp mills, the arrastras of the aborigines; and magnificent Corliss engines, the one-horse whim of the prospector. And nowhere can there be found today more complete and perfect machinery than that operating on the hills and in the canyons of Arizona. If the men who worked on the Vecol, twenty years ago, could see the Imperial smelter on the plain at Sasco, he would think that truly Alladin had come to life and rubbed his lamp again; so with the old miner of the Lucky Cuss, could he travel now through Humboldt, where is located the northern customs smelter; or through Douglas, where two great smelters are in operation night and day; or through Jerome, from where, by night, the slag dumped from the mighty furnaces sends out a glow so vivid and far-reaching as to be seen—a magnificent painting—in the Coconino Forest, fifty miles away.

Among the gold mines of the Arizona of today is the Congress, probably the deepest in its workings of any in the territory, and its richness holds with depth, nor shows signs of giving out. The King of Arizona and the North Star, two comparatively recent discoveries in the western part of the territory, are developing into gold producers, and every day brings news of additional discoveries. Notable among the gold mines of Yavapai county, the home of the Congress, are the Tiger, the Octave and the Poland of Mohave county, the Gold Road and the Arizona Mexican.

Nor must mention of our placers be omitted; for, from the Pot-holes of Yuma county to the Painted Rock in Maricopa, there seems to have been a shower of the precious metal; from the summit of Rich hill to Wickenburg, the record of coarse gold would indicate that in early ages there had been a cloud-burst of the golden grains. From the top of Rich hill alone a million and a half in coarse gold nuggets was picked up by hand in years gone by. And only capital is needed nowadays in order to work at a profit these great and almost untouched placers; for they need the dredge, a costly apparatus.

That investments in the mountains of Arizona richly reward the capitalist is proved by the results attained by the Detroit Copper Mining Company, the Calumet & Arizona, the Superior & Pittsburg, the Shattuck-Arizona, the Old Dominion, the United Globe, the Gibson Copper, the Arizona Copper, the Shannon, the Imperial Copper and the Oxide Copper Company, to say nothing of the United Verde and the Copper Queen. Nor is this half the list, but time forbids an enumeration of the hundreds of paying mines now in operation.

In the great and growing Southwest is room for every sort of miner. It is not the capitalist alone that finds fields of usefulness and profit. To the skilled laborer and the common miner Arizona now offers greater opportunities than ever before. Nor have the unions obtained the foothold here that they have in California and other Western mining communities. Strikes are almost unknown. Even during the panic and following the great slump in copper, the mines of Arizona kept up activities, employing nearly the usual number of men, with only a slight reduction in wages.

That Arizona jealously guards the interests of those that confide in her has been proved over and over again, from the days when a fearless governor published a printed declaration against fake mining companies, mentioning in particular one that he believed to be merely a drag-net for small wage-earners, down to the present administration.

The day of the soap-bubble mining company, as well as the day of the arrastra and the adobe furnace, has passed away, and with it is passing that distrust which men of means so often feel toward the mere territory—the frontier.

The total value of the production of copper, gold and silver in Arizona for the year just passed was in the neighborhood of $55,000,000. Nor are these the only minerals we produce. The list is long and includes asbestos, molybdenum, chalcedony, sapphires and other precious stones, as well as common table salt. Among other products is that white auriferous clay from the Black canyon, famous in the West for its medicinal qualities, and known as gy-zo-rine.

The valuation of productive patented and unpatented mines and mining claims in Arizona (for taxable purposes) is	$13,712,134.32
Valuation of improvements	2,102 272.00
Valuation of non-productive patented mines	2,552,977.93
Valuation of improvements	787,183.00
Valuation of smelters	1,941,875.00
Valuation of improvements on non-productive, unpatented mines	388,683.00
	$21,485,125.25

And even with the vast amount of mining going on, the industry is only in its infancy here. An observant person may watch the lines of transportation and the terminals, and he will see, daily, carloads of new machinery arriving and being speedily transported to the camps of Ray, Kelvin, Wenden, Bouse and the newer mining camps that are startling the commercial and mining world with their richness. While some of these statements may seem exaggerated to many who have even passed through the territory, if the most conservative will visit the different mining camps and mills in Arizona, he will agree with me, that the mineral resources of the territory cannot be exaggerated. The time given me did not permit of the preparation of a scientific paper requiring research, but if I have awakened your interest so that you will yourselves investigate the history and statistics in regard to Arizona's mining and mineral resources, the object of this paper will have been accomplished.

We need more capital—that capital which we are assured will flow to us when we become a state, even though then we shall be no worthier than we now are. We have the mineral, we have the transportation facilities, we have the mills and the smelters; and when we become a state we shall have all the capital we need to take out and work the ore. Until that time, with Sharlott Hall we say to those that would bar our admission:

"We will match the gold of your minting, with its mint-stamp dulled and marred
By the tears and blood that have stained it and the hands that have clutched too hard,
With the gold that no man has lied for—the gold that no woman has made
The price of her truth and honor, plying a shameless trade—
The clean, pure gold of the mountains, straight from the strong, dark earth,
With no tang or taint upon it from the hour of its primal birth.
The trick of the money-changer, shifting his coins as he wills,
Ye may keep—no Christ was bartered for the wealth of our lavish hills."

The Mineral Resources of Virginia.

BY E. A. SCHUBERT, INDUSTRIAL AGENT, NORFOLK AND WESTERN RAILWAY.

The name Virginia, to most people, associates little else, except that it is the seat of the first permanent settlement of English speaking people in America, and that it must of necessity under these circumstances be old and thoroughly known in practically every appointment. Strange as it may seem, this is far from the truth; in fact, there are thousands and perhaps millions of acres which to this day are practically unknown, unexplored by the white man.

For some reason, which I am not able to explain, this idea has taken firm root in our sister states, and no matter what argument may be advanced, it is scanned with a doubt, and by most people rejected; but regardless of the opinion of the skeptic, the premise nevertheless is true.

It is not within the province of this brief paper to discuss the mineral resources of Virginia from a purely scientific standpoint, but rather, in a general manner, to refer to their economic value and the part they may play in the mineral and other industries of the United States and the world in the future.

There scarcely is a possibility of contradiction from those who know the Virginias as I know them, with reference to the statements I am about to make; but I am quite certain that a majority of the members and delegates of this congress assembled will ask the old time question: "If what you say is true, why then is the mineral development so slow, and the influx of capital uncertain?" I can best answer my friends who question my statements, that capital is a peculiar and timid creature, particularly when sought for investment in mines and mining. The man with a thousand dollars to invest in the mineral industry much prefers to associate his investment with the far West, Mex-

ico or some other foreign country, remote from transportation, fuel, labor and society, in the hands of people of whom he knows but little, than to chance it in an old state like Virginia, which, if it is not, should have been well developed many years ago, and so, even our own native Virginian will dream of fortunes yet unborn and send his money to other sections, where his dreams in all probability will never become a reality and his money is gone from him forever.

It is the desire of the professional and business men of Virginia to bide patiently the time when the Old Dominion shall receive her own, and be endowed with that great awakening which year after year is drawing nearer.

Coal.

It is hard indeed to believe that man is so blind to his own senses as to pass his fortune, when the doors are about to be opened to him, but such has happened in the Virginias, when thousands upon thousands of acres of rich coal land were sold as low as fifty cents per acre, while hundreds of thousands of acres were forfeited to the state for taxes, which, if they had been held for a few years longer, would have made many a man a millionaire, who as a result of his ill judgment is a pauper today. This coal land which thirty years ago was sold for fifty cents per acre, fifteen years ago was worth $25.00 per acre and at the present time it is a frequent occurrence to learn that as much as $500.00 per acre has been offered and refused for well proven Pocahontas coal lands, and no person cares to sell. But is there any wonder, when I recall but one year since that wonderful display of bituminous coal at the Jamestown exposition, perhaps the finest ever shown, and recall one single lump taken from the mines of the Pocahontas Collieries Company, which showed the seam at that point to be over ten feet thick without one single parting? This lump was taken three miles from the entrance to the mine, and weighed eight tons. I might add that the Pocahontas Number Three coal seam will average more than twelve feet in thickness on this property and it has been mined at

points where it was twenty-three feet in thickness without a parting. In this particular section there are six workable seams of coal totaling about fifty feet. When we consider that Buchanan county, containing over 600,000 acres; Dickinson, about 250,000; Wise, 400,000, and Russell, Scott and Lee many thousand more, are practically one solid lump of coal, and that some of these counties at the present have not one single mile of railway within their borders, is there any question about this industry being in its infancy and that development has scarcely begun? Let us look to the future.

Thirty years ago less than half a million tons of coal were transported by the railways of this section to the seaboard, principally Norfolk, but now fully fifteen million tons find an ever increasing market in that port. Not content with the transportation facilities, as developed up to three years ago, two other trunk lines were organized, and now are nearing completion, one having its tidewater terminus in Norfolk, the other in South Carolina. When these roads are completed, the coal carrying capacity will be increased about forty per cent, and four of the finest railways in the United States, if not in the world, will carry this economic factor from the mines to all sections of the globe.

It is estimated that these great coal fields can, by means of the railways now completed and now building, transport two hundred trains per day, fifty cars to the train and fifty tons to the car, for upwards of four hundred years without exhausting the coal measures along their lines. And all this development has taken place in less than thirty years, which may not be realized by those in this congress. The United States Steel corporation realized the great value and power of this flat top region several years ago and now has developed and in operation one of the finest if not the finest coal and coking plant in the world, at Gary. Other companies have made equally great development.

I have referred only to the bituminous coal areas of the Virginias and the nearby territory. We have also what

we now term the Virginia anthracite, or semi-anthracite, a coal that partakes of the characteristics of the bituminous coal in its free burning, but partakes of the anthracite characteristics on account of its being low in volatile matter, thereby making it an ideal coal for domestic purposes, there being no more smoke than in the best of Pennsylvania anthracite. This coal area is practically undeveloped and unknown, save for four mines in the vicinity of Christiansburg and Pulaski. Perhaps half a million tons of this coal have been recovered at all of the operations and the deposits scarcely touched. I have traced this coal from the Tennessee border to the West Virginia line in Berkeley county and find it constant, regular and persistent; will vary from three to twelve feet in thickness; has a dip at the outcrop of about 38 degrees, gradually flattening with depth, until now, in one of the mines which has been worked on the slope about 900 feet, where the dip is only about twenty degrees. This coal is purely sedimentary, but its true history is still a matter for future research and definite conclusions. I am not claiming that the time is at hand for a general development of this coal field, but there is no question that this deposit in the future will prove of great value and yield billions of tons of high grade fuel. To conceive the area and tonnage that may be recovered, I might add that the territory is about 400 miles long, two to five miles wide and will easily average six feet in thickness, not calculating that at points there are as many as thirteen different seams and rarely less than two.

Triassic Coal Beds.

In Eastern Virginia are two coal basins having an area of several hundred square miles, found in the Triassic measures. This coal is found in a syncline, has a thickness of about six feet and many years ago was worked, particularly during the civil war. The coal is of a good quality, but on account of the depth and manner in which mining must be pursued, it cannot be recovered and compete with the drift mines of Western Virginia. Many years hence Virginia will have a valuable asset in these Triassic coal beds.

Iron.

To me none of the minerals playing such an important part in the supremacy of our nation are so interesting as are coal and iron. Having reviewed the former, I now shall take the opportunity to direct your attention to the subject of iron, which is creating so much discussion in the world today. This great factor is but a close companion to coal; they go hand in hand. A little over a year ago, the industrial and scientific journals were very much wrought up, but unnecessarily so, at the rapid depletion of the world's iron ore supply. A trifle over ten billion tons at that time was all that was accredited to the entire world. Of this amount, only about three billion tons was credited to the United States. Would I be venturing a visionary statement and one utterly untenable to proclaim to this congress that the Virginias today have a practically unknown and untouched ore reserve equal to that accredited to the entire United States? Yet this is true. I do not mean that it is an ore equal in iron content to that found in the Superior regions, neither do I mean that it is as low in metallic iron as that found in our sister commonwealth of Alabama, but it is quite an easy matter to have our ores average 45 per cent metallic iron, and well adapted to the manufacture of grey forge, foundry and basic pig. Further, I beg to say that much of this ore is not available at the present time, but will be in years to come.

This being an interesting subject, I shall indulge your time by referring to the several grades of ore and their localities. One of the most abundant varieties is what we term locally Brown Mountain ore. There are hundreds of miles of this iron ore lead on top or near the crest of numerous mountains in Virginia. The iron content is low, very seldom in excess of thirty per cent, and on account of its geological location difficult to recover at this time, in competition with the other and richer deposits. These leads will vary from three to forty feet in thickness, lie regular and therefore will be found to a great depth. There are fully one billion tons and perhaps double this amount of this kind of ore in Virginia.

Next is what we call the Oriskany ore, noted for making a very high grade iron, carrying a small percentage of manganese and taking its name from its association with the Oriskany sandstone, which it generally underlies, but may be found with this sandstone as the footwall as well. I do not hesitate to say that there are fully 500 miles of this ore lead in the state of Virginia, ranging in thickness from one to more than 100 feet. Recently the Norfolk & Western railway decided to build a branch into the Great Potts valley, for the purpose of developing this ore, and it is reliably estimated that more than half a billion tons are made available by means of the transportation facilities provided. I have given close attention to the ore deposits of this section; have spent weeks and months in the investigation, and do not hesitate to say that many million tons of this ore are practically unknown today. This ore will average about 47 per cent metallic iron, practically free from sulphur, and well adapted for basic purposes.

Still another variety is the Limonite or brown hematite of this same area. This ore is found in measures higher than the Oriskany, usually a close grained sandstone for a footwall, is not quite so regular and persistent, but is a good and easily worked ore in the furnace. It is quite difficult to venture an opinion on these deposits, but I believe they will be found in regular formation, in both synclines and anticlines, similar to the Oriskany. This ore covers a large area and therefore will become a great factor in the future.

The principal ore supply of Virginia and one that has been producing about one million tons per year, is the so-called Cripple Creek, true Limonite ore from southwest Virginia, in Wythe and Pulaski counties. This ore will average about 44 per cent metallic iron. It is these deposits which prompted so many people fifteen years ago to leave Virginia, saying that the ore deposits of the state were pockety and practically played out. It is this same class of men who never studied the true conditions of Virginia that we have to reckon with today and who do not care to return to the Old Dominion and let us show them the new

development. True, these deposits are pockety, but they are found frequently to a great depth and the future will see them yield many million tons of good ore.

But this is not the only ore we have; along the flanks of the Blue Ridge, in the valley of Virginia, and extending from Floyd county in the southwest to the Potomac in the northeast, is an irregular, semi-stratified, but yet continuous deposit of good wash ore, which easily will yield 100,000,000 tons in years to come. Paralleling this ore, but higher on the mountain side, is a lead of Specular iron ore, a red hematite, very hard and silicious, varying in iron content from 33 to 54 per cent, but which makes a very high grade foundry pig. This lead is a fissure formation, fully fifty miles long, from three to ten feet thick, averaging about six feet, and continues to a depth unknown. The tonnage to be recovered from this deposit is enormous. This ore will be in great demand after it is better known, since it makes a high grade iron and acts kindly in the furnace.

Still another lead of coming importance and one to which I have given much attention, is the Titaniferous deposits of Floyd, Franklin, Carroll and Grayson counties, Virginia, and Ashe and Wautauga counties, North Carolina. I have seen this lead vary from two to sixty feet in thickness, purely fissure formation with chloritic walls, and I am safe in saying that fully 200 miles of this lead are practically unknown and undeveloped today. This ore will vary in metallic content from forty to sixty per cent and in titanic oxide from three to fifteen per cent. Much of this ore, exclusive of titanium, is bessemer.

Paralleling this Titaniferous lead, we have some three veins of magnetic iron, more or less lenticular, but ranging in thickness from two to twenty-five feet. There are fully 150 miles of this iron in Virginia, none of which has been prospected to any great extent, largely on account of the transportation being unavailable. But now a line is projected into this field and great development may be expected in the near future.

Another great and practically unknown magnetic iron ore district lies east of the Blue Ridge and taking in the counties of Rappahannock, Green, Madison, Nelson, Amherst, Bedford, Franklin, Henry and Patrick. There is very little known about these deposits, except that one mine in Franklin has been in operation for a number of years and a very good grade of ore recovered.

Another deposit of more than passing interest is the Gossan or Mundic lead of Grayson, Carroll and Floyd counties. The extent of this wonderful deposit is practically unknown. It has been worked more or less for many years, first for copper, then for iron and now for the high-grade pyritic ore which is recovered and which, after much experimenting and the expenditure of vast sums of money, resulted in the establishment at Pulaski of the great chemical works which now manufacture all grades of sulphuric acid. This is a new institution, but the success of the enterprise is assured. This lead of ore will vary from ten to more than 100 feet in thickness, carries about 29 per cent sulphur and 50 to 55 per cent of iron. The sulphur is eliminated and the iron utilized in a nearby furnace.

Another deposit of future importance is the red fossiliferous, siliceous deposits found on the tops and sides of many of the mountains. This ore is not now available. since it carries only about 21 per cent metallic iron, but there are several billion tons of this ore in Virginia, which now is considered nothing but old and worthless "rock." The future will see this ore pulverized, the iron separated and briquetted for use.

Finally, there are hundreds of small and isolated deposits of ore found in practically every county of Virginia west of Tidewater carrying from a thousand to a number of thousand tons of ore; these at the present are receiving no attention, but the time will come when they, also, will become valuable, and in the aggregate will produce a goodly tonnage.

Thus I have told the story of iron ore in Virginia; it does not appear within reason, but the future will verify my statements.

Limestone and Dolomite.

I shall refer but briefly to the limestone and dolomite of Virginia. We have hundreds of square miles of high grade limestone, suitable for all purposes, from its use as ballast and macadam to the higher and purer grades used in the manufacture of hydraulic and portland cement, fluxing material, lime and general chemical purposes, to which this very economic product may be applied. This limestone will frequently contain as much as 99½ per cent calcium carbonate, while the dolomite is of such rare purity that it can be used for practically any purpose where a magnesian limestone is required.

Already lime kilns, fertilizer works and other industries consuming this product are being established and the near future will see still further development.

Clay and Shale.

To many people it may seem strange to learn that there is abundance of clay and shale in Virginia. The clay is not limited to any particular section of the state, but is found in nearly every county from the ocean to West Virginia, while shale of a very superior quality, both hard and soft, is found in nearly every county west of the Blue Ridge. This clay and shale is found in proximity with the limestone, and the future great development of the portland cement industry will recognize these vast deposits, which no doubt will lead to the establishment of other cement mills in the great valley of Virginia. Even now new brick plants are being projected for the purpose of manufacturing high grade vitrified, paving, and re-pressed building brick of a quality equal to those manufactured elsewhere. I predict that the future brick industry will see some of its activity removed from the valley of the Ohio to the valley of Virginia.

Gypsum.

The only state south of Mason and Dixon line, and east of the Mississippi, in which gypsum is found is Virginia. Smyth and Washington counties claim these deposits. This is a sedimentary stratified deposit, rather lenticular, and is

found only in the Holston valley; the area in which this valuable mineral is found is about three miles wide and fifteen miles long. It is found in a limestone formation and the character is perculiar to itself. Drillings have revealed the following: About fifty feet of detritious matter; from 40 to 50 feet of gypsum, then about 80 feet of detritious matter, then another deposit of gypsum about 75 feet thick. No drilling of record is known beyond this depth. A shaft was sunk in search of salt in the upper end of this valley, to a depth of 592 feet in solid gypsum and was still in gypsum when abandoned. It was perfectly dry the entire depth. This was at the close of the civil war. The tonnage is enormous; the gypsum is of great purity, being in excess of 98 per cent calcium sulphate. At the Jamestown exposition I had a drill core on exhibition taken from one of the drillings, 42 feet long, of grey and white gypsum without any foreign matter. This attracted much attention. However, the interesting feature is to visit the mines and see the wonderful cavern that is being produced through the removal of the gypsum and where the wall and foot show it to be fully fifty feet thick.

Already two great mills are in operation, the last one having a daily output of 500 tons, all kinds of product, while their equipment is modern in every appointment.

Salt.

At the lower end of the gypsum field, at what is known as Saltville, is one of the great chemical works of America. This plant involves an expenditure of several million dollars. During the civil war this was practically the only source of salt supply for the Confederacy; here the rock salt, limestone and other by-products are converted into soda ash, carbonate and bi-carbonate of soda, caustic potash, concentrated lye, carbonate of ammonia and numerous other chemical compounds. This industry has grown until now it has a daily output of about ten carloads.

I am not in a position to give you much information about this salt deposit, save that it covers several thousand

acres, and I am reliably informed that wells have been drilled to a depth of 2,300 feet and still in rock salt.

Marl.

We have two kinds of marl in Virginia, the granular limestone marl of Rockbridge and Allegheny counties, containing about 91 per cent calcium carbonate, and the green sand marls of Tidewater. Both are practically undeveloped, but no doubt in the near future will prove of great value and profit to the people developing the same. The marl beds can be purchased at nominal figures, while the demand, when once established, will be large for agricultural and cement purposes.

Marble, Onyx, Granite.

Marble is found in a number of sections of Virginia. A very fine Travertine marble is found in Grayson county; an exceptionally fine quality of Verde Antique is found in Fauquier. Limestone marble, in the pink, grey and black is found in Montgomery, Giles, Botetourt, Rockbridge and Rockingham counties. All these deposits are practically undeveloped and unknown. White marble is found in Fluvanna, Bedford and other counties east of the Blue Ridge, some of which has been worked in the past, but unfortunately none of the valuable deposits are accessible to transportation at this time. I had some of the finest and rarest specimens of Verde Antique marble at the Jamestown exposition. We also had a block of pure black marble from Montgomery weighing two tons, and other fine specimens which in the future will warrant extensive development.

Onyx of the cave variety is found in many caves of the valley, always in the limestone formations; but on account of its rare value as curiosities to visitors to these caverns, it is not available except as mentioned. Recently, however, in Tazewell county, a large deposit of onyx of rare coloring and figures has been discovered, and some exceptionally large pieces are being taken from the mines. Onyx also is found in the counties of Botetourt and Washington, and the future will see further development.

Granite is found in many counties of Virginia, but the most promising ledges are in the vicinity of Richmond, Petersburg, Burkeville and Blackstone. Other fine ledges are known, particularly in the border counties of North Carolina.

There is an abundance of building and structural stone throughout the state, ranging from different colors of limestone, such as pink, light and dark blue, and grey; sandstone, from a coarse buff in Tazewell and Giles counties; peak blue and dark grey in Pulaski and Wythe. This stone is a very fine texture but hard and heavy and will withstand an enormous crushing test. Virginia, however, is not noted for its fine grained sandstone, there being but one deposit, a beautiful buff in Warren county which to my knowledge is worthy of mention. The stone industry in every branch is practically undeveloped, but gradually there will be a growing demand for fine colored natural stone, and then will be the opportunity for developing an industry which at this time is practically dead.

Glass Sand.

In Roanoke, Giles, Floyd, Botetourt, Craig, Tazewell, Russell and Grayson counties are, practically speaking, mountains of silica rock or glass sand. At the present there is but one deposit developed and being worked. This deposit is in Roanoke county, near Salem. This sand is nearly pure, carrying 99½ per cent silica. Other deposits equally pure are available.

Slate.

Very few people associate slate deposits with any section except Maine and Pennsylvania, but we have here in Virginia, in Buckingham and Bedford counties, some of the largest slate quarries in America. The quality is excellent and suitable for practically all purposes to which slate is adapted. Fine deposits of slate are known to exist in other counties of Virginia, among them Botetourt, Craig, Giles, Bland, Wythe, Scott, Lee, Grayson and Patrick. This slate in some instances is suitable for heavy work such as

vaults and sanitary appliances, but it also will split into a fine quality of black roofing slate.

Kaolin and Feldspar.

Kaolin is found in many counties of Virginia. The quality is not so good as that mined in South Carolina and Georgia, since it carries a large amount of sand and mica, necessitating a thorough washing and quite expensive machinery for the preparation of the product for the market. The quality, however, is fine, having been used by some of the potters of East Liverpool for a number of years. There is an abundance of this material and the future will see active development in this line.

Perhaps one of Virginia's most valuable assets is her large deposits of high grade feldspar. This is found in true fissure formation and continues for many miles. About the only development work on this lead is in Bedford county, seven miles from a railway, where a very high grade potash spar has been developed and perhaps a thousand tons were mined and shipped this year. This spar carries over twelve per cent potash and the physical tests made with it show it to be equal to the best and superior to most feldspar on the market today. This is a virgin field and deserves careful attention.

Mica.

Associated with the kaolin, feldspar and chlorites is that wonderful product from nature's laboratory, mica. Much has been said and written about the qualities of the mica found in other states and countries, but it remains for several of Virginia's counties to produce a mica equal to the best. Pittsburgh capital saw the possibilities of the mica deposits of Henry county and they now have in operation one of the finest mining, cutting and grinding plants in the United States. This is a true fissure formation; the vein is about twelve feet thick, the mica is encased in a heavy feldspar, and all sizes found, up to and including some that cuts 22x32 inches clear sheets. I saw a piece of mica in this mine that weighed not less than 3,500 pounds.

This company owns about eighty acres, but there is an abundance of mica in that section, in fact sufficient for the establishment of a hundred such plants. The field is virgin and the opportunities great.

Asbestos.

Virginia also is a producer of asbestos; perhaps the longest but not the toughest fibres in the world come from Franklin and Bedford counties. A number of small mines are in operation, and the product recovered is prepared for the market in a large modern mill erected in Bedford City about five years ago. As stated before, I am not claiming for the Virginia product a tough fibre, but the length and purity of the fibre is a wonder. I have seen fibres four feet long. Other counties in which asbestos is found are Henry, Franklin, Floyd and Carroll.

Soapstone.

That the Virginia soapstone is of a superior quality is attested by the enormous quarries now in operation in Nelson and Albemarle counties. It is possible to quarry blocks four by ten feet and any thickness from one inch to five feet that may be required. This soapstone has no defects, is a beautiful blue and is manufactured into many sanitary and culinary appliances. There are many other sections where soapstone is found, both blue and buff, among them being Amherst, Campbell, Bedford, Franklin, Henry, Patrick, Floyd, Carroll and Grayson counties. There is a growing demand for good pure soapstone and the near future will see thousands of tons used annually in the steel and iron plants of the country.

Phosphates.

In the counties of Roanoke and Nelson, large deposits of apatite are found. This rock carries from forty to fifty per cent phosphate of lime and from ten to thirty per cent ilmenite. It is not available at the present, but future experiments will make this a very desirable deposit and one that has much value. Other deposits are known.

Pebble Grit.

In Montgomery county is an enormous ledge of pebble grit. This grit is being manufactured into mill stones for corn, paint and baryta mills and for any other purpose where such a stone is required. The quality is not excelled anywhere.

Copper.

The subject of copper is one of great interest, no matter where it may be found. Virginia, true to her record in other economic minerals, also has areas carrying copper ore. Three separate and distinct districts are known, namely, along the Blue Ridge in Clarke, Fauquier, Rappahannock, Warren, Page, Green and Masidon; Southwest Virginia, in the counties of Carroll, Grayson and Floyd; and Piedmont or Virgilina, being in the counties of Halifax, Charlotte and Prince Edward. In addition to these major areas, several small and isolated deposits are known.

The Blue Ridge deposits usually are found in the rocks of igneous origin, principally basaltic, resting against a heavy sandstone, very dense in character. The area over which the ore is found is large, but developments demonstrate that the copper bearing rock usually disappears at a very shallow depth, in very few instances exceeding fifty feet. The surface ore is of a very good quality of chalcopyrite, azurite and malachite, and will average about six per cent metallic copper and a small value in gold; but, as stated before, it soon becomes leaner and disappears entirely. That the tonnage which may be recovered is large is beyond question, but on account of the irregularity of the deposits, it will be years before any great amount will be recovered, or the field fully developed.

The southwest Virginia area carries chalcopyrite and the sulphide, and appears to be a very promising district. At one point, Peach Bottom, a shaft was sunk to a depth of 165 feet, showing a regular vein a little over six feet and averaging over four per cent copper, with about $2.00 per ton gold and silver. The walls are schist, dip at a slight angle, the lead being lenticular in form. I believe that future operations on this lead will be very satisfactory.

Paralleling Peach Bottom, about ten miles to the southeast, is a large and persistent lead of high grade sulphide ore. At Ore Knob in North Carolina, this ore was mined and refined until the year 1871, when the mine was shut down on account of its being impossible to produce the metal when it was necessary to haul the coke and other supplies forty miles across mountains by wagon, and return the metal by a similar train. Also the slump in the price of copper came, which in reality was the true factor creating the shut-down. This mine has produced over 17,000,000 pounds of refined copper. This ore averages over five per cent metallic copper, carries some gold values and is rich in sulphur.

From Ore Knob this lead can be traced for fifty miles to the northeast to the old Toncray mines, in Floyd county, which recently were purchased by a New York company and reopened. This company claims to have 1,500 tons of twelve per cent ore on the dump, with thousands of tons in sight. They also have erected a smelter for the production of matte and while 28 miles from the railway, this company expects to begin active operations in a very short time.

I have made analyses of the ore from this lead, and have had the same verified from a number of surface openings, which showed from 10 to 12.49 per cent metallic copper. This lead varies in width from six to thirty feet, has been worked to a depth of 300 feet and evidently is a true fissure encased in schist walls.

The Virgilina district is beyond a doubt the most important field in the state, and I believe in the future will become one of the safe and great copper producing districts of the world. The country rock is schist, the ore is found in quartz, true lenticular fissures. This field has been quite well developed and has been a constant producer for a number of years. Several of the mines have been worked to a depth of 400 feet and are still in ore. The veins vary in thickness from three to twenty-six feet and range in metallic content from 1.5 to 85 per cent, carrying no arsenic or antimony, but appreciable quantities of gold

and silver. The copper is found as chalcocite, chalcopyrite, bornite, azurite and malachite, and is beyond a doubt one of the prettiest ores found in the world.

This field is about three miles wide and extends with practically no cut-out for 75 miles to the northeast and for 50 miles to the southwest into North Carolina.

I see a bright furture for Virgilina; already a smelter has been erected at Port Norfolk having a capacity of 400 tons per day, and preparations are being made for the erection of a large and modern smelter having a daily capacity of 6,000 tons in the same port, this for the purpose of taking care of the Virginia and North Carolina ores, and providing in advance for the ores from Cuba, Santo Domingo, Chili, Peru and Mexico. This at a point where coal, coke, limestone, labor and other facilities are cheap and abundant; where transportation facilities are the best and the largest consuming markets right at the door. It is not difficult to understand the far-seeing wisdom of the promoter of this gigantic enterprise.

Manganese.

To speak of manganese is but to know that Virginia practically produces all this ore mined in the United States today. In the Shenandoah valley, in the secondary ridges of the Blue Ridge, for a hundred miles or more, is found the manganese imbedded in clay. Practically all manganese found in Virginia is the oxide, principally Psilomelane and Pyrolusite. The ore of the valley carries from 45 to 80 per cent manganese, averaging over 50 per cent, and comparatively free from impurities. At one time covering a period of more than four years, nearly all the manganese consumed in Pittsburgh came from one mine in Augusta county, namely the Crimora. This mine produced more than 30,000 tons per year.

At the present several small mines are in operation, the product being ground for use in the brick, foundry and chemical industries of the country. That this field will become a great producer in the future is beyond a doubt.

In Piedmont, Virginia, passing through practically every county of the state from Pittsylvania on the south to

the Potomac on the north, much manganese is found, but no development work has been attempted except near Lynchburg, where several good mines are in operation. This manganese is more siliceous than that from the valley, is found in pockets, but indications are that the quantity is large.

The largest but least known manganese belt is found in the mountainous districts of Virginia, in the counties of Washington, Grayson, Smyth, Wythe, Pulaski, Floyd, Giles, Montgomery, Craig, Botetourt and other counties to the north. This is a true stratified deposit, will vary from two to twenty feet in thickness and carries from 40 to 45 per cent manganese; from 3 to 15 in iron; comparatively free from sulphur, but variable in phosphorus. Very little development work has been done on this lead, but the future will see some very important developments.

Lead and Zinc.

The zinc produced in Virginia is famous the world over. It is the government standard, 99⅞ per cent pure, Bertha pure spelter, manufactured from the calamine ores in Pulaski and Wythe counties. This plant has been in operation for many years and continues to be a very satisfactory producer. Several other companies are operating or building smelters in Virginia, but not for the purpose of working the silicates. We have enormous deposits of sulphite or sphalerite ores in Virginia, carrying from 30 to 60 per cent zinc and very rich in lead. Thousands of dollars have been spent in experimenting for the separation of the lead and zinc, difficulty being experienced on account of the peculiar blend and specific gravity. Until this experiment has been demonstrated to be a real success the zinc industry in Virginia will not take on much additional life. This is a true stratified deposit, found between walls of limestone, and at the point where it crosses the New river, actual measurements show the ore bearing strata to be 500 feet wide, some of the mineral strata being 20 feet without the intervention of gangue.

Lead is found in Rockingham, Shenandoah, Floyd,

Wythe, Smyth and Tazewell counties. Only one mine is in operation, that in Smyth county. The lead, a galena, is found between limestone walls, varies from two to six feet wide in two parallel veins, about fifty feet of limestone intervening. This mine is now about 170 feet deep, the vein growing wider and richer with depth. This ore will average about 50 per cent lead.

In Wythe county, lead was mined 200 years ago, and in 1747, at Jackson's Ferry, the old shot tower, 110 feet high, was erected and is still standing, a silent monument to revolutionary times, where much of the shot and bullets for Washington's army was manufactured.

Miscellaneous.

Many other minerals are found in the Old Dominion, and that in economic quantities. Nickel in the pyrrhotite and sulphide has been discovered in Floyd county and a strong Boston company for the past four years has been developing the same, and now is making preparations for the erection of a smelter and the operation of their mines on a large scale.

Pittsburgh capital a few years since discovered and developed an arsenic deposit in this same county, but simply on account of disaffections in the company did the venture prove a failure, since several hundred tons of sublimed arsenic was produced in this modern establishment, which in the future will be reorganized. Gold and silver are found in many of the counties of Virginia. Two active and very profitable mines are in constant operation in the Virgilina field, making their owners rich. Another large mine is in operation in Fluvanna county, while several other counties, among them Floyd and Carroll, have in the past been producers of the precious metal.

Iron pyrites are found in Louisa and Spottsylvania counties, and several hundred thousand tons are recovered annually for use in the fertilizer and chemical plants of the state. Tin has been mined in Rockbridge county, where a large mining plant is going to ruin on account of dissensions among the owners.

Ochre, all colors, and other pigments are found in many counties of the state. Millions of tons are awaiting development. The quality is fine and the future will see it utilized. Garnets are found in Floyd; fairy stones or staureolites, in Patrick; amethysts and allanite in Amherst; amazonite in Amelia; satin spar in Rockingham; barite in many of the counties of the Piedmont districts and valley of Virginia. Other gems found in the state are diamond, quartz, andradite, beryl, apatite, kyanite, fluorite, microlite, columbite and helvite from the counties of Amelia, Buckingham, Hanover, Nelson, Bedford and Spottsylvania. In fact, I could name a score or more other minerals practically unknown except locally, that are produced in the Old Dominion, many of which in the future will become valuable and develop into profitable industries.

Conclusions.

Thus I have reviewed the mineral resources of Virginia. It sounds like a fairy tale, but it is nevertheless true. Year after year, the possibilities of these vast undeveloped minerals are presented to both investors and scientists. Year after year more people are converted to our story, and, believing, come to investigate and then invest. It is this constant and eager clamor for information that has led to the establishment of the Virginia State Geological survey, with Dr. Watson as its head. It was a demand for information that prompted the Norfolk & Western railway to employ a mineralogist for the intelligent presentation of facts pertaining to the vast undeveloped and practically unknown resources along their line, to its thousands of inquiries. It is the ever-increasing desire on the part of the people to be led aright that prompts me in indulging your patience here today.

It is a collection of the foregoing that has resulted in the investment of more than $50,000,000 dollars in the development of the coal industry of the state; $20,000,000 in the iron industry; $1,000,000 in the gypsum fields, and many millions more in the other minerals to which I have directed your attention. It is strides like the following that are

educational: In 1880 Virginia produced 29,934 tons of pig iron; in 1907, 478,771 tons; in 1880 no coke; in 1907 1,545,280 tons. In 1882 the mineral production was $1,348,195.00; in 1907, $19,313,182.00. In 1880 there was mined 43,079 tons of coal; in 1907, 4,710,895. In 1880 there was mined 243,542 tons of iron ore; in 1907 it had grown to 786,856 tons. In 1881 we had 1,893 miles of railway; in 1907, 4,337 miles. We have, at a minimum, over 700,000 estimated undeveloped horsepower of water power. In 1880 the national bank deposits were $2,040,125.00; in 1907 they had grown to $56,412,346.00. In 1880 the total wealth of Virginia was about $700,000,000.00; now it is more than twice this sum. And thus I might make comparisons not only with the state, but comparisons with other states. And all this in the past twenty-five years; the investments have risen from a few million to more than one hundred million invested in the mineral industry alone, this not including the allied industries.

And this is but the dawning of the day; what of the morrow? Twenty years hence will be a revelation. Already the state of New York has proven nearly two billion tons of iron ore reserve. Pennsylvania will add several hundred millions more. Virginia has several billion; followed by Tennessee and North Carolina with a billion each; Alabama with her two or three billion, while Georgia and Kentucky will aid in swelling this great total. Coal in abundance totaling hundreds of billions of tons; limestone, clays and shales without computation. Virginia's water power, developed and undeveloped, cannot be surpassed by any other state. She has the finest harbor in the world. Absolute harmony among all. Mineral water surpassing any state of the Union, and now the banner shipper of the United States. Thus twenty years hence will see such activity among us that verily it will be said the Old Dominion is coming to her own.

I trust that each and all of you will consider what I have said and that you will not say impossible, but one and all come to Old Virginia and see and learn for yourself. The opportunity is at hand; we accord you a hearty wel-

come, just and equable laws, best of society and co-operation. My message is finished, and I thank you most kindly for this opportunity of telling you something of our Southern resources.

Mineral Resources of Arkansas.

BY A. W. ESTES, YELLVILLE, ARK.

Notwithstanding the fact that Arkansas is by nature especially adapted to agricultural pursuits, producing in profusion all of the farm crops which are grown in any other part of this Union, she has also for a number of years occupied a prominent position in the production of lumber from her various forests of pine, oak, cypress, hickory and many other useful varieties of commercial timber; yet the mineral resources of the state have until recent years been practically unknown and neglected, even by our own people; while so far as a real knowledge of the great mineral resources of Arkansas are concerned, the public today has only a faint idea.

Arkansas is an old state in many respects, having been admitted into the Union long before many of her sister states, which have outstripped her in the progress of development. But in point of natural resources, considered from the standpoint of diversity, usefulness, volume and quantity, as well as that of development, Arkansas is the newest state in the sisterhood today.

In keeping with the subject assigned me for this occasion, however, I shall only undertake to briefly tell you something about the mineral resources of this new territory. More than 7,000,000 acres of the area of the state contains valuable mineral deposits, although the field is practically undeveloped. The minerals of the state are of a class such as are used in the manufacture of staple articles and are so grouped with reference to fuel, water power, etc., as to bring the cost of production to the minimum.

Zinc and Lead.

Of the metal deposits in Arkansas zinc and lead strongly predominate. The field in which these valuable deposits are located is in the north central portion of the state on the Ozark Mountain range, about 100 miles south-

east of the Missouri-Kansas field, which is situated on the crest of the same range. The district comprises five counties, including the whole of Marion county and a portion of the bordering counties of Baxter, Searcy, Boone and Newton.

Two distinct ore levels occur in this field, locally termed the upper and the lower run. The upper run occurs in the mountain about 200 feet below the apex and on the same range or level in which the zinc deposits in the Missouri-Kansas district are found. The mountain streams in the northern Arkansas field have by erosion cut their way below these ore levels, and left exposed along the mountain side the ore bearing ledges, thus rendering prospecting on the upper run extremely easy and certain.

In the opinion of geologists and mining engineers who have carefully studied the upper ore levels, these deposits extend through the mountains from one side to the other, as in many instances the ore bearing levels are found cropping out at the surface on the opposite side of the same mountain at the same level. As an evidence of the correctness of these conclusions, prospect tunnels have revealed the continuous presence of the ore bodies as far as 700 feet into the mountains. As a rule the ore deposits grow heavier and richer as depth into the mountain is reached. Anticipating the suggestion that enduring deposits of zinc and lead cannot be expected to exist above the water level, it is not considered out of place to here call attention to the fact that numerous living springs flow from these mountains, many of them from above the upper ore run, and it rarely occurs that living water is not encountered in prospecting before a distance of 200 feet into the mountain is reached, although little or no additional expense is incurred thereby, as natural drainage of the mine can be had. The lower ore level above referred to occurs from 25 to 150 feet below the level of the valleys, and in many instances 200 feet below the upper run.

Prospect drilling in almost every local camp in the district has proven the presence of lower ore runs, ranging from 10 to 49 feet in thickness, while many shafts have

more than verified these records. In some instances the ground on the lower level is found to carry as high as 15 per cent, and rarely falls below five per cent, and the product maintains the highest standard of purity, assaying from 60 to 65 per cent metallic zinc.

That the zinc and lead district of Arkansas is officially recognized by eminent geologists as being one of proven merit, reference is here made to government reports; Vol. 24, United States Geological Survey; of zinc and lead districts in northern Arkansas by Geo. I. Adams; also Vol. V, Geological Survey, by Dr. John C. Branner, former state Geologist of Arkansas, now of Leland-Stanford University. The opinions of these eminent authorities have since been thoroughly supported by the practical application of the pick and shovel.

Until recently the Arkansas zinc and lead district was destitute of railroad facilities, which fact may be properly assigned as a reason for the backwardness of the development of mining. In 1906 the Missouri Pacific constructed a line connecting Kansas City, Mo., and Memphis, Tenn., known as the White River Division. This line passes through the zinc and lead district by way of Yellville, the county seat of Marion county. Since that time much valuable development has been done, and considerable ore has been shipped from the new mines of the district. Now electric lines, to be supported with water power from the White and Buffalo rivers, are projected into several of the most important camps, and many new mining enterprises are being planned. As to the excellency of the ores from this district which are practically free from pyrites and other objectionable substances, attention is here called to the fact that a solid chunk of zinc ore weighing 12,700 pounds, which was taken from a mine in Marion county and exhibited at the Columbia Exposition, Chicago, 1893, was given the highest award. This sample which is the largest piece of pure zinc ore ever taken from the ground, is now on exhibition in Field's Columbian Museum, Chicago. Arkansas Zinc Exhibit at the Louisiana Purchase Exposition in 1904 was awarded the gold medal over all competition. High-

est honors were given the Arkansas zinc and lead exhibit from the Yellville district at the American Mining Congress, Joplin, Missouri, 1907, at which all camps in the Missouri-Kansas district were competitors for the prize, and the collection of ores sent from Yellville, Arkansas, to the present session of the American Mining Congress will serve to remove any doubt that may lurk in the minds of those who will consent to being shown.

Coal.

The coal fields of Arkansas are located in the west central portion of the state, comprising an area of more than seven counties, and known as the Fort Smith coal field. The field extends from the west line of the state down the Arkansas river valley for 75 miles. Its extreme width near the west end is about 50 miles; the north edge lies up to the southern foothills of the Ozark Mountain ranges, which extend from the vicinity of Little Rock westward across the state. The beds have an average thickness of 4½ feet, the thickness in the vicinity of Fort Smith being greater. A comparatively small portion of the coal region is being worked. The beds occur in rock which correspond in age to the lower coal measures in the Pennsylvania field. The Arkansas coal is bituminous, semi-bituminous and semi-anthracite. Over 3,000,000 acres produce the smokeless coal of a superior quality.

Beauxite.

The beauxite beds of Arkansas are larger than those of all other regions combined; they are located from 10 to 20 miles from Little Rock, the capital of the state, with few exceptions of small deposits in Georgia and Alabama. The beauxite beds of Arkansas are the only ones located in the Western hemisphere, and the state now has 19 quarries in operation. The Arkansas product excels in quality that found in any other part of the country, carrying from 45 to 75 per cent aluminum. It is quarried instead of mined and at a comparatively small expense.

Marble.

Marble in large deposits occurs in the northern tier of

counties. The Arkansas marbles have in general a softer, warmer color than others, which is generally in their favor. The beds occur in an elevated region where the stratas are horizontal. It is mostly comprised in two beds; one is the St. Clair in the lower Silurian, the other the St. Joe, at or near the bottom of the lower carboniferous. The natural advantages of this locality for quarrying dimension stone or for lime burning are unusually good, as everywhere is growing an almost unlimited amount of wood for lime burning, and the strata usually outcropping on the hillside, making it easy of access for both quarrying and loading.

Granite.

Arkansas contains more variety of commercial stone than any other similar area of the globe, and all of a superior quality. Just three miles south of Little Rock in Pulaski county is a mass of blue and grey granite, which has been subjected to every test and in every instance proved to be superior to any other in the world.

Clay.

The clays of Arkansas cover a vast area, and are of great variety. There is no article of commerce which is made of clay, from the finest and most delicate china to the cheapest of brick, which cannot be manufactured from the clay of Arkansas.

Fuller's Earth.

Considerable quantities of this mineral are being marketed from Arkansas; the deposits being profitably worked at this time are located in the vicinity of Hot Springs.

Diamonds.

In addition to the great varied mineral resources of Arkansas, we also have the distinction and pride of possessing the only diamond mines outside of South Africa, and while our former state geologist in his report in 1889 mentioned the fact of a similarity of the Pike county diamond field to that in the Kimberly district of South Africa, development was not started, and no diamonds were found until 1905, and since that date under crude development more than 700 genuine diamonds have been found. Ex-

perts pronounce these diamonds of the purest water, equal to those found in the Kimberly fields of South Africa. At this time active development is being carried on and plants of the required capacity are being planned for the mining of these precious stones.

The following additional minerals are known to exist in the state, although some of them have not been sufficiently developed to determine their extent, viz: Antimony, asphaltum, copper, bismuth, cement, chalk, iron, colon, manganese, nickel, ochre, phosphate, salt peter, salt, soapstone, shale and slate.

Conservation in the Coal Industry, Protection of Life and Prevention of Waste.

BY GLENN W. TRAER, PRESIDENT OF THE ILLINOIS COAL OPERATORS' ASSOCIATION.

The protection of human beings from death and injury by avoidable accidents is one of the highest moral duties, not only in the mining industry but in every phase of human life and activity. The failure to recognize this duty shows a lack of moral sense, for want of which ancient nations and races declined and died. The existence of that moral sense is the safe foundation of our modern civilization.

But it is not merely a moral duty; it is also conservation in the highest sense. Every human life is an asset—either actual or potential, to human society, even if the matter is looked at in cold blood.

It has been customary in the past to attribute practically all coal mining disasters to the wilful neglect or gross carelessness of coal mine operators. In my opinion few owners of mines in this country will be found lacking in a due and proper sense of humanity with regard to protecting human life and avoiding human suffering. If any should be found, their conduct would meet with prompt condemnation not only from the general public, but from associates in their own line of business.

The greatest disasters usually arise from causes not fully understood by either practical men or scientific men and after such occurrences great diversity of opinion frequently exists. Every right minded person connected with the industry is striving to find the cause of the terrible tragedies which occur in coal mines and to find means of prevention.

In the tense and exacting struggle for that commercial efficiency without which no employer can long exist as such and overwhelmed with the cares and details of business, employers do not always foresee the occurrence of lesser accidents. Therefore mining laws have been enacted, which

undertake to foresee and which specify in a great multitude of particulars, the practical duties required of employers, and the necessity for protective laws does not exist entirely on account of employers' acts or omissions. They also undertake to restrict and punish reckless conduct on the part of employes and wilful disregard of the lives and safety of their brother workmen. In many cases these laws are enforced only with great difficulty and in other cases not at all. Large numbers of coal miners in Illinois insist upon blasting coal from the solid face of the coal in the mine, instead of undercutting it so as to present less resistance to the blasting shots. This practice is notoriously dangerous and recently has been condemned by the Board of Foreign Mining Experts brought to this country by the Technological branch of the United States Geological Survey. It is accompanied by an excessive and reckless use of powder, which results in a combination of conditions involving the danger of great disaster. The practice is defended by the miners on the ground that they are not paid to do this cutting, even though in many mines this undercutting was being done by the miners as a part of the work covered by the price per ton paid them, at the time when the present relative scale of mining wages as between districts was established; and the requirement for undercutting the coal was explicitly stated in the language of the joint contract between the mine owners' and the miners' respective organizations. The same relative scale of mining wages as between districts, and the same language specifying the duties of the miners in consideration of such wages, has been preserved in this joint contract for ten years and during that time the blasting of coal from the solid has continued to spread. By way of confession and avoidance it is pleaded that mine owners have consented to the extension of the practice. If submission under duress may be properly termed consent, doubtless mine owners have consented.

After years of experience I can honestly say, as far as my knowledge goes, all laws which have been animated only by a sincere and honest purpose to protect employes from death and accident from any cause under the control

of the employer, have met with the prompt obedience of coal mine owners. Bitter opposition and resentment have been aroused by attempts, sometimes successful, to shape such laws to secure advantages to working men, in no way necessarily incidental to the proper purposes of the laws. Laws have been enacted not merely for the protection of human lives, but including also the purpose of shifting from miners to mine owners, expenses and duties clearly specified in previous bases of wages as being included in the compensation paid to the miners.

One more illustration. The present Miners Qualification act in Illinois places the control of the supply of mining labor under the power of the present miners' organization. For all practical purposes under this law the present miners' organization has an absolute monopoly of mining labor in the state of Illinois. The law provides that the examining boards for the admission of new members shall be drawn from the ranks of the miners only. No other interest is recognized in the appointment of such boards, even though it is well known to everyone having any practical knowledge of coal mining, that coal miners as a rule are not as well qualified for such positions as many men who are not subject to the power and influence of the miners' organization. It is much as though only members of the Standard Oil Company were made available as members of an examining board for determining the rights of persons desiring to engage in the oil business. Resentment and opposition to such methods will continue, but in the matter of framing and enacting laws animated by a proper spirit only, coal mine owners have given their assistance freely and cheerfully in the past and may be relied upon to do so in the future.

I feel safe in saying that the Illinois Coal Operators' Association would favor a plan whereby all proposed mining laws would be submitted to the consideration of a special commission, to be composed of representatives of the employers and of the employes and of disinterested appointees of the Governor, for the recommendation of such a body to the legislature. As time passes, the researches of scientific

and practical minds, added to fuller experience and greater knowledge on the part of all concerned, may be expected to point the way to further safeguards. In the meantime let the present laws be rigidly enforced against the wrongful acts and omissions of employes as well as employers—something that is not now always done. Where methods of state mine inspection may be better organized or otherwise improved, it should be done; and wherever state mine inspectors should have greater scope and power for the enforcement of laws against all offenders, it should be given.

Given accurate knowledge of what it is necessary or desirable to do, the conservation of human life should be comparatively simple.

But conservation in the ordinary sense of the word, when applied to all phases of the coal mining industry, is a matter about which ideas are much less clear. It is a complex problem. It involves much more perfect economy in the use of coal. It raises complex practical questions as to how far mine owners may be properly required by law to extract much of the coal which is now left in the ground for various reasons and which can never be recovered hereafter. It also raises the question of how far voluntary conservation of coal in the ground may be reasonably expected of mine owners without a radical improvement of economic conditions in many coal mining districts.

The more perfect utilization of the potential energy in coal is an important branch of this subject. The responsibility in this respect rests upon the consumer. Vastly the greater part of all bituminous coal is used for generating power. Coal for these purposes is so cheap that its perfect utilization, even in a practical sense, has not sufficiently interested consumers. The great transportation and manufacturing interests of the United States, as a rule, pay less than half the price for coal paid by similar consumers in Great Britain and on the continent of Europe, after making allowances for differences in quality where they exist.

A very large tonnage of coal is made into coke, principally for smelting iron ores and for other metallurgical purposes. In the coking process, the volatile combustible mat-

ter in the coal is almost entirely wasted in almost all the coal that is coked. This is because the coal is coked in ordinary bee-hive ovens, instead of in by-product ovens. The energy thus wasted bears a large proportion to that which is finally utilized. This volatile combustible matter when treated by well known and long established methods, yields a large amount of combustible gas. It also yields a substantial amount of ammonia, which may be readily turned into a valuable fertilizer for supplying nitrogen to the soil. It also yields a large amount of tar, which in turn, by familiar methods, may be turned into pitch and a great multitude of other valuable chemical substances.

The steam engine method of producing power by burning coal in steam boiler plants, utilizes but a small proportion of the potential energy in coal, even when the plants and practices are of the best modern type. At the same time an insignificant percentage of the steam and power plants of the country may be considered efficient in their class. High class steam power plants require a very large additional investment compared with the ordinary type and coal usually has been too cheap to induce better installation, in the face of the difficulties to be overcome. At the present low prices paid for steam coal important economy is still possible. But if the consumers of the United States were obliged to pay such prices for coal as are paid in foreign countries, the brains of American industry very quickly would effect a revolution in the economical use of coal by the steam power method alone.

But still greater economy is practicable. Probably all of the coals now commercially known in the United States are available for making producer gas and by this method and by greater use of the gas engine which has been brought to a high state of perfection in practical use, economies may be attained which it is difficult to overstate.

Every step in advance in the more perfect utilization of coal will mean just that much progress in the abatement of the great national smoke nuisance. The public is gradually coming to understand something that scientific men have long known; smoke from bituminous coal means avoid-

able waste. No smoke is a certain indication of more economical use.

Practical results in these respects can be obtained only by the education of consumers in the possibilities and such education should be one of the aims of the great national conservation work now under way. No intelligent coal mine owner will fear the results of fuel conservation, to his property or as affecting reasonable profits. The cheapening of power, like the substitution of labor saving machinery, indirectly will create a vastly greater demand for that which it superficially appears to supplant.

It is doubtful whether under our present forms of government or any forms which the people of this nation are likely to tolerate, it would be possible to effect much if anything in the way of conservation of coal in the ground now privately owned, by statutory law or administrative regulation by departments of government.

It may be that certain regulations, broadly and properly designed for the safety of human beings, may also tend toward conservation of coal. For illustration, a requirement that all coal mines opened after a certain date should extract the coal only from the outer boundaries of the property toward the outlet of the mine. This would avoid the existence of any gobs or worked out areas between the working faces and the outlet, would lessen danger of gob fires and of accidents from falls of roof on the principal haulage ways of the mine; would improve ventilation and lessen the danger of or force of explosions. Undoubtedly such a method of mining coal would make possible the extraction of a much greater proportion of the entire coal vein than is now taken out. Where this system is not practicable it may be that the "full panel" system may be a suitable alternative, at least partially producing the same results with respect to safety and also permitting the mining of a greater proportion of coal. Fuller knowledge derived from experience, experiment and careful study may disclose other possibilities tending toward similar results. But the extraction of a greater proportion of coal than is taken out by the present methods will cause serious dam-

age by subsidence, to highly valuable farming lands in a great many cases, and particularly is this true in Illinois. The present value of the coal in the ground is very small compared with the value of the farm overlying it and which in many cases would be practically destroyed by the removal of all the coal or a materially greater proportion than at present, unless some new method can be devised for supporting the roof, which will be available under commercial conditions as they may exist from time to time. The solution of this problem, like those already referred to, will require the most careful experiment and study. All this experimental work and study may be very properly carried on by the Federal and State departments in co-operation and should receive the hearty support of coal mine owners.

But control by statutory laws or administrative regulations, of mere general methods of mining, certainly will interfere with private rights in some respects; and such a method never should be resorted to until after the most careful investigation and study and a full hearing of those whose private rights may be affected, and when it has been clearly demonstrated that interference with private rights is unavoidably incidental to the protection of human beings or the interests of all the people.

In selling or leasing coal lands now owned by the Federal government, regulations may be lawfully imposed for conservation of the coal as well as the protection of life, and it seems proper to presume such regulations will be imposed by the government bureaus in charge of such properties. The extent to which such regulation may be intelligently carried, like the regulation of mining of coal now privately owned, can be properly determined only by careful investigation, study and experience.

We now approach a phase of the problem in which the responsibility and duty of the public itself requires consideration equally with the responsibility and duty of private owners of coal mines.

The case for the public has been stated by Dr. J. A. Holmes of the Technological branch of the United States Geological Survey, in his discussion of the conservation of

mineral resources at the White House conference in May, 1908. Dr. Holmes expresses himself substantially as follows:

> "These resources which have required countless ages for their accumulation, which, when once exhausted are not reproduced, and for which there are no known substitutes, must serve as a basis for the future no less than the present welfare of the nation. No human agencies, no present owners of these resources, have contributed toward their accumulation, or to their intrinsic values. In the highest sense, therefore, they should be regarded as property held in trust or for the use of the race rather than for a single generation, and property for the use of the nation rather than for the benefit of the few individuals who may hold them by the right of discovery or purchase.
>
> "Measured in terms of the needs of a great and rapidly growing nation, the mineral resources of this country are limited in quantity.
>
> "There are no recurring supplies, no re-creation with the seasons, and the exhaustion when once accomplished is a permanent exhaustion.
>
> "Measured in terms of the life of the nation, at the present increasing rate of consumption and waste, we will, while the nation is yet in its infancy, exhaust permanently resources intended as the essential basis of the welfare of all its succeeding generations. To shirk this responsibility with the claim that these succeeding generations will discover other unknown resources for their use is illogical and unwarranted.
>
> "The right of the present generation to use efficiently of these resources what it actually needs, carries with it a sacred obligation not to waste this precious heritage.
>
> "The right to profit in the mining and subsequent use of our mineral resources does not carry with it the right to destroy the birthright of gen-

erations yet unborn, in order that we of today may obtain more readily and more cheaply the products we need for present use."

Dr. Holmes is candid and just enough also to state some of the principal points in the case for the mine owners, as follows:

"We cannot deny the power nor the right of the present generation to use efficiently so much of these resources as it actually needs:

"We cannot curtail present needs and these needs will increase as there is increase in the nation's population, and in the extent and diversity of its industries:

"We cannot expect the men of this generation to mine, extract or use these resources in such manner as to entail continuous financial loss themselves, in order that something may be left for the future. Unless there are profits associated with the mineral industry there will be no mineral industry.

"It is therefore reasonable to expect that the users of mineral products will pay for them such higher prices as will make profitable their mining and preparation without serious waste.

"In the mining of coal present prices of the product must be increased, before there is possible that higher but more costly efficiency in practice which is necessary if we are to eliminate the larger part of the enormous existing waste. And legislation intended to prevent this waste in mining and utilization of mineral resources must also permit such co-operation among those engaged in the mining industry as will secure the increase in prices of products necessary to cover the greater cost of clean mining."

I shall not undertake to controvert Dr. Holmes' statement of the principles upon which the public interest in this subject is based. I shall devote the time remaining

at my disposal on this occasion to an explanation of the present commercial conditions in the bituminous coal mining industry especially in the states of Illinois and Indiana, upon which I base the assertion that the present vanishing or vanished profits in coal mining will permit of no increase in the cost of producing coal, without an equal increase in the selling price thereof; and the further assertion that the public itself is partially responsible for these conditions.

For many years the people of this nation have demanded and enforced by statutory law absolutely unrestricted and unregulated competition. No matter how destructive and wasteful competition may be or how reasonable or beneficial to the public interests restriction or regulation might be, it falls under the absolute ban of the statute and is punished with harsh penalties.

Our present statutory anti-trust laws wholly ignore the natural principle that reasonable competition and reasonable combination are natural counter checks upon each other, regardless of the effect of ruinous competition upon the future of one of our most valuable national resources.

The fear of monopoly of things indispensible to the public good is naturally inherent in the public mind, and is no more than the instinct of self preservation. But the instinct of self preservation in this instance could and should secure actual and genuine self protection instead of relying upon a false and misleading security. The English nation, after centuries of commercial experience, still maintains the only true protection against the evils of monopoly. The English common law, which is also the common law of our nation, forbids only unreasonable and hurtful restriction or regulation of competition. Why should the people of this nation insist upon a sweeping condemnation of all regulation of competition, even when reasonable and beneficial? These two phases of regulation are easily separable and distinguishable. The same juries and courts which are accepted as fit to determine the facts and apply the law in all the multitudinous activities of our national life, are certainly fit to exercise the same functions in regard to regulation of competition.

Moreover it is an undeniable fact that absolutely unrestricted and unregulated competition leads directly and inevitably to monopoly, through legal ownership, because it prevents the survival of numerous efficient individuals. Such competition does not necessarily result in the survival of the fittest; it is more often the survival of the strongest or the most cunning and aggressive.

Let us observe the practical effect of the present so-called anti-trust laws upon the coal mining industry in the state of Illinois. Each brief period of unusual prosperity, like that following the anthracite strike of 1902, results in an increase in the number of coal mines and in their producing capacity far beyond the public requirements. There are about 300 independent coal producing companies in the state of Illinois alone. This has been made possible by the ease with which a body of coal lands could be purchased, at an insignificant price for the coal in the ground and the ease with which transportation facilities are extended in a prairie state and access given to already overfilled markets. Railroad companies have fostered the opening of additional mines in old districts and in new fields and districts, all of which were wholly unnecessary to supply the public demand, regardless of the influence of such a policy on the waste of coal, the waste of labor and the waste of transportation facilities.

Owing to certain natural conditions, it would not be practicable under any circumstances to operate our western coal mines every working day in the year. This is owing to the difference in the consumption of coal during the winter season and during the summer season. During the year ending June 30, 1903, the industry was moderately prosperous. The mines of the state as a whole were operated an average of only 222 days during the year. The entire force of miners and mine laborers throughout the state had an average of about 80 idle days out of the number of days theoretically possible after excepting Sundays and holidays. While it would not be practicable to save all these 80 days, it should be practicable, after making allowance

for all natural conditions, to operate the mines of the state at least 240 days per year. During the year ending June 30, 1907, although the actual output from the mines of the state increased 10,000,000 tons over the year ending in 1906, or about 25 per cent in one year, the mines of the state as a whole were operated an average of only 196 days during the year.

It is fair to say that the excessive producing capacity of the mines now in operation in Illinois results in a loss of at least fifty days work per annum to all miners and mine laborers on the pay rolls at the mines, more than 70,000 in number. This is equivalent to the absolute idleness for the entire year of at least 12,000 men.

This is an enormous economic waste. Many miners are held in the industry working short time, with resultant low annual earnings, when their labor might be usefully applied in other industries where it is needed. Fewer miners could produce all the coal needed and enjoy much larger annual earnings.

The excessive number of mines kept open for operation causes a scarcity of miners, makes miners much harder to get, more difficult to deal with, and makes it necessary to accept the services of inferior miners, when if fewer miners were required, operators could choose the better class, which the miners themselves desire shall be done.

All this grows out of the attempt to operate many more mines than are required to fully supply the public requirements. The very low average number of days' operation causes coal to cost much more than it would if fewer mines were operated a greater number of days; and the natural endeavor of each individual company to secure a greater number of days' operation than the average depresses the selling price of coal to cost or less, in an effort to avoid an almost certain greater loss by voluntarily accepting a lesser one.

Such conditions in a great industry are a public evil, not a public benefit, even though they result in lower prices to consumers than would prevail under an intelligent organ-

ization of the industry. But under present laws intelligent organization, of actual benefit to the public as a whole, is severely punished.

Laboring men are permitted to organize, perhaps because the majority of people have come to believe that men are better citizens and better working men under decent wages and working conditions—in a general way, that a good servant deserves good pay and to secure good servants we must expect to pay good wages.

Are not the capital and the brains necessary to carry on an indispensable industry, entitled to equal consideration? The public does not seem to begrudge reasonable earning power to the railroads and to many large industries which have become compactly organized by consolidated ownership. Is it wise for the public to force consolidated ownership upon the bituminous coal industry, at the expense of enormous waste during the savage process of the survival of the strongest? Existing anti-trust laws should be amended so as to permit intelligent organization of disorganized industries, while preserving at the same time such degree of publicity and public regulation as are necessary to protect the interests of the people as a whole.

So great a guardian of the public interests as the President of the United States has reached that stage of thought where it appears necessary and desirable to him that our anti-trust laws should be amended so as to become of economic benefit instead of remaining an economic evil, as at present. It is time that a leaf should be taken from this new gospel by the various states also. Wise economic results cannot be expected under unwise economic laws.

This American Mining Congress probably can do no more important work than promote the agitation, discussion and thorough understanding of this great subject. Steps should be taken in the various states to bring about the introduction of amended laws, even if with no greater present hope than that of bringing the subject before the people for practical discussion. In the past the people of this nation have always reached right conclusions upon all

great economic subjects, when such subjects have been fairly presented and sufficiently discussed. They will reach right conclusions upon this subject when it has been fully presented and comes to be fairly understood by them.

The Barren Zone of the Northern Appalachian Coal Field and Its Relation to Pittsburgh's Industries.

BY DR. I. C. WHITE, STATE GEOLOGIST OF WEST VIRGINIA.

It was formerly supposed that the several coal formations of the Appalachian region would hold coal of commercial value over the entire area of that great field. Your speaker pointed out, many years ago, that this was a grave mistake so far as the Monongahela and Pottsville series are concerned, and later, that the Allegheny and Kanawha coals also share the same fate when they pass under water level towards the center of the Appalachian basin. That instead of a continuous sheet of productive coal measures underlying this entire field, there is a great barren zone which in the Allegheny series begins a few miles north from Pittsburgh, and embracing most of Allegheny county, a large portion of Westmoreland, all of Washington, Greene and Western Fayette, as well as Southern Beaver, passes southwestward entirely across West Virginia and southeastern Ohio, thus reducing enormously the productive area of the Allegheny series, and its usually estimated coal resources.

The celebrated Pittsburgh coal holds its place in the series, however, until we reach Doddridge county, western Wetzel and eastern Tyler in West Virginia, when it too disappears, except in scattered patches along its eastern crop through Lewis, Braxton, Gilmer, Roane, Kanawha and Putnam counties, as we may see by inspection of the West Virginia map. The same thing happens to this coal in southeastern Ohio, so that it is practically absent from Monroe, Washington, eastern Athens, much of Meigs, and Gallia.

These facts have been brought to light principally by the oil well drillers in the search for petroleum and natural gas. The great Burning Springs-Volcano anticlinal of West Virginia which along its highest crest in Wirt, Wood and Pleasant counties, brings up to daylight successively the Monongahela, Conemaugh and Allegheny series, right

across the center of the Appalachian field, confirms the story of the drill, since near Petroleum station, where all the measures from the top of the Monongahela series down to the Pottsville, are exposed to view, only one coal bed is visible, and it is only four feet thick, impure, and split into two practically worthless divisions by six to eight feet of slate. Your speaker has personally examined the rock materials brought up by the sand pump while the drill was passing through the Allegheny beds in several wells from the region of Pittsburgh southwestward across western Pennsylvania, West Virginia, southeastern Ohio, and on to the Big Sandy river at the Kentucky line in Wayne county, with the result that over a belt having a width of 50 to 60 miles at the Pittsburgh end, and practically the same on the Big Sandy, and swelling out to 100 miles or more near its center at the longitude of the Little Kanawha river, there is practically no commercial coal, as we know that term now, in the entire Allegheny series.

The effect of this barren zone on West Virginia's productive coal area is to reduce it from 17,000 square miles, as usually given in statistical tables, to only about half that size, and the tonnage as recently estimated by Mr. M. R. Campbell of the U. S. G. Survey, from 231,000,000,000 to only about 60,000,000,000 of first class available fuel, after providing for the necessary waste in mining, or less than one-half of Mr. Campbell's estimate for that state. The one hundred and twelve billion tons of bituminous coal originally existing in Pennsylvania, and eighty-six billions in Ohio, as estimated by Campbell, are also both much too great on account of this barren zone in these states. It is quite certain that Pennsylvania will not furnish more than forty billion tons, and Ohio probably not more than twenty-five billions of commercial bituminous coal, so that the three great coal states of the northern Appalachian field, viz: Pennsylvania, Ohio and West Virginia, will together produce only about one hundred and twenty-five billion tons of good coal, and probably fifty billion tons of an inferior grade, instead of the much larger quantity indicated by Mr. Campbell's figures, which are evidently based upon

the old supposition that this barren area would hold as much coal as any other portion of the Appalachian field.

From this brief statement of the facts in the case, it would appear that the several coal formations, beginning with the oldest, Pocahontas, New River, Kanawha, Allegheny, Conemaugh and Monongahela, were deposited in narrow belts or fringes 20 to 30 miles in breadth, around the borders of the great Appalachian basin, each higher series extending farther toward the center of the trough than its predecessor. This condition of affairs is shown by the distribution of the colors on the West Virginia coal map, which is before you, and which in its uncolored portion also indicates the central barren zone. The query will naturally arise to many of you—why were no valuable coal beds formed in this great central trough, where the older geologists, and many of the younger ones, it appears, supposed the coal beds would be thickest and most numerous? The question is a puzzling one, but this absence of valuable coal deposits appears to be due to the fact that the central region of the Appalachian coal field was covered with water to such a depth that vegetation could not secure a foothold, and hence while sediments accumulated there to practically the same thickness as in other portions of the basin, they consist only of shales, sandstones and limestones, the latter being in greater proportion than where the coal accumulated in commercial quantity. Of course there will be some islands of commercial coal in this long and broad barren zone, but they will be local and of small extent.

This shortage of coal brings to the citizens of the Pittsburgh region, the present manufacturing center of the world, the most serious problem that has ever confronted them. You have been told that you originally had four hundred and thirty billion tons of coal in your mines, and that it would suffice for 150 to 200 years, while the truth is, you have only one-half of that amount, and with the present wasteful mining methods it will last only 50 years. If this waste continues, some of you in this audience will see the finish in the northern Appalachian field of all cheap and easily won coal. Many of you do not credit these state-

ments. They are capable of demonstration to those whose minds are open to reason and the irresistible logic of facts. The area of the great Pittsburgh bed, that wonderful coal seam to which Pittsburgh owes its very existence, is known almost to the acre. Pennsylvania had remaining 1,090,000 acres of it at the beginning of 1908, and she has several thousand acres less now, since her annual production from this one coal bed is approximately ninety-five million tons. This represents an exhaustion of over 1,000 acres every month of the year, because the best mining engineers of Pennsylvania have succeeded in saving and utilizing only 8,000 tons of coal to the acre, of the 12,000 to 15,000 that are present in the Pittsburgh vein. Hence should there be no increase in production over the present, this famous coal bed would be entirely exhausted from the state of Pennsylvania within 80 to 90 years. But what reason is there for not believing that every normal year will record its regular increase, until in ten to twelve years at most, Pennsylvania will have doubled her present output of Pittsburgh coal? West Virginia has only about the same acreage of this great coal bed as Pennsylvania, while Ohio's entire area will be practically gone in 25 years. Hence you can readily perceive that with only a century's supply at the present rate of mining, and in view of the greatly increased production which cannot fail to come with our growth in population, 50 years is a liberal estimate for the life of the Pittsburgh coal bed. The same causes will in approximately that time exhaust all of the cheaply mined thin veins in the Allegheny series of Pennsylvania, Ohio and northern West Virginia, and Pittsburgh's industries will have entered upon the expensive method of mining coal by deep shafts to beds of inferior quality, of only one to two feet in thickness, and of attempting to recover at great expense the many millions of tons of good fuel already left in the pillars and roofs and bottoms of long abandoned mines. This is no fairy story. It is as sure to come to pass at approximately 50 years in the future, if present wasteful methods continue, as that the sun will rise tomorrow. It can do no harm to recall some of the sins of waste committed by your people

in the past, since many of these still persist. The citizens of Pennsylvania, and especially of the Pittsburgh district, have already wasted more of their precious fuel supplies, both solid and gaseous, than they have ever used. More than thirty thousand beehive ovens continue to consume almost within sight of your great factories, one-third of the power, and all of the precious by-products locked up in the finest bed of coal the world has ever known, and of which, as we have seen, you have such a limited supply. The quantity of natural gas, that best of all the fuels, which western Pennsylvania has wasted from the many thousands of wells drilled within her borders, vastly exceeds in value all the petroleum she has ever produced. Not satisfied with thus despoiling your own fair commonwealth of its most precious fuel possession, some of your most powerful corporations, with headquarters in Pittsburgh, have been the principal agents in wasting unnumbered billions of cubic feet of this precious fuel in your sister states of Ohio and West Virginia. The general superintendent of one of your great gas companies told me only a few days ago that he had personal knowledge of one well in West Virginia from which twelve million feet of gas escaped daily in producing only four barrels of oil, and this spectacle of wasting the heating value of 12,000 bushels of coal daily, together with the power to deliver itself free of charges for transportation to Pittsburgh's factories, was at that time not an isolated case, but only one of hundreds. During this riot of waste, one of your great gas companies put into its lines in West Virginia nearly one hundred million cubic feet of gas daily and delivered in Pittsburgh much less than half that quantity, the larger portion having escaped into the air through the defective joints of cheap and imperfect pipe line construction. An enormous waste of gaseous fuel is still an incident of oil production in Pennsylvania, as well as in Ohio and West Virginia, and will probably so continue to the end of the chapter, largely because a few influential citizens of Pennsylvania, Ohio and New York always oppose any attempt to prevent this crime against these commonwealths. A great portion of this wasted gas in West Vir-

ginia and Ohio was safely stored by nature under immense pressure in the immediate pathway of this barren coal zone, and there can be no doubt that its heating value, if properly utilized, would have much more than replaced the missing coal beds, and thus to that extent delayed the end of cheap fuel in the Pittsburgh district.

The awful catastrophe at Marianna last week is most disquieting to thinking minds. Disquieting, not alone for the frightful loss of precious lives from the ranks of the brave toilers in a most dangerous occupation, in which the men of skill are all too few, but also for the dread suspicion which arises concerning the future of deep mining in this richest zone of coal. Harwick, Ellsworth, Naomi, Monongah, Darr, Marianna, are all within the regions of great deposits of natural gas. Can it be possible that in such situations this volatile substance, released from its long prison by the thousands of oil and gas wells drilled to the deeply buried reservoirs of gaseous fuel, has permeated these mines in large quantity through the ever present fissures of the earth's stony crust?

At the White House conference of Governors, called last May by our illustrious President to take stock of the fast disappearing natural resources of the nation, and to advise with him concerning ways and means to conserve the same, your speaker called attention to this "sword of Damocles," an ever impending peril to deep mining over the oil and gas areas, and to the unknown waste of coal and precious lives that may possibly result therefrom. At least three-fourths of the entire area of Pittsburgh coal remaining unmined in Pennsylvania, Ohio and West Virginia is within this dangerous zone. Of the thousands of oil and gas wells drilled in this great area stretching from the Pittsburgh region southwestward across Pennsylvania, West Virginia and southeastern Ohio, hundreds of which have been abandoned in each of these three states, and the casing removed, probably not a single one has been so located by public charts accessible to coal operators that its presence could be learned and its danger guarded against after the farmers have cleared away the rubbish of derrick and

drill, and recovered the poisoned soil for grazing and other agricultural purposes. There would have been perils enough in this deeply buried Pittsburgh coal area from the inflammable gases already present in the coal itself, if not a single oil or gas well had ever been drilled to these great underlying reservoirs to release when abandoned, the deadly forces of explosive gas into the very workings of the toilers, against which neither the skill of the miner nor the science of the engineer seems able to cope. It is barely possible that the oil and gas producers have thus through abandoned wells added so greatly to the perils of deep mining that large areas of this matchless Pittsburgh coal as well as any other beds which might underlie it in this broad oil and gas belt southwest from Pittsburgh, will be practically irrecoverable except at enormous expense of life and treasure. It is needless to comment upon the additional fuel shortage which such a condition would mean to Pittsburgh's iron and steel industries. The mere mention of the possibility of this peril ought to be sufficient to put every patriotic citizen on guard against increasing this danger. Not a single string of casing that has penetrated the productive coal measures in the oil or gas regions of the states where natural gas is encountered in any appreciable quantity should ever be pulled out until the underlying coal has been removed. The oil producers are robbing the entire country of its precious fuel gases. Why should they be permitted also to endanger its solid fuels? Here is some work for the Governors and Legislatures of Pennsylvania, Ohio, West Virginia and Kentucky that could bring no harm to legitimate oil and gas interests, and which may result in an immense saving of life, as well as of fuel resources.

What moral should be drawn from these facts by Greater Pittsburgh, with its 5,000 factories absolutely dependent upon cheap fuel? That homely adage of our forefathers, "Needless waste brings woeful want," is just as true for communities, states and nations as for individuals. The story of "Coal Oil Johnny" is being re-enacted by the Pittsburgh district, and many other districts of our country

on an enormous scale, and the final results, although a little longer delayed, cannot fail to be similar. On the one hand you perceive your fuel resources reduced by this barren zone to one-half of what were supposed to be readily and cheaply accessible, and on the other these resources so greatly depleted by unbridled waste that in only a few years at most cheap fuel will have passed into history from this great district.

Disguise it as we may, the picture is not a pleasing one. Your great engineers and captains of industry whose skill and genius aided by an unrivaled wealth of cheap fuel and the protecting Aegis of a wise and generous government have centered here the iron and steel business of the world, should not glance at the picture and turn lightly away to forget it in the busy hum of furnace and forge. Your wonderful industries should remain here and prosper not a few decades, but for centuries. But just as surely as your successful past and glorious present have been founded upon your unrivaled resources in cheap fuel, so surely will your great industries decline and die with its disappearance. "Mene, Mene, Tekel, Upharsin," will be written large over the gateways of your wonderful city before the present century closes unless the men who own your mines and factories awake at once to the danger that portends.

What will it profit Pittsburgh's industries that enormous coal deposits exist in Wyoming, North Dakota, Montana and far away Alaska, as well as in other portions of the distant West, when a freight cost of many dollars per ton intervenes? No, these Western coal fields are not for Pittsburgh. Nature has forbidden it by barriers which the skill of man can never hope to conquer. When the coal in the Appalachian field is gone no other field can take its place in Pittsburgh's industrial life.

Every citizen of our beloved union is interested in perpetuating as long as possible the giant industries that have sprung into existence around the home of Father Pitt. When the mighty pulsations of your industrial life slow down, even temporarily, lethargy and palsy strike every artery of trade and commerce on the continent. The post-

ponement or prevention of the evil day when your great industries shall close for want of power is worthy of the best thought of every patriotic American. What is the remedy? What is possible to be done in order to postpone indefinitely this dreaded day so fateful to Pittsburgh's industrial life? The answer may be summed up in two words—Stop wastes. Not alone waste of natural gas, waste in mining, but all other needless wastes. Why should you permit this pall of smoke and dirt and grime from unconsumed carbon to continue to menace the life and beauty of your great city? Why should the flaming throats of so many wasteful coke ovens continue to vomit skyward such enormous volumes of precious gaseous fuel, with its clouds of carbon to pollute the air, stifle vegetation and render life a burden, when all of this wasted energy will so soon be needed in Pittsburgh's unrivaled factories? True, your furnace managers may say the coke from the beehive oven is superior in structure and reducing capacity to that of the by-product process, but is this superiority sufficiently great to warrant the waste of so much heat, and all of the other precious by-products which our European cousins find so much profit in manufacturing and selling to us? Are not your engineers equal to the task of manufacturing a first class furnace coke without such an enormous waste of values? Are they less skillful than their German and English brothers?

Why should you retain the steam engine to consume with frightful speed so much of your finest fuel, when much more power can be obtained by the use of the gas engine from an equal weight of impure or low grade coal? Fortunate would it be for Pittsburgh's future if some master genius could arise in your great iron and steel industries who would at one stroke arrange to relegate both the steam engine and the beehive coke oven to the junk heap of the wasteful past, like McCrea and his predecessor, the gifted Cassat, have undertaken to do with the steam locomotive on one of the world's greatest railways.

Again, why should the Pittsburgh district permit these acres of coal barges, loaded with precious black diamonds, the heart of the finest coal bed in the world, mined from

your immediate hills, to float through your gates down to the other marts at a minimum profit to any of your citizens, owing to enormous losses by flood and collision, when it is absolutely certain that before the century closes the coal from eastern Kentucky and southern West Virginia will be towed up the Ohio to replace what should never have been taken away. Would it not be prudent and the part of far seeing business wisdom to let the Great Kanawha and Big Sandy coal fields possess these southern markets to which they are so much more cheaply accessible, rather than sell at a small profit today what you will buy back in the near tomorrow at triple or even quadruple the present selling price? The coal in the Appalachian field is the only large body of first class coking fuel on the continent, and the first duty of those who control the bulk of the enormous iron and steel industries of this district is to conserve all that is possible of this precious fuel for that particular purpose.

Another form of wasted energy not so apparent to the eye, but which in the aggregate probably amounts to much more annually than all other forms of energy both consumed and wasted in the Pittsburgh district, is the waste of water which the nation permits to pass by your factories unhindered to the sea, often destroying enough property in this one district, between here and Cairo, in a year, to pay the entire cost of control and utilization. With the waste and disappearance of our forests, these periodical floods are certain to increase in destructiveness. Happily situated at the junction of two great rivers whose waters tumble down from the mountain summits 2,000 feet higher, and all easily within the limits of electrical transmission; why should this now worse than wasted power not be so stored, controlled and utilized that you could not only have navigable rivers the most of the year, from Pittsburgh to the Gulf, upon which to distribute cheaply the products of your mills and factories to so many of your sister states, but could also thereby greatly prolong the life and growth of your famous industries.

Your patriotic mayor has done well to appoint a com-

mittee of distinguished citizens to head a civic movement to rescue your noble army of toilers from the filth and squalor and disease of tenement conditions almost unequaled for undesirable surroundings by that of any other great city of the world, in order that human life and energy may not be wasted in unsanitary homes. Let Mr. Guthrie supplement that noble work by appointing a committee for the prevention of unnecessary waste of your material resources in every form. Thus by the united influence of Pennsylvania and her sister states upon the nation's rulers, it may be possible, by reforesting the Appalachian mountains, by storing, controlling and utilizing the water power of your mighty rivers, by conserving and properly using your priceless stores of fuel, to prolong indefinitely your industrial life, so that Pittsburgh may not only become the city beautiful, but also the city perpetual.

Needs for Conservation of Our Coal Deposits.

BY J. V. THOMPSON, UNIONTOWN, PA.

To be fully and adequately impressed with the importance of the question,

> "How rapidly are we exhausting our coal deposits in the United States?"

We should study the subject with regard to these aspects of it

1. What is the area of accessible, merchantable coal?
2. What is the annual rate of consumption?
3. What is the rate of annual increase in this consumption?

Answering the first question, I might quote in general terms from an authority on the subject, who writes, that the distribution of coal is as follows:

> First. The Appalachian area in which is found the big vein of from six to nine feet in thickness, extending from Northern Pennsylvania to Alabama, running through part of West Virginia, Kentucky and Tennessee, and touching Eastern Ohio.
>
> Second. The Michigan coal field of limited extent.
>
> Third. The Illinois, Indiana, Iowa and Missouri field, of larger extent in area, but of recent development.
>
> Fourth. Scattered areas in Nebraska, Kansas, Colorado, Montana and North Dakota, whose veins are but slightly known or mined.

For information as to past consumption, and recent rate of increase, upon which we can safely predict for the future, we must look to that locality where the mining of coal has been most extensively and persistently carried on in the past. This brings us to the Southwest Pennsylvania and West Virginia fields, whose records cover the greatest number of years, and the greatest tonnage. These regions

supply the East, the central West and the Northwest, where the demand for such fuel has been the greatest in the past twenty years.

For brevity's sake let us make this single comparison:

In 1857 the coal production was 11,000,000 tons.

In 1907 the production was 435,000,000 tons, or 3,540 per cent increase.

The increase was not gradual or uniform. It was much greater in the past ten years than in any previous decade.

In 1870 we mined 33,000,000 tons.
In 1880 we mined 71,000,000 tons.
In 1890 we mined 157,000,000 tons.
In 1900 we mined 269,000,000 tons.
In 1907 we mined 435,000,000 tons,

which exceeds 1906 by an amount greater than the total mined in the world in 1876! We can better comprehend the vastness of this by reducing it to acres.

The acreage represented by these tonnage figures sprang by leaps at ten year periods from 4,400 acres in 1870 to 9,466 acres in 1880, to 20,933 acres in 1890, to 34,533 acres in 1900, and to the magnificent total of 58,000 acres in 1907.

Reduce these acres to square miles and we get

in 1870 but 7½ square miles,
and in 1880 but 16 square miles,
and in 1890 as much as 35 square miles,
and in 1900 as much as 58 square miles,
and in 1907 we get 91 square miles.

This means a principality in area and values gone forever, used in one short year of 300 working days. This consumption was not scattered over the United States generally, but prevailed in three or four states principally; from Pennsylvania 55 per cent, from Illinois and adjoining States 10 per cent, from West Virginia 10 per cent, from Ohio 5 per cent, and from all the rest of the United States 20 per cent.

At this rate of consumption who can fail to see the end of the big vein of coal in this country. Its life was once

placed at 300 years, later at 200 years, now at less than 100 years. In the Pittsburgh district it is less than 40 years. In the Connellsville coke region it is about 35 years. I take no account of those thinner veins, of doubtful value and quality. I refer only to the big vein now mined, known locally as the Connellsville Coking or 9-foot vein, or the 9-foot or Pittsburgh vein. The thinner veins will be but little mined until the great Pittsburgh vein is near exhaustion.

If I have made clear to you the rate of exhaustion now prevailing, what increase can you see in the near future? Is the outlook reassuring, or alarming? Can you hope to decrease the consumption of coal? or rather will it not be recorded in 1925 that at least 200 square miles of this big vein of nature's richest gift is being extracted annually, without the possibility of substitution or replacement? This would mean an annual tonnage of little less than 1,000,000,000 tons.

Are the figures too large for comprehension? Not to us of this district who see annually 150,000,000 bushels of the black diamonds go floating out of the Pittsburgh harbor alone, down the Ohio for southern ports, exclusive of rail transportation. Not to us who see in the Connellsville region alone 37,000 coke ovens lighting the heavens at night, and sending out daily 2,500 loaded cars of coke, stringing out into 14,000 cars a week from 186 coke plants.

I have endeavored to show the extent of consumption of this precious mineral. Need I dwell on the conditions in the Pittsburgh and other industrial centers as the life of the nearby coal area approaches its end? We boast that Pittsburgh is the industrial centre of the world, that her tonnage is greater than the combined tonnage of Chicago, New York, London and the Suez Canal, that her pay roll is $1,500,000 each day of the 300 working days of the year. Will that continue when the nearby coal is gone? Can she reach out and get relief from the untested coals of the South and far West?

Is not then the need of conservation most pressing? How can we get the same efficiency at a less rate of tonnage consumption? Natural gas will help us out some, but its life

is precarious. Mechanical devices in the making of coke, and in making fuel heat will improve in efficiency and give some saving. By-products will add to our profit account. But who will arise to lead us to the solution of the great and pressing economic problem, how to conserve our fuel supply, and extend its life of usefulness?

"Man marks the earth with ruin; his control
Stops with the shore; upon this great wide plain
The wrecks are all his deed, now will remain
A vestige of our greatness; these rich fields
Will in an aeon cease their fertile yield
Unless some leader with a Seer's great gift
Will rise, inspire, direct us and uplift."

Conservation of Mineral Resources.

BY J. B. ZERBE, CLEVELAND, OHIO.

When notified by your secretary that I was expected to say something to you upon the Conservation of Bituminous Coal, I was also informed that Mr. Traer of Chicago would precede me in speaking on the same subject, and as he always does well in anything he undertakes, I considered it unnecessary for me to prepare a paper.

At the present time the practical workers in the production of bituminous coal can see no good reason for taking up the subject we have before us, as unfortunately during the past year the business of the country has been so depressed that little coal, in our opinion, is being used or wasted, and we are hoping that in the near future you will get busy and waste more of the material which we produce.

The time has come, however, when some concerted action must be taken, looking toward the conservation of all the natural resources of the world, and particularly of the deposit of coal. It is only a short time since we all considered this deposit so enormous that it seemed impossible ever to exhaust it, yet inroads are being made upon it so rapidly that statisticians are looking forward to the early depletion of the coal deposit.

I recall when one of our Ohio roads was projected to extend from the harbor of Lorain to the Ohio river, one of the then prominent men in Cleveland was asked for a letter recommending the building of this road, and it was largely upon his recommendation that this was carried through. It consisted simply of a letter which he had written to the projector, in which he stated that the road began at the harbor of Lorain, which was one of the best on Lake Erie, and ran down through fertile valleys of beautiful farms until it entered a coal field which was so extensive that the supply would last Hell a thousand years. This letter went to New York, got into the hands of Horace F. Clark, of the Vanderbilt interests, who said upon such a representation

he was willing to build the road. He wired the gentleman who had written the letter to come to New York, and ever thereafter while these two men lived, the question as to the amount of coal necessary to last the devil one thousand years was a source of never-ending discussion. However, at the expiration of thirty years what was then considered a vast field of coal is now about exhausted, and the owners of the railroads have found it necessary to extend into West Virginia, where it is hoped they will find a sufficient quantity of coal to meet the above proposition.

There is a loss in the use of coal that equals vandalism. This loss occurs not only in the producing, but also in the consumption. We believe vast improvements can be made in the producing of coal. Too much is left in the ground. We think that scientific efforts on the part of the government or the several state governments would assist in saving this waste for the future. The greatest waste in the use of coal is in the method of consumption.

Ever since the steam boiler has been in use, we have utilized not to exceed ten per cent of the coal consumed. This waste cannot go on indefinitely, but it must be left to the scientific investigation of men capable of grappling with it, and they will find a solution to the problem. The coal producers of this country are willing that you should find any means that would save the waste of this material, even though temporarily it might work a hardship upon the business, but in all matters touching such a great industry as this we must be exceedingly careful. Do not expect to accomplish in a year or in a decade what the good Lord evidently intended we should be centuries in discovering. Whenever a great necessity arises, means are found, and it will not be long perhaps before the proper solution will save this great material to the world. Make haste slowly.

Let this great American Mining Congress do all it can looking to the safety of the lives of those employed in the production of coal. To me this is the primary question which is before you now—protection of the life of the man who leaves his home in the morning and enters into this

work to support his wife and children, to better their condition, to educate and uplift them, and in the evening is laid low in the mine.

No man will protest against any measures you may take looking to the safety of the individual, but do not do it hurriedly, excitedly, or in any way political. Let the government appoint the most scientific men they can lay their hands on, let these men know all the conditions surrounding each and all the mines, and intelligently work out this problem. At present the cause of these great disasters is not known. Some force buried underneath the ground, some chemical composition coming in contact with the air or the fire causes these great explosions.

No one will question the fact that the owners of the property on which the recent disaster occurred, made every effort to make their new plant one of the best in Pennsylvania. We all know that Mr. Jones prided himself upon the fact that he was doing so, and yet immediately following the investigation of the mine inspector this horrible tragedy occurred. Evidently the lamps did not indicate any trouble, the men were all unconscious of it, and yet it came. The remedy must come from the brain of the scientist who has been educated in chemistry and in mine engineering, and who knows conditions surrounding the atmosphere of the mine and its supports, and if the Mine Bureau is created, let it be so conducted by men of high character and ability that when conclusions have been arrived at, we will not question them. And so with all the industries.

The one in which I am more particularly interested is that of the timber of the country. The beautiful forests should be no longer laid waste, if it is possible to find a way to stop their destruction, but whatever effort is made by the government should not have the effect of restricting any industry, and men who want to use timber should have it in plenty, not to waste but to use. As the forests are cut they should be replaced by plenty of young trees on the wasted land, wherever such land may be found. The general government and the states should insist upon replanting these

trees, and such an undertaking will prove a profitable investment to the one who makes it.

I planted 10,000 trees three years ago. I can see them growing, and it is a pleasure to watch them. The increase in their value may be better than a ten per cent investment. The government encourages such planting and is very generous. Men are sent out to analyze the soil and will tell you the sort of tree you should plant in any given locality, and when requested to do so the government will send you men to see that the trees are properly planted and also will give them supervision after they have been planted, and watch their growth.

If the Bureau of Mining established by the government would be conducted on the wise basis upon which they are conducting the forestry work, then I say God speed the time when we will have such a Mining Bureau.

The American Mining Congress is to be congratulated upon the personnel of its organization. I have never met in convention with men who so impressed me with the seriousness of their intentions, or the honesty of their convictions, and I trust it may be my pleasure to meet with you again.

Conservation in the Coal Industry.

BY JOHN MITCHELL, EX-PRESIDENT U. M. W. OF A.
NEW YORK CITY.

Mr. Chairman, Ladies and Gentlemen: Last summer the President of the United States did me the honor to invite me to address a meeting of governors which he called at Washington to discuss the question of the conservation of the nation's natural resources. I chose at that time to discuss the conservation of our fuel resources, and incidentally to discuss the protection of human life. I took occasion to say that in my opinion one of the chiefest causes of the waste of our coal was its cheapness, that coal was so cheap that consumers could afford to be extravagant. Shortly thereafter I received a letter from a gentleman in a New England town saying that the retail coal dealer in his place had acted on my suggestion and had raised the price of coal. (Laughter).

Now, in what I say upon this subject this morning, I want to have this borne in mind—and if the newspapers report anything of what I say I wish that they would report this part—that I do not believe the householders or the domestic consumers of the coal are paying too little for it. As a matter of fact, the domestic consumers of coal are paying altogether too much for what they burn; and the large consumers of coal are paying altogether too little.

I have been informed by several large coal companies, or the representatives of several large coal companies, that the entire profit on their business is made upon some ten to twenty-five per cent of their production. That means that the small consumer of coal is paying all the profits of the industry, and that the railroad and large manufacturing companies are buying their coal at cost and sometimes at less than cost. Now, what is needed, in my judgment, is that the large consumers of coal shall pay a higher price for it. When they pay more for their coal they will not be likely to use it with such prodigality. And if coal producers

can secure higher prices for their products, the probabilities are that they will mine it without so much waste. As Mr. Zerbe has so well stated, in the consumption of coal only ten per cent, oftentimes only five per cent, of the heat units are utilized. The layman, unfamiliar with the production of coal, would hardly believe you if you were to tell him that ninety per cent of every ton of coal burned is wasted, that only ten per cent of each ton of coal is actually used. That is to say, only ten per cent of the heat units of all coal consumed is used for either heating, lighting or motive power. The remaining ninety per cent either goes up in smoke or is hauled out in ashes. There has been a device in use within the last few years by which coal may be converted into gas and the gas used for fuel, and in that way they have been able to use from twenty to twenty-five per cent of the heat units. You can readily understand that if it were possible to adopt this method in the consumption of all coal, instead of requiring 480,000,000 tons of coal to supply our needs, as it did last year, 240,000,000 tons would be sufficient to give us all the heat, motive and lighting power that we would require. And no doubt by the process of invention the time will come when fifty or sixty per cent of the heat units of all fuel produced will be used for motive power.

There is another phase of the question. If operators were to secure a reasonable price for all their fuel it would enable them to produce a vast amount of coal that now goes to waste. Because of the low price of coal at the mines, mine owners only take from the earth that portion of the coal that they can produce cheaply, leaving there irreclaimable the coal that cannot be produced at a sufficiently small cost to sell in the markets of this day. I believe that in the last year the average value of coal at the mines was about $1.14 a ton. The average of coal at the mines of England, Germany, France, Belgium and other coal producing countries is nearly double that amount. In other words, in the old countries the consumers of coal pay twice as much for their fuel as they do in America; and bear in mind that

when $1.14 a ton is the average value of coal at the mines, that means that the railroads and the great manufacturing companies are purchasing their fuel for less than $1.00 a ton and the domestic consumer and the small manufacturer are paying vastly more than $1.14 a ton.

I think, speaking, not as an operator, and having no pecuniary interest at all in his well being, that what I say upon the subject of increasing the cost of coal to the consumer will not be attributed to any selfish motive. I have this motive in it, however—aside from my desire to see our fuel resources conserved so that future generations may share in the benefits with which God has so bountifully endowed us—that operators shall be able to afford to the mine workers a larger share of protection than is now enjoyed. And it is with that phase of the subject that I am vitally concerned. Gentlemen, it is a standing disgrace to the people of our country that more men are killed in our industries than in the industries of any other country in the world. It is with a sense of shame that we admit that for every man killed in the mining industry of the old world, we here in America kill three or four. I want to make an analysis of the latest figures submitted by the United States Geological Survey, and I want to introduce into this analysis a phase of the question which I think has heretofore received little consideration.

As you know, I am a trade unionist; I am a trade unionist first, last and all the time. I am a trade unionist because I believe that through the organization of labor the workingmen of our country, the workingmen of the world, must receive all their protection. I am a trade unionist not because I am at war with capital, but I am a trade unionist because I want conciliation with capital. I want to live in peace and harmony with capital, and I believe that through our trade unions we can do so.

A peculiar thing about the mining industry is that more non-union men are killed than union men. None will deny that the unions will raise wages and reduce hours and improve the conditions of the employes. But a good many will

deny that the unions save life. And yet as a matter of fact the figures submitted in the Government reports demonstrate beyond the peradventure of a doubt that the greatest factor in the conservation of human life is the much maligned organizations of labor. I have taken the statistics of coal producing states and grouped them into divisions showing the number killed per thousand employed, the number killed per thousand tons produced in the thoroughly organized states, in the partially organized states and in the practically unorganized states, and I ask you to pay attention to these figures. The following states are thoroughly organized and men cannot work in the mines unless they are members of the United Mine Workers of America: Arkansas, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Ohio and Oklahoma. The average number of men killed per thousand employed in all those states was 2.47. The figures given are for 1907.

These are partially organized states: Pennsylvania anthracite Pennsylvania bituminous, and the state of Washington the average number killed per thousand employed was 5.07.

These are unorganized states: Alabama, Colorado, New Mexico and West Virginia. The average number killed per thousand employed in these non-union states was 9.49. In West Virginia they killed 12.35 men for every thousand employed; whereas in the state of Missouri, giving the two extremes, they killed only .95. They killed nearly fourteen times as many men per thousand employed in West Virginia as they did in Missouri. About two years ago the governor of West Virginia called a conference of representative coal operators and coal miners, and assuming that I knew something of the subject of coal mining, he invited me to attend, and I was very glad to accept his invitation. Unfortunately it was rumored through the state that I was coming there, and the operators stayed away and the governor stayed away.

If there is one state in America requiring mining legislation and decent treatment of coal miners in order that

their lives and limbs may be preserved, it is the state of West Virginia. Now it may appear to some that these figures just happen to show that more men are killed in West Virginia than in Missouri, or that more men are killed in Alabama, Colorado, New Mexico and West Virginia than in the other states that I have named—that it may just have happened that way, or that it was simply an act of God, or that the natural conditions of mining are not so safe, so favorable in those states as in Ohio, Pennsylvania, Illinois and Indiana. But as a matter of fact, as every well-informed coal mining man can tell you, the natural and physical conditions of mining in West Virginia, Colorado and Alabama are safer than in the state of Pennsylvania. Yet they killed in West Virginia eight more men per thousand employed than they did in Pennsylvania, and Pennsylvania killed four men per thousand employed for every one they killed in Missouri.

It seems to me that these figures are susceptible of no other interpretation than that where men are organized and are able to act in concert they will refuse to work in a dangerous place and will not permit one of their number to be discharged or discriminated against who refuses to work in an unsafe place. As a matter of fact, we have many instances in which men have not only supported one of their number who refused to work in a place known to be unsafe, but wherein they have struck rather than see their brother miner killed. And much as I regret strikes I am free to confess to you that I should sustain the miners without hesitation, if they struck in defense of the life of one of their brothers. Another thing, where men are organized they are able to secure legislation, and they cannot do it unless they are organized. And what is equally important, where the men are organized and where they act together the laws are better enforced and there are better mine inspectors than in the states where the men are unorganized.

What is required, gentlemen, to preserve the lives of these men who spend so much of their time in the earth and not on it, is better mining laws and the rigid enforcement of the laws now on the statute books. There is no good rea-

son why in America 4.86 men should be killed for every thousand employed. In France they killed .91 men per thousand, less than one man for each 1,000 employed annually. We would indignantly deny that any continental country is as highly civilized as we are in America. We would regard it as an insult if some fellow were to come over from Belgium and say, "We are in advance of you Americans." And yet in Belgium they killed only one man for each thousand employed in the mines; we killed 4.86 men per thousand employed last year. In Great Britain they killed 1.28; and in Prussia 2.06, as against our 4.86.

Taking the same group of states referred to before, and dividing them into groups of union, non-union and partially unionized, we find that in Arkansas, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Ohio and Oklahoma they produced last year an average of 246,707 tons of coal for each man killed. In Pennsylvania bituminous and Pennsylvania anthracite, and in the state of Washington, which were partially organized, they produced an average of 136,476 tons of coal for each man they killed. In the non-union states, Alabama, Colorado, New Mexico and West Virginia, they produced an average of only 86,204 tons of coal for each man killed

Last year they killed in the coal mines of America 3,125 men, and seriously injured—because only the cases of serious injury are reported—5,316 men. Gentlemen, if a great war should occur during our lives, and in some of the battles it should be reported that 3,000 men were killed and 5,000 men were seriously injured, the whole world would stand aghast and our humanitarians would cry aloud against this devastation of human life. Yet day by day, hour by hour, in this peaceful industry, men are unnecessarily sacrificing their lives. Right now—today—not less than ten men will be killed; yesterday that number lost their lives. To-morrow ten or twenty will be killed and to-morrow's to-morrow and the following time until the laws are changed, ten to twenty men will be killed daily in the mines. And what are you going to do about it?

What are we going to do about this awful loss of life?

Mr. Zerbe suggests the importance of preserving the lives and limbs of the coal mine workers, but suggests that we go slowly and be sure. I have no doubt that that advice is well intended. But, gentlemen, these are human lives! These are men just like you and me, who are going to die to-day and to-morrow; and they are not willing to wait. The dependents of these men are not willing to wait an indefinite time for a remedy. The situation has grown worse year by year. Every year for the past twenty has shown an increase in the number of men killed, an increase in the percentage of men killed, an increase in the number of men killed per thousand tons of coal produced, and I think it is time for us to decide upon some definite policy. Of course some may ask what I should recommend, and I am going to tell you.

I am not a scientific man by any means, and I do not understand nor profess to understand the composition of gases, nor am I able to tell the cause of all mine explosions, but I do say, gentlemen, that there is only one way to prevent men from being killed by mine explosions, and that is to have the men out of the mine and have them out while they are alive, not carry them out after they are dead. There is no necessity for a large number of men being killed in a mine explosion, because it is a simple matter to employ only two men or four men in any one mine in America to discharge all the shots and do it at a time when the other men are at home. The introduction of shot firers does not mean a material increase in the cost of production. It means the expediture of only ½ cent, or not to exceed 2 cents, per ton, and I believe that the consumers of coal would not protest against a payment of one or two cents more for their fuel if they knew that in doing so a thousand or two thousand lives were saved every year. That is one method, gentlemen, of saving lives. That will save the lives now lost from mine explosions, that is explosions caused from firing shots; and I believe that nearly all the great explosions have come about by a badly placed shot or what we call a "blown-out" shot.

There is another way to save life, and that is to require that any man who works in a mine shall be competent to do so. You know of late years mining has been revolutionized, in respect to the character of the men who mine coal. When I was a boy, mining was a trade and all the men who mined coal took pride in being skilled miners. We regarded that as our life work, and every man wanted to do his work well. He felt the same pride in his trade that professional men feel in their professions, or a tradesman feels in his business. The men who have sought employment at the mines in the past twenty years are not the skilled miners, not the tradesmen, but men recently arrived from continental Europe; in most cases men who never saw a coal mine in their lives, and possibly never burned a ton of coal in all their existence. It is the small hand farmer from the rural districts of continental countries who comes to our shores and goes to the mines and who is welcomed there and given employment, and no question is asked as to whether he is experienced; he is put to work mining the coal. And is it any wonder that these inexperienced farm laborers of continetal Europe not only destroy themselves but oft-times, through their inexperience, destroy the lives of their fellow workers in the mines? I believe that greater care should be exercised in the selection of the men who shall mine our coal. It may be all right for men to commit suicide, but it is not all right for them to commit murder. A man may have a right to destroy himself, but we must see to it that he destroys no one else. And let me say now that in a coal mine you might have 500 of the most experienced men it is possible to employ, and only one inexperienced man, and that one man would kill all the rest. Not knowing what to do, he goes to a place where he should not be, or he explodes gas, or he fires a shot in his coal in such a manner that it causes a blown-out shot, which is followed by a dust explosion and every life in that mine is wiped out. We need protection, gentlemen, and we need laws for the protection of the miners; we need protection for the women and childeren who are dependent upon these men in the mine.

And I am going to suggest, even at the risk of tiring your patience, that the time is here now when some adequate provision should be made to take care of these widows and orphans and for these injured miners.

Last year there were produced and sold in our country 480,000,000 tons of coal. A tax of one cent a ton would give to the dependents of each mine worker who was killed a thousand dollars; it would give to each injured miner $500, and yet there would be a balance left of over $300,000.00. The coal produced last year had a market value of $615,000,000.00. Two-thirds of one per cent of the market value of that coal would give to the dependents of every miner who has been killed $1,000.00, and $500.00 to every injured miner. Gentlemen, that is not too much to ask. It is not much to ask that the dependents of a man who has given his life in the mine or the man who has been injured in the mine should receive from that industry a fair compensation for his life or for his injury. I believe that each industry should be charged with the responsibility of not only protecting the men at work, but also providing for their families if they are killed, or for them and their dependents if they are injured.

It may seem an injustice to require one coal operator or one coal company to pay the expense incurred by disaster at the mines of another coal company, but unless that provision is made, then you might as well not provide for compensation at all.

Let me illustrate. Let us assume that the mine of the Pittsburgh and Buffalo Coal Company which blew up the other day was the only mine that company had. Could they compensate the men or the dependents of the men killed there? Why, they would not have anything to do it with; whereas if a tax were levied upon the entire coal industry of the country or of the state of Pennsylvania, it would amount to so little per ton that no one would feel it seriously. You understand the difference between the compensation laws of England and Germany.

In England if a man is killed the coal company employ-

ing him must pay to his dependents an amount equal to $1,500.00. There is no question of law about it, no question of going to court about it; they have got to pay it. And if a man is injured in one of their mines, even though his injury is the result of contributory negligence, the coal company employing him must pay to him an amount equal to half of what he would have earned each week, a sum not to exceed $5.00 per week. In Germany if a man is killed in the mines, or any industry, all the employers in that particular industry contribute to a fund from which the dependents of that man are paid not only a specific sum at his death, but a pension for the rest of their lives. Both in England and Germany, when it was proposed to enact this law, a protest went up that the enactment of such legislation would lead to the destruction and bankruptcy of the industry. As a matter of fact, in Great Britain the cost of providing for these death and accident payments has proven less than the coal operators formerly paid for liability insurance; and while I do not know the amount paid by the coal companies in America for liability insurance, I believe it is safe to say that they pay either for their insurance or in defending suits for damages, more than one cent a ton. And if it does cost them one cent a ton or one-half cent a ton to pay for liability insurance and to defend suits against them for damages, how much better would it be that the money thus spent should be paid directly to the dependents of a man who has been killed or to a man who has been injured than given to some law firms and wasted in our courts.

I am told that in the city of New York seven-tenths of all the time consumed by the judges of the Supreme court is given to the hearing of suits for damages in cases of injury. I say, gentlemen, it would be much to our credit, it would be a great evidence of humanity, it would be an indication of justice, if we should try to get together and fix up some arrangement not only to prevent the terrible accidents that have become so numerous that they no longer shock the moral conscience of the people, but also to provide in some manner to take care of these widows and orphans

and of the poor fellow who has been injured. If we should do that in the mining industry we should do something that would be an everlasting credit to us.

My friends, I have probably consumed more than my measure of the time. But I feel very earnestly about this matter. I feel keenly the fact that every year sees an increase in the number of widows and orphans as the result of mine disasters. And I want to predict now that unless there is some change for the better, the miners are going to stop appealing for relief; they are going to become indignant at these unnecessary deaths and accidents. Of course the man going down in the mine himself little thinks that he may be the next—he gets so accustomed to the danger that he is not afraid of it. But with these explosions occurring at frequent intervals and the great number of men whose lives are lost something is going to be done to get relief, and how much better it would be if in some sane and economical way we could make provision for their safety; make provision for them if injured and for others after they are dead!

The first thing to do is to give to the coal operators a price for their product that will enable them not only to take out all the coal in the ground, but also to provide for the safety of the men and compensate the dependents of those who are killed. I say that is the first thing; that the large consumer shall pay more for coal and that the increased profits shall be used not only to pay good wages, to give improved conditions of employment, also to provide adequately for the victims of a restless progress. (Great applause).

The Installation of Electricity in Mines.

BY W. A. THOMAS, COMMERCIAL ENGINEER, WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, PITTSBURGH, PA.

It is not the intention of this paper to dwell upon the general subject of the use of electricity in mining operations, but to deal more particularly with the manner of installation and operation of electric conductors and apparatus in underground mine workings.

While the suggestions offered can readily be applied to the general mining work, they are made with more particular reference to the coal mining work, in connection with which the matter of precautions for the safety of employes and property is being given careful consideration at the present time.

It is sometimes difficult to account for conditions which have become more or less permanent. The mystery with which electricity has been regarded has led to the custom of attributing to it the responsibility for many actions simply because they could not otherwise be accounted for. "Defective wiring" has long been the reason for fire in buildings even though leaky gas pipes or oil lamps may have been a factor in many cases.

In like manner has electricity been blamed for accidents in coal mines, where many other causes might as consistently have been found. In some states the attitude of the inspection department has been thought to be hostile to the use of electricity in the mines, but it is more reasonable to believe that decisions which appear unfavorable are the result of a failure to comprehend fully the results to be expected from a given set of conditions.

In the sincere effort of the leading operators to determine precautionary measures for the safety of employes, the question arises what, if any, are the limitations to be placed on the use of electricity in the coal mines. In like manner, the various commissions appointed to investigate the ques-

tion of mine laws and regulations to safeguard the lives of employes in mines, are confronted with the same question.

It is fully recognized by mine owners and operators that some attempt at uniformity in methods should be established regarding the manner of installing electricity. This would have many beneficial results, important among which are, first, a better understanding on the part of men doing installation work of just how it should be done; second, a more careful study would be made to determine the best practice to follow under a given set of conditions; third, a uniform system of installing would train the miners where to look for danger and what to expect in the way of results from certain uniform causes.

Electricity has come to play so important a part in the production of coal that most careful consideration should be given to the question before establishing many "Thou shalts" and "Thou shalt nots," which may or may not have the desired results.

The treatment of this question to date has been widely different in different states, but it was hoped that the conference of Governors of many coal producing states in Pittsburgh early in December would result in a more uniform and satisfactory method of solving the question for all conditions.

It is recognized that many of the suggested changes in methods of mining must necessarily increase the cost of producing coal and to adopt these changes in one state and not in another must necessarily work to the disadvantage of the industry in the state making the most reforms. The conference, therefore, of the various Governors of coal producing states will doubtless be of far reaching benefit to the industry.

In Ohio the inspection department, it is understood, prepared and presented to the legislature and had established, certain rules with reference to installing and operating electrical apparatus, which in their mind would prove effective in safeguarding men and mules in the mines of that state. Once established, these rules were found to be ineffective and inoperative. In fact, the enforcement of some

of them would render the mines in most cases more dangerous from other causes; for example, the cutting of a groove in the roof deep enough to bring the trolley wire even with the roof.

Discretionary power was then given the inspectors in the matter of enforcing certain of the rules. Such a condition always gives rise to a difference of opinion, and leaves room for the fear of discrimination.

The question is now being considered by a commission appointed from the ranks of the inspection department and of the operators to settle upon just and consistent measures which can be made effective.

In Pennsylvania there have been no rules of consequence as applying to electrical installations, except in the matter of their use in gaseous mines. There has been a commission appointed by Governor Stuart for the revision of the bituminous mine laws and they are considering carefully a set of rules to govern the installation and operation of electricity in bituminous mines.

It is unofficially reported that the rules of the Government of New South Wales are being used as a foundation around which to formulate rules to apply to Pennsylvania conditions.

The commission is composed of inspectors, coal operators and one representative of the miners' organization. They have consulted frequently with electrical engineers from the mines and from the prominent manufacturers of electrical apparatus for mine work and consulting electrical engineers, and if the advice of these men be followed, the rules cannot but be beneficial in arriving at the desired ends.

In West Virginia apparently no definite rules have been established to govern the use of electricity, but the operators appreciate the desirability of establishing standard methods and practices in new installations.

Mr. W. H. Keller, chief electrician of the New River Collieries Company, in his paper before the West Virginia Mining Association at Charleston, W. Va., October 7th, dealt with this subject in an able and skillful manner. Mr. Keller pointed out that the inspection department should

have been skilled in electrical matters in order to render decisions which would be fair and consistent. He also brought out the fact that the next step would be the establishment of rules and standards to be applied to all mines of the state. To use Mr. Keller's words:

"Standardizing of methods and materials and laws governing same has the effect, (1) of reducing to a minimum the danger to life and limb, (2) of educating the employe to a more systematic method of performing all kinds of work, and obtaining from him the highest efficiency, (3) of enabling the owner to operate his plant with a minimum investment in spare parts, (4) permitting the operator to contract for material in quantities at an attractive price.

If the mining department employed skilled and experienced electrical men, competent to judge in matters of this kind, it would even then be difficult to render just decisions without some general rules which were recognized as standard.

If this is true, how then under the present conditions can the mining department expect, with justice, to govern the use of this most important factor in the greatest industry in our state?

If I were to offer a few general rules governing the installation of electricity, I would offer as a safe voltage anything up to 600 volts direct current.

In making specifications it is not within the province of the electrician alone to decide which mines should or should not have electric installations, but mines should be classified as follows:

(1) Gaseous mines in which the volume of inflammable gas generated is such that no electrical equipment except signal and telephone lines carrying not over 20 volts may be installed.

(2) Gaseous mines where the volume of inflammable gas generated is so small that it may be good practice to install safety lamps and safety powders, but will not preclude the installation of electric haulage, electric pumps on the entries, and mining machines and gathering locomotives in rooms when the power is transmitted from the haulage

entry to the machine or gathering locomotive over a well insulated single or twin conductor cable, the exposed wiring and main haulages being principally in the intake airway.

(3) Non-gaseous mines where electric machinery operated with direct current, 600 volts or less, may be installed.

Having decided the question of installing power, a few rules as follows would put the equipment in safe condition. I say a safe condition, that applies to the general run of men. I have seen a few fools who touched wires charged with various voltages just to see what they would do.

Tracks should be bonded in an approved manner and regularly inspected to see if bonds are in place. Should be cross bonded every two hundred feet. Should be cross bonded around switches. Where water, air or steam pipes parallel track they should be bonded to track, and pipe should be bonded around flanged joints. This not only helps the return circuit, but prevents electrolysis. If it is necessary to use a return wire in addition to rail, the wire should be connected to the cross bonds by an approved connector.

Wires. No permanent wire, either feed or trolley, transmitting 600 volts or less should be insulated, as the mine air soon affects the insulation so it does not insulate. Men are liable to be deceived, believing they are handling an insulated wire. It is better to teach men to keep hands off all wires.

Trolley wires should be erected at a uniform height from the rail and a uniform distance, about six inches, outside the outer edge of the rail. As a guide to men traveling on the main road, lights should be placed and maintained every 200 feet to show which side of the entry supports the trolley wire.

Where trolley wires cross the main heading they should be protected by an inverted wooden trough and lights put at both ends of the trough.

Switches should be of an approved type in boxes.

Each motor and each locomotive should have an enclosed copper wire fuse on the main circuit.

Pump motors, fan motors, car haul motors, rotary converters or any other form of stationary motors should have the frame grounded in an approved manner.

Controller frames on electric locomotives should be grounded to locomotive frame.

Lightning arresters should be placed at the entrance of the mine.

All high tension insulated cables should be provided with static arresters or have steel or lead covered cables grounded.

Where mining machines or drills are used in rooms the frame of motors should be grounded to frame of machine and machine connected to return circuit.

Where it is necessary to install wires in rooms, have an approved automatic cut-out or switch, and have installed in the rooms in view of miner two lamps in multiple.

All roads over which locomotives operate should be kept clean down to top of ties and drained.

Where mines are ventilated by electric fans an alarm should be so arranged in the power house that when fan stops the power house engineer will get a signal. If the mine is gaseous he should have instructions to cut power off the mine at once and immediately start an investigation as to cause of fan stopping and, if it cannot be immediately started, notify the mine foreman so that the men may be gotten out as soon as possible. Too many automatic devices create a degree of carelessness that must be avoided.

As much as possible fan circuits should be separate from all other circuits inside or outside the mines. Starting devices should be arranged to either automatically start the fan in the fan house or have the power house engineer start it in the power house.

The remedy lies not in the prevention of the installation of electrical appliances—for electricity is an important agent in the coal industry—but in regulating the installation of same. Regulations and standards should be adopted, but only after thorough investigation by men of training and experience."

The three foreign mining experts, Messrs. Watteyne, Meissner and Desborough, who were requested to investigate conditions in our mines, were present at the meetings when Mr. Keller delivered his paper. Their report is now published in the form of Bulletin No. 369 by the U. S. Geological Survey, from which the following is quoted:

"Electricity in mining operations offers so many advantages, and has been so generally adopted, that no reasononable objection can be made to its use under proper restrictions. The electrical equipment, however, should be installed, maintained, and operated with great care, and so safeguarded as to minimize danger from fire or shock. The fact that the effectiveness of some insulating materials is soon destroyed in most mines should not be lost sight of."

They recommend 650 volts direct current and 500 volts alternating current as limitation of voltage for underground distribution of electric power.

This is in line with the New South Wales rules and seems to meet with favor both in the United States and Mexico.

Similar discussion and action seems to be going on in Mexico and it is probable that rules will shortly be established there by the Government to guide the operators and inspectors in the use of electricity in all classes of mining work.

A careful study of the New South Wales rules shows that a great many regulations deal with probabilities of defects in the insulation of feeder wires. The experience of mining men in the United States seems to be general in finding a greater degree of safety in using bare feeders which are known to all to be alive and to be let alone by other than those men whose duty it is to see to them.

In the use of insulated wires in the average mines they are safe to touch and handle until such time, and short it is too, when the insulation becomes damaged and then like "the gun that was not loaded" they become dangerous with careless handling.

It is unquestionably better practice to use bare feeders up to 300 volts and, until some insulation is developed com-

mercially that will withstand mine water better than the present rubber-covered wires, 500 to 600 volt feeders should preferably be installed bare and so located as to guarantee the greatest amount of safety.

In general, it is recognized that electricity as a motive power has come to stay in the mines of the United States and it is desirable that more uniform practices be obtained and a greater degree of skill be employed in its use and in deciding questions of moment pertaining thereto.

Coincident with the adoption of uniform standards in installation and operation, steps should be taken to provide the state mining departments with men especially skilled in the use of electricity in the mines.

The action of the Technologic branch of the U. S. Geological Survey in endeavoring to obtain the most skilled man possible to assist in their investigations, is one which could with profit be followed by the State Mining Departments. The Federal Government cannot render too much aid in the researches they are making. On the other hand, the states should be equipped with the best talent possible to interpret these results and apply them to every day decisions in the field where they are endeavoring to safeguard life and property.

A Brief Statement of the Rising Importance of the Rare Element.

BY DR. HERMAN FLECK, PROFESSOR OF CHEMISTRY, COLORADO SCHOOL OF MINES, GOLDEN, COLO.

A glance at the list of elements quickly reveals the fact that in the last two decades the term "rare metal" has gone to the scrap heap along with "catalytic action" and some other terms familiarly purred twenty years ago. Nor does the reason lie in the fact that twenty years ago the great thinking chemists abroad were deploring the rage of organic chemistry endowed with its beautiful exactness of analogy. What exponents of inorganic work there were, contentedly chose the familiar paths and carefully avoided the stubborn rare element. At that time some of us recall the childish wonder excited by the properties of aluminum, just emerging from under cover of the Castner process, soon, however, to be placed together with every-day matter by the rapid use made of this metal and the birth of the modern electric furnace, which produced it cheaply and in large quantities. Aluminum was a rare metal in those days. Boron, silicon, titanium and chromium metals were very rarely seen except in museums, and tungsten, molybdenum, vanadium and uranium were simply names which glorified their discoverers.

A remarkable change has taken place since then; a ton of tungsten metal or vanadium metal is bought and sold with the stolidity which marks an ordinary trade and no one is astonished except the one who at an earlier period was taught to hallow these names.

Since then the world has become "light mad"; the "speed mania" demands tougher and more resisting steel and still tougher and more resisting tools with which to work it; a keen grasp of the economical plan of building upwards instead of sidewise demands a structural iron of hitherto unheard of qualities and the electric furnace and thermit process have made such things possible. Thus van-

ishes the fear of the purists of the past. In various ways inorganic chemistry has again reached its high pedestal and not least among the causes for this is the utilization of the rare metals which are now found in astonishing quantities. Among the first in the rank of deserters was the element zirconium. Its use in the modified Drummond light is now a matter of historical interest.

The importance to the coal gas industry of the discov eries of Auer von Welsbach may be summed up in the statement that it assured a new lease of life for this product as illuminant. The rapid progress of electric incandescent lighting had already begun to make inroads on this industry. In principle there was nothing new, for it was well known that certain substances like lime, oxide of zirconium and platinum glowed with brilliancy when a hot flame impinged on them. Welsbach's real service was the conception of the mantle glower, which now consumes immense quantities of monazite sands, which replaced the less extensive thoria earths of Norway first used. Nitrate of thorium is the base of this product. In a few years the price of this article fell from $200.00 per pound to about $4.00 per pound.

In 1906 the monazite output of the United States from the Carolinas was 846,175 pounds sand, valued at $152,312, corresponding to a price of 18 cents per pound. In 1907 the output was smaller and brought about six to eight cents less per pound. The thoria contents vary from three to nine per cent. The area of production is 3,500 square miles and includes eleven counties in North Carolina and seven in South Carolina. In addition to this there is a large Brazilian output, controlled by German capitalists.

The by-products from the thoria extraction have as yet not found much commercial application, but at present liberal quantities of these are offered research workers whose results will no doubt soon dispose of them with profit.

What Welsbach did for gas, Dr. Walther Nernst has done for electricity. Nernst's first patents appeared in 1898, but the Nernst lamp as it is now manufactured by the thousands, is the result of several years' work after this

date. The principal of the lamp depends on the conductivity of a filament of rare earth oxides at a temperature of 600 degrees Centigrade. To fit the filament for the passage of the current then, a device is necessary to bring it to the proper temperature. This is done by means of an attached platinum wire whose resistance to the current heats the filament, which then glows. Thereupon the initial conductor is automatically shut off.

To prepare this filament the earlier patents state, eighty parts zirconium oxide, ten parts erbium and ten parts yttrium oxide are prepared with clear starch into a plaster, which is then pressed into filaments and baked. To supply the materials for these filaments, zircon and gadolinite are used. Zircon is obtained from the deposits in Henderson county, North Carolina, and the gadolinite is obtained from the deposits occurring in a pegmatite dyke at Barringer Hill, Llano county, Texas. The property now belongs to the Nernst Lamp Company of Pittsburgh, Pennsylvania.

A new kind of steel came into use in 1900. This is known as high speed steel, which has the following advantage over ordinary carbon steel. The ordinary lathe tool made from the latter, when working on mild steel, wrought iron or soft cast iron, will not endure a speed of over fifteen feet per minute adjusted to standard cut. But an addition of 1 to 3.5 per cent of chromium and 5 to 17 per cent of tungsten or of tungsten alone will permit a speed as high as ninety feet per minute, at which point its temperature will verge on the dull red heat. The economical advantage of such a product, which depends on the metal tungsten for these qualities, are at once appreciated. Tungsten finds some minor uses in the arts. The fine colors of the compounds of tungsten, so-called tungsten bronzes and the variegated shades of the different states of oxidation of tungsten are made use of in form of pigment and glaze or glass coloring material respectively. By far the greater demand for the metal is that of the tool steel manufacture For this purpose the raw material, chiefly wolframite, produced in the United States in 1907 amounted to 1,640 tons, valued at $890,048.00. Boulder county, Colo-

rado, produced most of this, while smaller amounts were produced in California, Arizona, Montana, Nevada and Washington. This raw material represents in round numbers about 650 tons of tungsten metal.

The metal appears in two forms on the market, namely, tungsten powder and ferro-tungsten. The former is made by a complicated chemical process, as a steel grey powder, and is preferred in Germany and America. English manufacturers prefer the ferro alloy, which ranges in tungsten contents from 25 per cent to 75 per cent. This is made usually by direct reduction in the electric furnace. Aside from cost and greater tendency to oxidation of the powdered form, there appears to be little choice.

Molybdenum is a fellow to tungsten. It is used for practically the same purposes, but in tool steel composition it replaces tungsten metal about one to two.

Molybdenum is marketed in the form of the two minerals, molybdenite, the sulphide ore, and the wulfenite, or lead molybdate. The first is the more important and strongly resembles graphite in appearance. It occurs disseminated through the crystalline rocks, principally granite, gneiss and seyenite. The New South Wales deposits have been prominent in their production. Wherever the mineral is disseminated in form of films in the rock seams, and this appears to be by far the greater kind, the concentration of it has so far proved unsatisfactory. The metallurgy consists of the preparation of concentrates by hand sorting, air blast, oil or electrostatic methods. The metal and its ferro alloy are made by reduction of the oxide which results on roasting.

Sources of molybdenite in the United States are the deposits at Crown Point, Chelan county Washington, and at Cooper, Washington county, Maine.

And finally, heralded as the specific for the ills of iron, comes vanadium.

This element occurs quite widely distributed. In fact, it has been discovered in traces in many of our metamorphic rocks. Many clays and iron ores contain it in appreciable quantities and the ashes of coal carry it so frequently that some speculation has arisen over the part vanadiferous coals

play in the origin of known vanadium deposits. The superior qualities belonging to Swedish steel are said to be due to a small quantity, .05 per cent, of vanadium. In concentrated form, however, vanadium occurs in few localities, the most important of which is that discovered in 1906 at Minasragra, Peru. In the cretaceous sedimentaries there occur a series of eruptive dykes which at the point of greatest frequency show outcrop so far traced for about 400 feet. The ore body is about eight feet thick and contains vanadium to the extent of about sixteen per cent in form of sulphide, named patronite. The supply is reported as inexhaustible and yet vanadium alloys cost $5.00 per pound of vanadium present There is good opportunity at this price for competition from domestic ores, notably the large deposits of vanadium mica at Placerville, San Miguel county, and the large bodies of uranium-vanadium ore carnotite of San Miguel and Montrose counties, Colorado, and Grand county adjoining in Utah. At Placerville the ore occurs as roscoelite, vanadium mica, in the La Plata sandstones above the lime stone. The ore is readily sorted to contain about four or five per cent vanadium oxide. So far it appears that the treatment of this ore and carnotite has not met with success. France imports considerable vanadium in form of ramirite an arseno-phospho-vanadate of lead, from Charcas, state of San Luis, Potosi, Mexico.

The metal is silvery white, has a specific gravity of about 5.6 and its melting point is higher than that of platinum. Its use in the Siemen's glow lamps has been recorded. By far the greater amount of vanadium is made in form of ferro-vanadium, an alloy of approximately two parts of iron and one part of vanadium. This alloy melts readily and is easily incorporated into fluid steel, on which first and foremost it has a cleansing action. A strong affinity for oxygen and nitrogen, the occlusion of which is now realized to exert a powerful influence on the physical properties, cleanses the iron of these poisons and sweeps them with part of the vanadium into the slag. The remainder, a quantity usually not greater than two-tenths of one per cent, is assimilated

and the combined effects show a remarkable rise in the elastic limit, resistance to wear under repeated strain and shock, known as fatigue. Illustrations of these superior qualities over other steels are the following:

A sample of vanadium steel was tested on a vibratory stress machine. Several samples of carbon steel all broke after 20,000 revolutions. The vanadium steel endured 100,000,000 and remained unbroken. The elastic limit of vanadium steel is about three times that of ordinary structural steel. The limits for tempering are made wider, an advantage readily recognized. Resistance to shock is shown in the following tests:

A sample of carbon steel withstood a blow of 11 ft. pounds. A sample of nickel steel withstood a blow of 14 ft. pounds. A sample of vanadium steel withstood a blow of 17 ft. pounds. With the shock made less violent but repeated, the carbon steel withstood 25, the nickel steel 35, and the vanadium steel 69 blows. Gradually raising the number of blows, but decreasing their intensity, the steel withstood 6,000, the nickel steel 10,000, the vanadium steel 67,000. Judicious admixture of chromium and vanadium or of nickel and vanadium show decided advantages over the metals used alone.

Truly this element may well be called the king among alloys.

Uranium has been given more attention in the last ten years than any other rare metal, and this is principally on account of its relation to radium and not its commercial aspect. Much study has been made of uranium with the idea of increasing its usefulness in the arts. As a ferro alloy its use has not met with encouragement but there is a good, steady demand for its compounds, the oxide and the sodium uranate in coloring glass and porcelain. To glass it imparts a fluorescent green tinge which indeed is a characteristic property of many uranium salts. Due to the formation of a velvety black oxide when reduced, its use in coloring porcelain black has been long known. The greater supply still comes from the Bohemian pitchblende from the

residues of which radium was produced in quantities of sufficient amount to make its study possible. Colorado is the chief producer of uranium in the United States. A shipment of pitchblende valued at about $25,000.00 was made not long ago from Gilpin County. Compounds of uranium and high grade ore valued at $50,000.00 have been shipped from the Dolores region of San Miguel and Montrose Counties. The ore there is the canary-yellow carnotite of which there is an abundance in form of low grade material. The recovery of the uranium and vanadium values from these deposits involves some fine problems.

Another rare element of rising importance to the iron industry is titanium which in the form of ferro alloys is manufactured by the Goldschmidt process. A small amount, .5% to 2%, introduced into both coke and charcoal iron materially raises the tensile strength. Titanium in form of oxide has been used quite extensively in the manufacture of artificial teeth into the composition of which it is introduced.

And still the introduction of the rare elements to practical use continues. Selenium recovered from the copper slimes of the electrolytic refineries sells at $2.00 per pound, and the demand is good. One plant disposes of about two tons per month. No doubt the peculiar property possessed by this non-metallic element, that of increased electric conductivity under the influence of light, is the basis of its use.

Tantalite and columbite are now eagerly sought for their tantalum contents and this is the result of the increased efficiency of the tantalum filament lamp, the invention of Dr. Werner von Bolton. The discovery and description of pure metallic tantalum are only a small part of the seven years of research which gave us the tantalum lamp.

The commercial values of other rare elements will force them into use from their obscurity and new properties of those now in use will increase their demand and output. The rare metal has a firm hold upon the attention of the miners and metallurgists and it enters the curriculum of the

technical school with a newer meaning not to be despised when placed beside the commoner ores and metals.

The author desires to express his thanks to the Vanadium Alloys Company of Pittsburgh, Pa., for the data on physical properties of vanadium steel.

Tariff on Zinc Ores.

BY S. DUFFIELD MITCHELL, CARTHAGE, MO.

At the annual session of this Congress held in November, 1907, at Joplin, Missouri, I had the honor to deliver an address upon this same subject. The same facts and arguments which were then announced can, in the light of a year's experience, be urged today with double force and effect in favor of an adequate specific duty on all zinc ores. While we have passed through a year's severe commercial depression and the zinc mining industry in Joplin has suffered cruel stagnation, we are confronted with the undeniable fact that but for imports of Mexican ore during the years of 1907 and 1908 a much larger percentage of our mines and mills would have been in continuous operation for the past year and the average ore prices would have been higher.

So convinced have become the operators of mines and business men of the Joplin district that certain smelters were seeking undue advantage over the domestic zinc miner in depressing ore prices by importing Mexican zinc ore, that they have organized the Zinc Ore Tariff Club, whose propaganda is to teach tariff on zinc ore by facts and figures. It is doing a splendid work and is reaching out in influence to the farthermost corners of the country.

The tariff case of the United States vs. Brewster, which one year ago was on appeal from the Board of General Appraisers before the Circuit Court of the U. S. at Laredo, Texas, was decided on April 21st, 1908. The government lost in every contention; the Board of General Appraisers was fully sustained. Briefly stated, the Court held that calamine (which under paragraph 514 of the Dingley Bill is admitted free) includes both the silicates and both the carbonates of zinc; that calamine, therefore, is not only the hydrosilicate of zinc, as contended for by the government; that sulphide zinc ores are not dutiable under paragraph 183 of the said act, as "metallic mineral substances in a

crude state," because the free native metal is not to be found in the ore; and last that paragraph 614, which places on the free list "minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture," includes all zinc ores, because the quarrying of Mexican ores, the breaking apart by hammer the valuable ore and the waste rock and the sorting of the same by hand is not a process of **manufacture,** but is done merely for the purpose of reducing freight rates.

It is difficult to comprehend the mental processes used in reaching this decision; but as a final test of the question, the government has appealed the case to the U. S. Circuit Court of Appeals and the appeal is now pending at New Orleans, awaiting argument at an early date.

However, if the government should win in the Circuit Court of Appeals, the victory would be fruitless, either as affording revenue to the government or protection to the zinc mine operators. This is so, because 20% ad valorem duty on ore, valued at 10 or 15 dollars per ton is a delusion, viewed from either standpoint.

Last year I advocated a duty of 1 cent per pound upon the metallic contents of all zinc ores. Today I am thoroughly convinced that 1½ cents duty per pound upon such contents is absolutely necessary to lift the zinc mining business from the "slough of despond" and to establish it upon a plane of fixed and stable prices.

Last June I addressed the Engineers' Society of Joplin upon the general subject of Mexican ore imports and the zinc ore tariff. My "false conclusions" and "mis-statements" (to use his definition) were so marked as to require a public answer before the same society by Mr. A. B. Cockerill, of Nevada, Missouri. After his persuasive talk, it appeared that this country does not and cannot produce enough zinc ore to supply the smelters for manufacturing spelter; that the smelters were required to go to Mexico to secure the ore deficiency and until the domestic ore producers can materially increase their production, Mexican ore must be imported. Mr. Cockerill, however, admitted that Mexican ore can be purchased, relatively speaking, so

much more cheaply than Joplin ore, that there is much more profit in smelting it, than our ore. His kindly advice was to close down all our mines until spelter reached a sufficient price to enable the smelter to pay us $40.00 base price. In view of the fact that he proposed to continue the importation of his Mexican ores the "gall and worm-wood" of his proposition were at once so apparent to the local ore producers, that that night marked the birth of the agitation for a tariff on zinc ores. Mr. Cockerill's admissions, wrung from him most unwillingly, were the most potent arguments that any one had advanced, that an adequate specific duty on zinc ores is absolutely necessary if that great industry is to survive and prosper.

The claim of the smelters that for the first half of the year, 1908, the depressed ore prices were due entirely to the large stock of surplus spelter carried over from the year 1907 may well be true, but the surprising fact is, that the tonnage of that surplus almost exactly equaled the tonnage of spelter derived from all ore imported during the year 1907. The difference was less than 249 tons. In other words, foreign ore produced 26,115 tons of spelter and the surplus stock was 26,364 tons, according to the U. S. Geological Survey. The Engineering and Mining Journal and the U. S. Geological Survey both agree upon the main fact of this proposition. The conclusion is therefore irresistible, that had there been no importations of foreign ore, either there would have been no surplus stock of spelter to bear domestic ore prices, or the domestic mines would have been operated to produce that surplus. Thirty thousand tons of surplus spelter would have required the production of 60,000 tons of Joplin ore. This would have kept all our mines running single shift for twelve weeks. As about half the mines were operating all last winter and spring, it would have kept all our mines running all that time, and our miners and employes well employed. With the conditions of other zinc mining districts of the U. S., other than Joplin, I am not familiar.

This district is essentially a "poor man's camp." The

poor man began in 1873 to develope the zinc mining industry and with what marvelous results!

From 1873 to 1894 the district produced 1,399,720 tons of zinc ore valued at $26,520,727, and prior to 1890 the Joplin district produced 425,000 tons of lead, whose value I have been unable to ascertain. These were the days of rich pocket formations; shallow diggings; crude mining methods; and low ore prices.

From 1895 to 1899 the district produced 967,339 tons of zinc ore and 139,695 tons of lead ore of a total valuation of $30,194,760.

From 1900 to November 8th, 1908, the district produced 2,490,828 tons of zinc ore of the value of $82,984,563 and 304,682 tons of lead ore worth $17,679,708. In other words, according to records of actual values above given, this remarkable district in 35 years has dug from the earth lead ore and zinc ore values of over $157,000,000, and it is safe to say that the ore values exceed $175,000,000.

It is a surprising statement to make, but it is nevertheless true, that for the years 1906 and 1907 the value of the ore production of the Joplin district exceeded $15,000,000 for each year and the value of the gold production for 1906 of California was only $18,800,000.

In place of the horse "hoister" and the hand jig of the early days, and of the diminutive 75 or 100 ton mill of ten years ago, we have today the 250 to 500 ton mill, equipped with air compressor plants, machine drills, high speed hoists and all the elaborate machinery to effect the closest saving of ore values. Then, too, a minute system of accounting is kept and costs are properly divided and kept down to the lowest figure. This modern milling and business practice is now necessary, because the bulk of our mines are in the hard "sheet ground."

When the rich shallow pockets were mined the life of them was vexatiously problematical. The owner might be "in clover" this week, next week nothing but blind walls might be seen.

With the sheet ground deposits, the proposition is different. They are vastly extended bodies of lower grade ore.

By the use of a churn drill, the operator can prospect his land and he usually finds the ore covering a large area. But he must be contented with ore which will mill from 4 to 6 per cent. of concentrates.

The sheet ground deposits have been largely developed from the year 1904. Their development was stimulated by the high prices offered by the smelters the latter part of 1904, the whole of 1905 and the good prices of 1906 and the first half of 1907.

Today and in the future the sheet ground deposits must be the "back-bone" of the Joplin zinc ore production. It is probable that these deposits are practically inexhaustible.

Menace of Mexican Ore.

What is the menace of Mexican zinc ore importations? It is what the future has in store for us, compared with what the past has shown. Competent judges who have visited the field, affirm that a territory 600 miles long and 50 or more miles wide, is rich in all zinc ores. A prominent smelter official says that a million tons of sulphide zinc ores in Chihuahua alone can be developed and soon placed upon the market. The carbonate deposits are practically inexhaustible. All that is needed is the conquering hand of man, to develop these vast mineral resources and build lateral railroads to make them immediately available to the U. S. smelters. American capital will readily furnish the financial sinews of war.

What has been the manace of Mexican zinc ore? In 1905, 41,000 tons were shipped to the U. S.; in 1906, 90,000 tons; in 1907, 108,000 tons; and in 1908 almost 50,000 tons, a grand total of almost 290,000 tons; this ore averages about 40% metallic contents. Translate that into 60% Joplin ore. We have 192,000 tons. The average Joplin ore price for the years 1905 to 1908, inclusive, has been about $42.00 base for 60% ore. That means that had the Joplin district been required to produce that ore, it would have required 32 weeks to do it; that the ore would have been worth over $8,000,000, in point of production to this district; that labor would have received about $3,600,000 more in

wages; and, assuming that the average man works 300 days per year at a daily wage of $3,00, it proves that 4,000 miners have been unemployed for one year and that 9,000 to 12,000 dependents have suffered a skimp livelihood, for the benefit of the Mexican "greaser."

The above figures of Mexican zinc ore imports are taken from Mineral Industry. They are gleaned from reports given by the smelters and in some instances largely exceed the government official figures. Can it be that large quantities of zinc ore are invoiced as lead ore; are so imported and classified; and are paying a paltry duty under paragraph 181 of the Dingley Act upon the insignificant lead contents only?

The Possible Menace of the World's Production of Zinc Ore.

Last year I took occasion to call attention to the large zinc ore contents in the tailing piles of the Broken Hill District of Australia and stated that it was estimated that the holdings of the "syndicate" would produce 900,000 tons of zinc ore. Mineral Industry for 1907 at page 917 states that in 1906 that district exported 103,665 tons of concentrates and in 1907 the export was 237,218 tons. This ore went to Europe; but with low water charges there is a chance that the U. S. may offer a profitable market.

Along the Cape to Cairo railroad in Africa are deposits of zinc ore which rival in some ways those of Mexico. A writer in a recent publication described the hills of lead and zinc, which "rise right up out of the plains like mounds, each independent of the other." He described seven in sight of Broken Hill Camp, in Australia. In one, the lead in a tunnel is 58% pure and the zinc over 8%. Another hill is ninety feet high and about 300 feet in diameter, and it contains ore of zinc containing 35% to 40% metal. It is estimated that the main body has over 400,000 tons of zinc ore, and that there are 300,000 tons more above the water level, which occurs sixteen feet below the surface.

These deposits of zinc ore are not likely at once to compete directly with our domestic mines; but the time may come when they may compete with Mexico in the markets

of Europe, and if Mexican ore be not shut out of the U. S., by a substantial tariff duty, the whole vast Mexican zinc ore deposits will be dumped into the U. S.

It is quite within the range of probability that the Australian and African zinc ores may seek a market in the United States.

This theory will be later developed. As showing the largely distributed areas of the world's supply of zinc ores, I quote at some length from Mineral Industry, 1907, at page 916:

"During the last few years, especially during 1906 and 1907, conditions have been developing in the zinc industry of the world, which are of supreme importance. This relates particularly to the enormous increase in the supply of ore offered to the smelters. New South Wales and Mexico, the former gradually and the latter suddenly, have developed into producers of the zinc ore of the first magnitude. The exportation of zinc ore in New South Wales in 1907 amounted to 237,218 long tons, against 103,665 long tons in 1906, and 103,000 tons in 1905, but going behind the face of the returns, it appears that there was a considerable increase in 1906 because of the better grade of ore produced, the estimated yield of spelter from the ore exported having been 33,427 tons in 1906, against 30,637 tons in 1905. American smelters received from Mexico 108,800 short tons of ore in 1907, against 88,900 in 1906, 32,164 in 1905, and practically none in 1904. Some Mexican ore also was exported to Europe. Besides these large new supplies, European smelters have been recently obtaining a good deal of ore from other new countries, such as Japan (where zinc smelting works are now being erected), China, and Turkey; while in 1906, a considerable supply of calamine ore of high grade was for the first time received from Rhodesia, where there appears to be large deposits, which will afford a steadily increasing output.

"This plethora of raw material has already had an important effect upon the world's market for spelter. For one thing, it has cut off all hope that the United States will soon

become an exporter of spelter. On the contrary, it is to be feared that, more frequently than usual, the price of spelter in the United States will have to be reduced in order to prevent importations, in spite of the protective tariff of 1.5c per pound. During the last three or four years the prices for spelter at London and New York have been showing a decreasing disparity. This is easily explained by the position of European smelters, who in the abundance of their ore supply are able on one hand to offer spelter at lower and lower prices, and on the other hand bid lower and lower prices to the miners for ore, preserving a large margin for smelting all the time. During 1906 the smelters' margin was so large that the business was unusually profitable."

These large zinc ore deposits are undoubtedly a menace in the future to zinc ore miners of the United States. Up to the present time, no ore has been shipped to the United States from either Australia or South Africa. The European smelters to the present time have been well supplied with zinc ore from their usual sources of supply. With immense production in these new fields the ore will be marketed at the nearest point of consumption. I am indebted to Mr. F. A. Jordan of the Continental Zinc Company of Joplin, Mo., who makes some suggestions very worthy of profound thought. Speaking of the Broken Hill district in Australia, he states that it is connected by rail with Port Pirie, distant about 240 miles and with Adelaide about 325 miles away. The freight from Broken Hill to Port Pirie on blende is $2.19 per long ton; and from Port Pirie to Swansea, Wales, it is $6.25, or a total of $7.50 per short ton.

Now, it is interesting to note the different distances to points of smelting the ore, with the thought of possible importations of these ores into the United States.

From Port Pirie to Swansea by way of the Suez Canal, the distance is about 10,350 miles and to New York City 11,030 miles. The distance directly to San Francisco is 6,400. Upon completion of the Panama Canal, the distance to the very center of the United States will not exceed two-thirds the distance from the Australian ports to Swansea.

Domestic Zinc Ore Producers Can Furnish Sufficient Ore to Supply Spelter Requirements.

Mr. Cockerill in his "Summary of Views," published in the Mexican Mining Journal for August, 1908, states:

"That if it can be shown that sufficient ore can be furnished in the United States to operate the smelters that are needed to make the spelter that is used in the United States, I will agree not to fight against the tariff on zinc ore."

He admits that my figures of 660,000 tons annual maximum smelter capacity are "approximately correct." He also said that even in busy times not more than 80%, or 528,000 tons, of this capacity could be operated, continuously throughout the year. Now, according to the Mineral Industry, 1907, page 904, the production of zinc ore in the United States for 1906 was 905,175 tons and that of New Jersey was 404,690 tons. The production for 1907 in the United States was 903,000 tons and that of New Jersey 368,710 tons. Of the New Jersey production I concede his claim:

"That practically all of this ore goes into the manufacture of zinc oxide, and if any of this ore goes into the manufacture of spelter, it is fully offset by ores from other districts that go into the manufacture of oxide at other points."

After deducting the New Jersey production from the total United States production we have for 1906, the sum of 500,485 tons and for 1907, the sum of 534,290 tons available for the manufacture of spelter.

Mineral Industry for 1907 at page 898 states that "In 1907 there was a large increase in the zinc smelting capacity of the United States."

The three smelters at Bartlesville, Oklahoma, including their 8,700 retorts were completed in 1907. These have a maximum yearly capacity of 65,000 tons of green ore and 80% of their capacity will require about 52,000 tons of ore for spelter purposes.

After deducting the Bartlesville increase of 52,000 tons of new smelter construction in 1907 from 528,000 tons of

smelter capacity, (conceded to be correct by Mr. Cockerill), we have an apparent smelter capacity for the year 1906 of 476,000 tons. Not to be too prolix, it will be found that the proposition may be thus stated:

Year.	Net Smelter Capacity.	Spelter Ore.
1906	476,000 tons	500,485 tons
1907	528,000 tons	534,290 tons

And to strengthen the producer's position, the three Bartlesville smelters are reported not to have started operations until the year 1908.

Mr. Cockerill further reiterates that in 1906, "the ore prices were certainly all right, and we were still unable to get sufficient ore in this country to run our works. If we had not been able to secure this ore in Mexico, the galvanizers, iron manufacturers and brass manufacturers would have had to ship this spelter from foreign countries, and the men laboring at our smelters would have been thrown out of employment because of our inability to get sufficient ore to run our works."

Within the period since 1901 there has not been a year when the Joplin ore producers did not have to resort to some expedient to stop falling prices and get rid of surplus ore in the bins. Sometimes ore was exported to Europe; at other times a large number of the operators closed down their mines and the employes were thrown out of employment. In July, 1907, with St. Louis price of spelter averaging $6.04 per hundred for the month the operators of the Joplin district inaugurated one of the most general and complete shut downs in the history of the district, which became effective on August 1st for sixty days. There are today in the Webb City district over 2,000 tons of ore produced before that time and since held for better prices.

Cost of Smelting Ore.

Mr. Cockerill at Joplin scouted the idea that the cost of smelting one ton of Joplin ore at a Kansas gas smeltery was about $8.00 per ton; but refused to divulge what is the actual smeltery cost.

But Mr. W. R. Ingalls, of New York, a member of the British Columbia Zinc Commission, goes elaborately into smelting costs, in Kansas, Illinois and Rheinland, Germany. He considers the following items in making up cost:

Labor, fuel, reduction material, clay and other supplies, repairs and renewals, and administration.

The result of his investigations is as follows:

A. Well designed Kansas smelter; mechanical roasters; gas at 2 cents per 1,000.....$8.00
B. Well designed coal plant, in Illinois, gas firing $9.50
C. Ordinary natural gas plant, in Kansas; hand roasting furnaces $8.50

He then states that "Zinc ore is being smelted today in spite of increased cost for both labor and gas, more cheaply in Kansas than it can be in Europe. Even with coal it can be smelted in the United States for approximately the same cost as in Europe, although it is hardly being done at the present time."

Based on a smelting cost of $8.00 per ton of the Joplin ore at the Kansas Smeltery we find that the smelters have profited on such ores in the following amounts for the following years:

Year.	Price of Joplin Ore.	St. Louis Spelter.	Smelter Profit.
1906	44.82	6.04	8.78
1907	44.36	5.81	6.90

This does not take into consideration the saving of by-products, the manufacture of sulphuric acid, etc., from which the smelters derive large profits.

The smelting business is a permanent manufacturing business. The mining business is vexatiously uncertain, even with the best of mines. To the unprejudiced mind, it would seem that the miner is entitled to a greater profit per ton of ore sold to the smelter, than is the profit of the smelter upon that ton of ore. Without question, the miner is not extracting his just profit.

The Just Demand of the Zinc Ore Producers.

The domestic zinc ore producers in their demand for an adequate specific duty on zinc ores are merely asking that their industry be permitted to survive and prosper. With no tariff duty on zinc ores, and with the future great development of Mexican mines and the marketing of their abundance of zinc ores at the smelters of the United States, but one result can happen—the absolute stagnation and paralysis of the zinc mining business in this country.

The zinc miners of the United States can never compete with the Mexican zinc miners; any more than our wool growers found they could prosper against the free importation of wool from Argentina and Australia during the existence of the Wilson Bill.

The living conditions of the Mexican miner; his abjectly low mode of life; the ease and cheapness of quarrying ore in Mexico; and the inexhaustible deposits of this cheap ore; all make for ruin to our domestic zinc industry, unless a legislative barrier be raised against Mexico, and the living conditions and wages of Mexican miners.

The vast deposits of Mexican zinc carbonate require but little labor and a minimum of powder to be blasted down from the hill sides. To use the language of four affiants in the zinc ore tariff case of U. S. vs Brewster, before mentioned:

"The ore occurs in solid veins or deposits and is blasted out. Any of the adjoining rock that may be, by accident, blasted out with the ore, is sorted out by hand. Afterwards the ore is broken down to a convenient size with hammers, for transportation to the railroad, where it is loaded in cars for shipment."

The stilted language "that may be by accident," is strongly suggestive, to say the least.

As against this simple mining method, we call attention to the report of ninety-two mining companies in the Missouri-Kansas district, made at the recent ways and means hearing, showing an average cost of over $37,000 in development of mine and construction of mill.

The Mexican miner can produce his ore and deliver it at the smelter in Kansas for from $11.00 to $14.00 per ton. The same cost in the Joplin district is about $37.75 per ton.

Now, Mr. Cockerill at Joplin stated that with the price of St. Louis spelter at $5.00 per hundred, he could purchase Mexican ore f. o. b. his Kansas smelter for $18.00 per ton. This ore assays 40% metallic contents. Figured on a 60% basis, the ore would cost him $27.00 per ton. That fixes the price of Joplin ore for all time to come at $27.00 per ton, if Mexican ore continues on the free list.

These statements necessarily prompt the inquiry:

What Is the Raw Material in the Zinc Mining Business?

The language of the above mentioned affiants proves that the bulk of Mexican zinc ore, delivered into the U. S. is a **raw material.**

It is the wool on the sheep's back, so to speak.

It is doubtful whether there is a zinc mine in the United States, where the ore is blasted down, hand sorted and reduced to "convenient size with hammers" and shipped to the smelters.

In the Missouri-Kansas district, the zinc ore, as blasted out in the mine, could not be sold to the smelters at any price. It contains but 3% to 6% zinc concentrates. It must be crushed, rolled, jigged, and the fine particles run over sliming tables, before the valuable concentrates can be placed in the ore bin, ready for sale to the smelter buyers. This process of concentration requires a most elaborate mill, involving a large investment of capital. It is necessary to rid the ore of the associated rock and sand, called the gangue. $25,000 is the moderate cost of such a milling plant; as against this the Mexican miner has no mill investment.

It is believed that throughout the entire zinc producing districts of the United States the same concentrating methods are used as are applied in the Missouri-Kansas field. It is, therefore, absurd to say that the domestic zinc ore concentrates are raw materials. Is the spelter derived from that ore, a raw material? Unless every product is a raw material, until it lands in the hands of the very ultimate con-

sumer, the domestic zinc ore is a highly manufactured article. It should be so treated by Congress in considering it as a lawful subject of protection by tariff duty.

Investments in Smelters.

The Census Bureau Bulletin, No. 86, for 1905, issued in November, 1907, gives some statistics relative to the zinc smelter industry which are valuable and which may be tabulated as follows:

	1900	1905
Combined capital	$14,192,000	$23,701,500
Wage earners	4,561	6,528
Wages paid	2,355,813	3,856,466
Material consumed	13,283,690	17,028,418
Products manufactured	18,188,774	24,791,299
Number of smelteries	31	31

The figures presented in the bulletin are only for the year 1905. From percentage of increase, noted for each item, it is possible to ascertain the approximate figures for the year 1900.

From the most reliable smelter sources I am confident that for the present period the following figures may be presented:

Cash capital invested in smelters (not including working capital) $10,000,000
Smelting capacity (daily) ..... 1,550 tons of ore
Wage earners employed 5,000
Products manufactured into spelter (annually) . 250,000 tons
Materials consumed (daily) $85,000
Smelting cost per ton of ore ..... $10 to $14

It is a conservative statement to make that in the Missouri-Kansas district alone employment is given to over 10,000 wage earners; and that the investment value of mining lands, mining leases, mines and mining plants, fully equals $50,000,000.

Add to this statement the number of men employed and the investment value of zinc properties in all other sections of the United States, and the statement must be most as-

tounding, compared to the number of smeltery employes and cash investment in smelters.

With the smelting business prospering; with the ore-producing business languishing; which interest should appeal to the policy of protection, based upon the number of employes involved, the profit of the business, and the ultimate good which can be dispensed to the greatest number of individuals, affected by a rational protective tariff?

What Has Protection Done for Lead Ore?

Consider what the Dingley Act of 1897 did for lead ore in affording a rational classification, so that all lead bearing ores paid a duty upon the lead contents, regardless of what other ore was the component material of chief value. Prior to the Dingley Act, if silver lead ore contained greater money value of silver contents than lead contents, the whole importation was classified as silver ore and came in duty free. This method of classification worked a great hardship to the United States lead mines; they were at the mercy of the Mexican lead miners; it was said in 1897 that:

"The large supply of silver-lead ore in Mexico enables that country at present to control our market. For as soon as the price of lead reaches a point that the manipulators of Mexican ore consider favorable they put upon the market all the lead it can make to prevent any such increase in the price as will protect our home industries. They thus hold the power to keep down the industry absolutely and to limit any tendency in upward prices. This power they used in the calendar year 1895 to the extent of putting on the market 20,000 tons of lead from Mexican ores, and 27,000 tons of lead from Mexican bullion."

It was complained that in 1896 the official price of lead at New York City touched the lowest point ever recorded there; i. e., 2½ cents per pound and for a considerable time the New York price was on a par with the London price. As soon as the Dingley Bill was passed lead went up to $4.40 in 1897; $4.75 in 1900; and $6.25 in 1905.

The Dingley Bill not only stimulated the prices of lead, but it likewise encouraged domestic production and de-

creased importations from abroad. Taking the seven years before the passage of that law and the seven years subsequent to its passage, it will be found that during the latter period lead ore imports decreased 45% and domestic production increased 55%.

Some of the opponents to a tariff on zinc ore declare that it will not increase the domestic price of the ore; that is diametrically opposed to the usual arguments that a tariff duty creates a domestic price, of the foreign price of the commodity plus the amount of tariff duty. What a protective duty has done for lead ore, we believe it may do for zinc ore. In June and July, 1908, the government reports showed that Mexican lead was being delivered to the border ports of entry at the price of $36.07 per ton, and lead was selling in the Joplin district for $60.00 per ton. Why the difference? Simply because a tariff duty of $24.00 per ton of 80% lead contents kept up the domestic price. And let it be said that the good price for lead ore during a large part of the summer has worked a great benefit to the Joplin district, and has enabled many zinc mines, which were respectable producers of lead ore, to operate at a profit and give employment to many miners.

Legislation Required.

Now, the question is, shall the zinc ore producers of the United States bend the knee to Mr. Cockerill and take $27.00 per ton for zinc ore (which is entirely out of the question) or shall we insist upon and get such legislation from Congress as will protect zinc ore at least to the amount of difference in cost of producing a ton of Mexican ore and a ton of domestic ore? This difference is about $18.00 per ton. The legislation urged before the Ways and Means Committee at Washington last week was designed to accomplish that result. It provides in substance that all imported zinc ores shall pay a duty of 1½ cents per pound on the "zinc contained therein."

This duty would make Joplin zinc ore worth a $45.00 base price. At that rate 3 and 4 per cent. mines in this district can operate at a profit.

The smelters during the year 1905 paid an average base price of over $47.40 per ton for Joplin ore and received an average price of $5.73 per hundred for spelter. They must have prospered at that ratio between ore and spelter because throughout the entire year of 1906, a large increase of smelter capacity was taking place.

We believe that our demands are just, that our cause will prevail before Congress; and that the sunshine of prosperity will then prevail over the zinc ore mining districts of the United States.

In so doing, our united effort is directed to the end that the following provision, in relation to lead and zinc ores, be placed in the new tariff bill, to be considered by the 61st Congress:

Lead bearing ore of all kinds, one and one-half (1½) cents per pound on the lead contained therein; zinc bearing ore of all kinds, one and one-half (1½) cents per pound on the zinc contained therein;

Provided, That all ores imported which contain both lead and zinc shall pay one and one-half (1½) cents per pound on the lead contained therein, and also one and one-half (1½) cents per pound on the zinc contained therein; and

Provided, further, That on all importations of lead bearing ores and of zinc bearing ores the duties shall be estimated at the port of entry and a bond given in double the amount of such estimated duties for the transportation of the ores by common carriers bonded for the transportation of appraised or unappraised merchandise to properly equipped sampling or smelting establishments, whether designated as bonded warehouse or otherwise. On the arrival of the ores at such establishments they shall be sampled according to commercial methods under the supervision of government officers, who shall be stationed at such establishments, and who shall submit the samples thus obtained to a government assayer, designated by the Secretary of the Treasury, who shall make a proper assay of the sample, and report the result to the proper custom officers, and the import entries shall be liquidated thereon, except

in case of ores that shall be removed to a bonded warehouse to be refined for exportation as provided by law. And the Secretary of the Treasury is authorized to make all necessary regulations to enforce the provision of this paragraph.

Arbitration as a Factor in the Mining Industry.

BY JUDGE GEORGE GRAY, WILMINGTON, DEL.

Since my recent letters explaining the impossibility of my complying with the many kind suggestions that I should attend the coming session of the American Mining Congress, December 2-5, and say something on the subject of arbitration as a factor in the mining industry, it has occurred to me that I might add to my former letters some expression of my interest in the occasion and in the general subject of arbitration, as the means of assuring industrial peace.

I gladly recognize the increasing public interest in this subject. No real advance in the civilization of modern times has been made, unless it be the result of aroused public attention and that intelligent and free discussion for which popular institutions give the greatest opportunity. Such results must needs be of slow achievement, and human nature is so constituted that time and use are necessary to intrench them in the hearts of the people and make them permanent parts of our social structure, to be accepted without challenge or question. We have, then, no reason to be discouraged, much less to despair, of the progress made in very recent times in the cause of arbitration for the settlement of industrial controversies. We have just cause, as American citizens, to be proud that our country has led the way in commending International Arbitration to the Family of Nations as a substitute for war, in the settlement of International difficulties. Our example has slowly, but measurably, influenced the diplomacy of the world, and I believe we can confidently look forward to a fast approaching time, when resort to the World's Tribunal at The Hague would be the first, and not the last, thought, on the occurrence of International difficulties.

It seems amazing, when we take a backward glance at the history of even modern times, that humanity should

have been subjected to the suffering and material and moral havoc wrought by what now seem unnecessary wars, and we rejoice that much of this is now made impossible by the clearer recognition of the truth, that there are few International difficulties that cannot be more satisfactorily adjusted by peaceful arbitration than by resort to war.

The analogy between International Arbitration and Industrial Arbitration is not an unnatural or forced one. The widespread suffering, material loss and moral deterioration wrought by obstinate and uncompromising industrial strife, in comparatively recent times, are caused by the same obstinate pride of opinion, the same cruel tyranny exhibited in the desire of individuals or classes to work their arbitrary will upon others, and the same blind disregard of all interests, save those of the parties to the controversy, as have characterized most International Wars. In the one case as in the other, all intelligent men must agree that a settlement of the difficulties which were the origin of the war or the strike, by the arbitration of an impartial and intelligent tribunal, would have been infinitely more satisfactory to the parties concerned, and would have, in addition, saved all the frightful cost, both moral and material, of the other alternative.

In most cases—I will not say in all—objections to arbitration, in the settlement of industrial controversies, spring from the baser—not the nobler—passions and feelings of our nature. Arbitration is an appeal to reason and conscience; its alternative an appeal to brute force. To the latter, no American willingly submits. A just cause need not fear to submit itself to the judgment of intelligent and impartial men. The maxim, that no man is a good judge in his own cause, is true in labor controversies as it is in other human affairs. But, whether the cause on either side is just, or whether justice lies not altogether on one side or the other, can never be determined by force, and a sober public opinion will never be satisfied or conciliated by such determination, nor in the large majority of cases by the refusal of either party to such a controversy to submit to fair and impartial arbitration.

These sentences sound like platitudes; so obvious are they, that one hesitates to seriously argue them. They surely commend themselves to all right thinking minds. Nevertheless, it remains true, that in this matter, as in others, things obviously true and obviously for the betterment of human conditions are often most slow in gaining that universal acceptance that renders them useful in the practical affairs of life. Time and use will insure this general acceptance, and it only needs that both sides to a strike situation should realize the importance—nay the duty—of at once submitting the questions that seem incapable of solution by the parties themselves, to the arbitrament of an intelligent and unbiased tribunal.

I am speaking here of voluntary, not compulsory, arbitration. To the approval of the latter, I have not yet been able to reconcile my own judgment. We welcome the former, not only as a settlement of serious and dangerous controversies, but for the self control and civic virtue which it evidences and promotes. No one, who witnessed as I did the development of mutual respect and high courtesy on both sides of the controversy, throughout the daily sessions of the protracted hearing by the Anthracite Coal Strike Commission, and the ability and fairness with which the argument on both sides was conducted, could fail to have been impressed with the dignity of the occasion and the disciplinary influence upon operators and miners alike, of the voluntary submission of their questions of difference to an arbitral tribunal. Nothing occurred to disturb the calm atmosphere in which reason and justice can best assert themselves.

We are not without evidence that an intelligent public opinion is maturing on these lines, and by its moral coercion will compel the adoption of this course in serious labor difficulties, where real questions present themselves requiring careful investigation and the calm exercise of the judicial faculty for their determination. I do not, of course, mean that every small difference of opinion, disappointment or caprice, entertained on one side or the other, by employers

or employed, should be the occasion of an arbitration, or that the personal liberty of men to work or not work, or reasonably to control their own business, should ever be brought into controversy; but where the situation is complex, out of which the alleged grievances arise, and the attitude of each party is that of obstinate adherence to its own demands, arbitration alone can satisfy the ends of justice.

To this end, in so large and widespread an industry as that of mining, Miners' Unions become a necessary factor. And this leads at once to the thought that such unions should be encouraged, and not discouraged, and their better organization and leadership be insured by the hearty sympathy of all parties, operators as well as miners. It is a mistake to suppose that the highest ideals of citizenship are not compatible with membership in such organizations. They were not intended to be nursing mothers of anarchy and lawlessness, but rather the promoters of civic righteousness and justice. And if I might say a personal word to the members of these unions, I should say what I have said before, let your societies illustrate not only your intelligence and courage in times of prosperity, but also in times of adversity and gloom. Brave men are brave everywhere and at all times, and wise men should not lose their wisdom and self control when things go hard or wrong. Religious obligation and common manhood alike require us to meet adverse circumstances with fortitude and patience, and to not seek to tear down and rend, because want and suffering may, in the vicissitudes of life, come for a time to our hearthstones. Hard times are bound at intervals to come, but envy and jealousy and all uncharitableness will not mend them. Rather believe that all interests and all conditions of men are bound together by a common humanity and a common sympathy, and the charity of judgment you exhibit to others will return to you in ten fold blessing from those towards whom you exercise it. Your personal and individual liberty can only be secure in the willing and generous recognition of the like liberty of your neighbor or fellow-citizen. The homage you pay to his, is the title deed and assurance of your own. Believing thus and acting

thus, you can fearlessly demand for yourself that justice, the love of which is implanted so deep in the human heart.

This is the burden of my thought, which I should have been glad to have amplified, could I have availed myself of the invitation you so kindly extended to me.

Arbitration as a Factor in the Mining Industry.

BY THOMAS L. LEWIS, PRESIDENT U. M. W. OF A., SPRINGFIELD, ILL.

We have assembled here as the representatives of the greatest industrial nation in the world. We owe our industrial and commercial greatness to our valuable coal deposits and our ability to produce cheap fuel.

Every citizen of this country should be interested in the coal mining industry, not because it is the foundation of our industrial greatness, not because it is the life blood of our commercial supremacy, not because it produces the heat and light that bring comfort and happiness to the home of millions of people, but because the occupation of the miner is the most hazardous of any in the country, with the single exception of those employed in the powder mills. The work of devising some method to better protect the lives of the mine workers is worthy the serious consideration of all men and women who are interested in the material welfare of humanity.

We have also met for the purpose of considering many questions that vitally and directly effect the mining industry and those employed in or associated with its development.

To me has been assigned the subject "Arbitration as a Factor in the Mining Industry."

This subject has a peculiar application to the coal mining industry for the reason that arbitration has done more than strikes to promote the welfare of the miners and to give stability to the industry.

As we understand arbitration in its application to the mining industry, there are two kinds—the one kind of arbitration is where the representatives of the two parties to a controversy disagree and call upon a third person to settle their differences. The other kind of arbitration is where the representatives of the two parties to a dispute settle their own differences without calling upon the third person.

Time will not permit of a detailed explanation of the

difference in the two methods of arbitration or their effect upon the mining industry. I shall briefly explain the difference and which is to be most desired as a factor for permanent peace between employer and employe.

First. The method of arbitration requiring the selection of a third person to settle differences between contending parties, does not permanently settle an industrial dispute, neither does it give satisfaction to the parties directly interested.

To illustrate: The real merits of the question at issue are not considered for the reason that the umpire is usually selected, not because of his personal knowledge of the many details of the dispute to be settled, but because of his impartial mind, honest purpose and the desire that he shall deal with the questions in dispute from a general rather than a technical standpoint. His decision for this reason must necessarily be general in character and usually a compromise.

In the great anthracite coal strike, we have one example of such arbitration. The members of the anthracite coal strike commission were among the most eminent and intelligent men of our country. No one questions their sincerity of purpose, their desire to arrive at a correct solution of the questions in dispute, and every one realizes that they worked honestly and faithfully to solve the problem that caused the greatest industrial conflict in the history of the country.

The decision of the Anthracite Coal Strike Commission was a compromise and in its application to the wage question, it did not give to the anthracite employes an equal advance in wages. This was no fault of the work of the Commission, but rather a fault of the conditions under which the anthracite mine workers labored. For this reason the problem has not been permanently settled in the anthracite coal field.

In Alabama at a later date we had another instance of this kind of arbitration to settle disputes in the mining industry of that state. It was known that the miners' representatives in presenting their evidence to the arbitration

board practically won every demand they made and the umpire, Judge Gray, decided most of the questions in favor of the miners. Some of the questions at issue were compromised. This did not permanently settle the differences, because the following year the operators repudiated the entire work of the arbitration board and made war on the miners.

Second. The other kind of arbitration is where representatives of the parties to a dispute meet in conference and present their propositions and support those propositions with the facts and decide the questions at issue on their merits. This method of arbitration has been a powerful factor in promoting peace in the mining industry, settling differences between employer and employe without resorting to strikes, and giving that stability to the mining industry which it cannot secure or maintain in any other manner.

This method of arbitration depends for its success on several essential elements:

(a) Employer and employe must recognize each other's rights as a factor to the development of the mining industry.

(b) That any demands made must be supported by facts or there is no reason for attempting to sustain them.

(c) That passion and prejudice must give way to reason and intelligence in the presentation of claims by either party.

(d) That final conclusions must be reached by the unanimous consent of all representatives in the conference. This feature protects all parties and requires each to be cautious and to proceed with negotiations in an intelligent manner.

This method of arbitration has materially advanced the wages of the mine workers in most of the mining states of our country. It has lessened the hours of labor and improved the conditions of employment. More important than these, it has established a better relationship between the employer and employe and has been the means of educating thousands of mine workers to take a keener interest in their rights and duties as citizens of this country. It

has also been an incentive for mine workers to locate permanently and own their own homes.

This latter feature alone is one of the strong endorsements of this kind of arbitration as a factor in the mining industry.

The system is not without its weaknesses. It has not always been a complete success, but it is the most successful method of arbitration that we know of as a factor to establish and maintain peace between employer and employe in the mining industry.

As one party to the development of the mining industry, the miners demand nothing that they are not willing to concede to the employers. We seek no special favors either from the mine owners or the American people.

Equal rights and opportunities are what we want and we will not be satisfied until we have succeeded in bringing into joint conferences the mine owners of the country. Give us this system of arbitration and we will be able to demonstrate our ability to establish industrial peace so far as it affects mining. By this method we will solve many of the problems that now seem to perplex even this Mining Congress.

Problems of the Coal Industry.

BY ALEXANDER DEMPSTER, OF PENNSYLVANIA.

The subject upon which I am to speak is "Problems of the Coal Industry." That is another name for the discussions and papers which you have heard, because they are all applicable to this point, the problems of the mining industry.

You have heard one discussion from our good friend Mr. Osborne, who has just taken his seat, on the conservation of our coal. There is no one who is more interested in this district or anywhere else than is the gentleman who has just taken his seat. He is a large operator and deeply interested, and so far his interest lies in the conservation of his coal fields, and what is true of him is true of every other operator in this or any other district. It appeals to every owner to conserve his interests by saving or stopping waste. When coal was so cheap as it was fifty years ago, it was a matter of a comparatively small amount of money to leave coal in the ground, which was done at that time, and is done to a certain extent to-day, because of—I was going to say improper mining—but that is gradually being overcome, and soon will come the time when we will take out at least 90 per cent of the coal in the ground instead of the percentage which we now take. Some may be getting that amount now, but not a large number.

Mr. Chairman, I do not intend to discuss any theoretical problems. I want to make a few remarks on the questions that more nearly concern us, and on an issue as brought before us yesterday, which has been brought before us before, and has been before us to-day, the establishment of a mining bureau. There are various questions that are important, among which are what shall be the province and scope of that national mining bureau which is being established. We listened to a discussion this morning somewhat on the lines of what was national and what was state terri-

tory. Mr. Harrison read his paper raising that question, but without, I think, at least so far as I heard, making any positive recommendation relative thereto, or taking sides thereon. I will raise the question, Mr. Chairman, not for the purpose of doing more than calling attention to it. Now what shall be the scope of that national bureau proposed to be attached to the Interior Department? Shall it be that of investigation and dissemination of knowledge that they acquire or shall they go on further and extend suggestions that will include supervision of mines by the national Government instead of the state? That is the question that concerns a good many coal men, and it will have to be carefully guarded as to the line of demarkation or limitation, if you please, between the state and the national authority. The state, having charge of its police regulations, must have and will have charge of the mines. What I suggest is that you get Brother Holmes, and the others who are interested (among which I myself am one) to see that this law be so framed that there can be no misunderstanding, no ambiguity, no words that can be misconstrued afterwards into a conflict between the two.

Mr. Chairman, I have been somewhat disappointed in the discussion of this branch of our subject before this Congress in listening to the eulogies of the theory and passing by the practical and the facts. What I mean by this is that there has not been sufficient importance attached to, nor sufficient notice taken, of what has been done, for example, in the state of Pennsylvania, by the operators, for the very purpose of accomplishing that for which this bureau is to be established, according to the light they had. The province of this bureau is to secure more light and to disseminate it for the benefit of those who have charge of our mining department in the state of Pennsylvania and other states.

I want to say, Mr. Chairman, and I want it to go out from this convention, that the mining department of the state of Pennsylvania, through its chief and assistants, has exercised reasonable vigilance and efficiency in the supervision of mines and the intelligent application of the laws,

and, spurred by the accidents that have happened, it is now making, under the recommendation and appointment of the governor, such revision of the laws, the operation of which will be, if not the elimination of accident, at least its reduction to a minimum of probability. The new law will embody the up-to-date knowledge and most advanced information they can secure; said commission is more than receptive in its attitude relative to all the channels of any information coming from any sources. The state of Pennsylvania is doing everything it can to protect the lives and promote the welfare of its miners, and by so doing is going along the lines of action indicated here. And the province of this bureau is to secure further knowledge and disseminate the same throughout every state in the Union. There is a great deal in the mysteries of Nature that we do not yet know, and it is for these people to investigate such matters as will be for the benefit of humanity, and give it to our mining departments through the different states. There is the sunshine in the heavens, and it sheds its rays over all the earth. Here in the arsenal is the sun of science to shed its rays of whatever knowledge it may acquire in its investigation throughout the whole length and breadth of the whole mining region of the United States of America. (Applause.)

This to my mind is the proper province of the nation, and it is the duty of the nation to thus provide for the welfare of its people. Mr. Chairman and gentlemen, I want to say that I am not here just as a coal operator and representative of the coal operators. Whatever I may say that is worth saying belongs to me as a representative of the coal operators. Whatever I say that is irrelevant, incompetent or unwise belongs to me individually and not to me in a representative capacity. (Laughter.)

Inasmuch, Mr. Chairman, as I have no set speech, I am a little rambling, but I will try and get some thought in. A great deal has been said about accidents, and the relation that we bear to foreign countries in connection with accidents.

This question was considered so important, Mr. Chairman, that our Government invited foreign people to instruct us; and in a report teach us how to act and how to perform our duties to our miners, and we have been held up as coal operators in the light of having more accidents occurring here in America than occurred in foreign lands they represented, and that our mining conditions are not nearly so favorable towards the prevention of accidents as they are in those countries. Mr. Chairman, I will call your attention to an accident in Germany of a few weeks ago, to an accident in France of older date, as samples to show that the accidents that happen there under the jurisdiction of foreign governments which exercise authority over the mines are as serious as those that happen in this country. I have here a report of 1893, taken from a report that was made by some of our mining people, which shows that in Pennsylvania there were 3.84 average lives lost per million tons of coal mined. In Great Britain it was 4.15, in Germany 6.35, in France 6.56, in Belgium 5.71, in Austria 8.16, thus showing that our "death rate" by mining accidents is the lowest percentage per million tons mined of any of the countries, and one reason why our accidents have been multiplied so as to appear so much greater than theirs is that the others do not do as much work as we do, so that ascertaining the work done by us, compared with that of other countries dissipates the assertion that we kill more people, and have more fatal accidents in our country than in theirs in proportion to the production of coal.

As to the position that the operators take relative to the protection of their miners, we have this fact: That but a few weeks before the "Marianna" disaster there was a letter sent out from the headquarters of the company by its president to all the officials impressing upon them the importance of doing everything in their power, and within their knowledge, for the safety of the miners of that company. What is true of one is true of another. While we have had disasters, most serious and painful disasters, there is no person who laments such more than the operators who are interested, and who have suffered thereby.

To illustrate the position of the operator, let me read this letter:

Letterhead of Pittsburgh-Buffalo Company.

November 13, 1908. To all Superintendents and Mine Foremen.

Dear Sirs: It is now the time of the year when the atmosphere becomes very dry, due to the cold weather. It is necessary for you to take great precautions to see that you do not have any gas in any of your working places or on any falls.

2. See that no dust is allowed to accumulate on the rib, roof or tracks, which might be ignited by a small explosion of gas or a blownout shot. See that the ribs, roof and bottom are well watered and the dust loaded.

3. See that your fire bosses visit each and every place each and every day after they have made their regular rounds in the morning, to see that the miners work in safety, and that there is no loose rock or slate overhanging to injure the men at work. Each mine boss and fire boss in slate and rock should see that it is properly supported before anyone is permitted to pass under it.

4. Make it your duty to see that there is as much air goes through the last cut-through on the entry side and around the face of the workings as there is at the inlet.

5. Under no circumstances take any chances that would result in loss of life or limb to any of our employees, as we would rather lose money than take chances of injuring any of our men. I would be the proudest man in Pittsburgh if at the end of each year our company can show a record of having hurt and killed less men than any other company in the Pittsburgh district. If there is anything which you go up against which you find you cannot immediately overcome, and which might become dangerous, kindly communicate with your general manager and the writer at once.

DON'T TAKE ANY CHANCES.

With kindest regards I beg to remain,

Yours very respectfully,

J. H. J. (Signed) JOHN H. JONES.

That letter was dated on November 13, and was sent out to all the superintendents of that company, which is the company which suffered under the explosion. What I want to say relative to this is, Mr. Chairman, that accidents will happen in the best regulated mines. There may be pockets of gas that are unknown and may be encountered and suddenly set off, as has been done in this case, with all reasonable precautions exercised. The cause is unknown here at present, and of course we cannot comment on it now, but here is a case where every precaution known to the science of mining or to the art of mining has been employed, and yet there is this sad accident. There are accidents which happen in every department of manufacturing and of mining here and elsewhere, so that we cannot look forward to a time when operations will not be accompanied to a greater or less extent by accidents. It is our duty to minimize the same, even to the hope of elimination, realizing, however, that where the human factor is, there will always be more or less liability to accidents, and that perfection is nowhere experienced or obtained, and especially where ignorance or carelessness prevail.

We have heard something about the price of coal in relation to which I would say that we presented to the individual operators one of the most serious problems, Mr. Chairman, that is, how to produce coal and sell it at a lower price than the "other fellow."

Who is responsible for that condition? It is the consumer. Here are some ladies, tender-hearted and kind, as many are in this country, yet when they go shopping they go to get the "best" price possible for their dresses, etc., and they do not look beyond the sweathouses, where the women and children have been working sixteen hours a day or perhaps longer, under miserable circumstances, and getting a miserable pittance (applause), and it is because of the demand for cheap merchandise and getting it cheaper than the other person, so as to get a little advantage, and be enabled to go into the market and "cut under" the other person; it is because of that that many manufacturers are

tempted to spend as little as possible in the production of merchandise.

This illustrates the difficulty in every business, your dry goods stores, your tailor shops, and everything of that kind, and the demand that everybody makes to procure all grades of manufactures just as cheaply as it is possible to get it, without going behind the scenes to inquire into what sacrifice of time, labor and comfort is made by the persons engaged in the production. That is the reason that so many of our stores will sell you at "fifty per cent less," "twenty-five per cent less," at "75 cents on the dollar," to induce people to come in and pay for an inferior article, or an article, the knowledge of the manufacture of which would horrify the tender-hearted purchaser. Now, how can we remedy that? Mr. Chairman, if you can do that you are the greatest benefactor that ever lived. If you can do that you will have a fortune both of philanthropy, the dispensation of which will bless the world, but is not reasonable to expect until the Millenium comes, and not until the "Golden Rule" is acted as well as professed, and everyone shall do "unto others as he would have the others do unto him"—not as David Harum put it, "Do unto the other fellow as the other fellow would do unto you, only you do it fust." (Laughter.)

Mr. Chairman, I think the province and influence of this Congress or any other congress that wishes to promote the welfare of their fellow-men in any department, is beneficial, if it is properly filled and exercised. And as you said last night, the aims and the ambitions and the efforts and the concentration of everything you do, is for the upbuilding of this Congress on the line of beneficent action towards your fellow-men in the mining industry particularly. Mr. Chairman, we accept this expression, coming from you, as the motive and sentiment, underlying and impelling your action and so, accepting, we acknowledge our duty toward this Congress. It occurs to me in a practical way it is the duty of every man who has been invited here as a delegate, not being a member, to give your name to the secretary and become an active, as well as a partici-

pating member of this Congress, and so affiliate yourselves with these men who are trying in their way to advance the knowledge, the proper application of which will surely bless humanity. They come, will you permit me to say, Mr. Chairman, from the "West" fresh with the breezes of the Rocky Mountains, and they bring a good deal of the atmospheric tonic and exhale it amongst us, much to our pleasure and profit. Mr. Chairman, have you noticed that when the breezes start from the Rocky Mountains, charged with all the vigor and ozone of the Western clime, often they are modified to some extent when they reach us here; they are not quite so strong nor so vigorous? Our good friends have brought the breezes of the West here into this Congress; the breezes have blown a little stronger than some of us would agree as being best for our conditions, but they come here and we help to modify them and get them all into a nice smooth current, which will be beneficial and refreshing all around. And it ought to be the duty of this Congress, and as I suppose it is its aim, to so advise at any rate—I was going to say to control—but I will say to advise, that the streams of labor and streams of capital shall blend in one united current—like the streams of the Allegheny and the Monongahela to make the beautiful Ohio, and carry the commerce down to the Gulf—that these two streams of labor and capital should be united in Pittsburgh and the confluence form a diffusive stream that shall go on to the ocean, pleasing to everybody that purchases and everybody that consumes a pound of our material. This is the province of this convention and the province of the mining bureau, and we feel honored and happy that they will blend in beneficent action in prescribing the things necessary to enlighten us in the performance of that duty and disseminate it through our land. And permit me as a last word to say that the state of Pennsylvania through its mining department is efficiently, energetically and intelligently through its commission reforming the mining laws of the state of Pennsylvania so as to procure the best results, and the operators are in harmony with them so far as that result is necessary. (Applause.)

Distribution of the Nation's Mineral Wealth.

BY GEO. OTIS SMITH, DIRECTOR U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C.

The subject, the Distribution of the Nation's Mineral Wealth, eminently fits both the place and the occasion. The city of Pittsburgh, rightly termed "the world's industrial wonder," is founded on the mineral resources of not only Pennsylvania, but indeed of the whole country, while you members of the American Mining Congress represent the industry that has enabled this nation to realize a rich income from its mineral heritage. Nor is it inappropriate that a representative of the United States Geological Survey should bring to your attention facts relating to the distribution of this mineral wealth. In the thirty years since its organization this federal bureau has recorded the development of the mineral industry, and to indicate how phenomenal has been this development I need only cite the fact that during these three decades the mineral production of the nation has increased six-fold.

Last year, at the Joplin session of the Mining Congress, I had occasion to refer to the probability that the value of the mineral output for 1907 would pass the two billion dollar mark. The statistics since collected have verified that estimate, showing the value of the 1907 mineral production to be over $2,069,000,000. In 1879 Congress expressed its appreciation of the importance of the nation's mineral wealth by establishing a scientific bureau charged with the investigation of these resources, and now, three decades later, the mineral industry, making as it does an annual contribution to the nation six-fold greater, truly deserves further recognition.

We should not leave this topic of the thirty years' development without mention of certain notable features in the growth of the mineral industry. In 1880 the non-metallic products constituted 47 per cent of the total mineral production of the country; in 1907 fully 57 per cent. This

increase in relative importance of the non-metallic products has not been regular inasmuch as metals have exhibited a tendency to be more quickly affected by general business conditions, with the result that for the year 1894, for instance, the non-metallic percentage rose to 65 per cent and again in 1904 to 63 per cent.

The pages since 1880 can also be studied in another manner. Then, in order of value of output, coal stood first, with iron second, followed by gold, silver, petroleum, lime, building stone, copper, lead and salt. In last year's production, after coal and iron came copper, clay products, petroleum, gold, stone, cement, natural gas and lead. You will note that in this column of the ten most important mineral products, coal, iron, petroleum and building stone have maintained their relative positions notwithstanding the sixfold total increase. Copper has advanced from eighth to third place and gold has dropped from third position to sixth, lead from ninth to tenth, and silver to just behind lead. The new comers in the 1907 list as contrasted with that of 1880 are clay products, cement and natural gas.

Production statistics are the pulse of the nation's material life and these differences in relative growth are significant symptoms in the development of the mineral industry. They indicate present tendencies in the utilization of the nation's mineral wealth, and indeed the relative importance of the different minerals, considered from the national point of view, which is that of industrial growth.

The distribution of mineral wealth depends on geologic factors and different geologic provinces are characterized by deposits of different minerals. Herein lies the value of much of purely geologic study. Thus an important part of the Survey's work through these years has been to keep the country informed as to the occurrence of economic minerals. Not only has the Survey statistician been recording the increasing activity of mine, furnace and smelter, but the Survey geologist has been mapping and measuring the nation's mineral deposits and investigating the possibilities of new discoveries of the mineral fuels and ores. In the last few weeks the result of this great inventory which it

has taken years to make has been brought together in the report submitted to the National Conservation Commission, and it is the existence of these quantitative data that enables me to discuss this important subject at all adequately.

The facts of the distribution of mineral wealth are of practical value because of the vital connection between such geographic distribution and the development of manufactures and commerce. I give precedence to manufactures because this industry rather than commerce should first feel the creative influence of mineral wealth. The metallurgical. clay-working, structural and chemical industries constitute the web and woof of industrial prosperity and to a large degree it is only the disregard of the principles of political economy that permits the export of raw material beyond the boundaries of state or nation. Free trade among the states of this union has developed great interstate and internal commerce on a grand scale, but this phenomenal national development should not blind the people of the individual states to the advantage of local utilization of their own mineral resources. As an illustration of this, the new industrial south is possible because the south has always possessed mineral wealth. With these southern states mining nearly seven per cent of the iron ore of the United States and over 21 per cent of coal it is simply obedience to natural laws that the southern furnaces should produce ten per cent of the pig iron of the country. Economic laws must be recognized and the fact of distribution and production—of supply and consumption—must be in mind before we can at all comprehend the inter-relation existing between all branches of the mineral industry to plan intelligently for its future development.

Let me cite a few characteristics of the distribution of our mineral wealth: In the first place, the widespread distribution of raw materials makes possible an industrial nation in which every state and territory has some share in the mineral production. Last year only three states had a mineral output valued at less than $1,000,000, and twelve states had a production valued at over $50,000,000 each.

Again, no state or section appears to have a monopoly

of the mineral industry. While "progressive Pennsylvania" with its total mineral product nearly one-third that of the whole country, leads in coal, cement, stone and natural gas by large margins, another state, Minnesota, leads in iron ore; another, Arizona, in copper; another, Ohio, in clay products; Oklahoma in petroleum; Colorado in both gold and silver, and Missouri in both lead and zinc. Furthermore, these centers of production are ever shifting.

For instance, in 1900 the primacy in quantity of petroleum produced passed from Ohio to California, thence to Oklahoma; and within a year Montana in copper production has given place to Arizona; in lead, Idaho to Missouri, and in silver, Montana to Colorado. It is evident that we cannot prophesy future progress of the industry unless we can determine the centers of the mineral reserves, for it will be toward these centers that the industry will trend.

Science as the Basis of Commercial Success.

BY HON. JOSEPH BUFFINGTON, UNITED STATES CIRCUIT JUDGE, PITTSBURGH, PA.

I am obliged to the chairman for interrupting the program of the evening and giving me the opportunity to say a few words to you tonight. If he will excuse me I will remain here on the floor instead of taking the platform. I should be false to my feelings tonight if I did not say that it is a great pleasure to be present. I stopped my work down at the court of appeals in Philadelphia in order to come here, because I had such an intense interest in the movement which has culminated in turning the old arsenal of war into a home of science, that I feel today is not only a red letter day for humanity and Pittsburgh locally, but that it is also an epoch day for our government, one of signal significance in the development of the future of our country. I have long felt that the civilized nations of the world were stripping to the waist for a great commercial struggle, and I have feared that in this great country of ours, owing to its very greatness and its division into many states, that what was everybody's business was nobody's duty; and that dear old Uncle Sam and these states of ours were losing sight of the strategic vantage points in that titanic commercial struggle. And that strategic base to my view is in the turning of the minds of the scientific men of this country from pure science to applied science and in the nation's taking advantage of this applied scientific knowledge, and what commercially flows therefrom, as the great dynamic force which shall lead us to the heights of international commercial supremacy. Germany has grasped and gripped this fact. Her astounding commercial growth today is not the result of chance, not the fortuitous development of commerce or the work of individual men, but it is the outcome of resultant result from causing cause. It is because the great minds that were building the greatness of Greater Germany a generation ago grasped the signifi-

cance of the laboratory, the chemist, of pure science in the ultimate outcome of applied science. These great minds unified, centralized and localized this great economic-scientific policy into German scientific and commercial life and hand in hand the twin sisters—laboratory and factory—knowledge and practice—the head of science and the hand of toil, have led Germany in half a generation to the forefront of commercial development. In that time, for example, Germany had quietly had at work a great central governmental institute of testing material, of fuel economics, of analyses, combination and quantities, where the great underlying questions of manufacturing have been intelligently and scientifically studied out. From this foresight she is reaping today the rich first-fruits in an aggressive, surging commercial advance that is at once a lesson and a warning to her sister nations. Today she is a generation ahead of us in this march of scientific forethought. She is reaping harvest where we are just beginning to plow our fields. Seeing which, I for one am deeply interested in this work which you have seen officially installed here today. This work which you have been privileged today to see begun; the starting of these testing places, these places looking to the conservation of material, these bringings of the theoretical chemistry of the past into the practical work of the present have immensely to do with the commercial future of the country. And I feel, gentlemen, and we of Pittsburgh feel, glad that this work has taken but a tentative form here, because we feel that the development from this day forward will be such that in a few years we will wonder that some former generation had not begun it. We do not want to look on it as an enterprise merely for the benefit of this community. It has a far wider range and deeper significance. The mere accident of its location is one of locality because we realize there is no place save Pittsburgh on the map of the United States which is at once within a night's ride of the city of Washington and also within a night's ride of so many sister cities.

I have every faith, as this work goes on and develops, that the co-relation of other things, other industries, other

sources or means of scientific development will bring other scientific branches of the government to this point where they may be concentrated, and where we can as a whole country get the advantage which Germany is now getting from her scientific station at Charlottenburg.

With these few thoughts in mind, I feel tonight that we are on the eve of a great movement in this country and we have been participating today in that which is pregnant with a great future. I want to add my conviction of the substantial value of this together-coming of practical, strong, level-headed men in such a gathering as this Mining Congress. The mining man who fails to come to such gathering loses tremendously to my mind in the development of himself and his work. I attended your sessions this morning and I was struck not only with this thought, but (after Dr. Holmes called for volunteers to speak) of the suggestions that a convention of this kind must bring to the men who are engaged in purely scientific work. Think of these lamentable accidents, the terrible catastrophes in the coal mining industry! What a flood of thought was brought out to the scientists by the simple statements of operators as to the variations in the atmosphere and the humidity of such atmosphere, and the proneness of those accidents to occur at certain seasons of the year. I am no prophet, and I am not a scientist, but I venture to say that this suggestion of the relation of the humidity and conditions of the atmosphere to these explosions will be taken up by these scientific men of the government, by the schools of mines by scientists everywhere, and worked out to some solution that will lead us to see the connection between the cause and the effect. I was struck with the fact of the open lamp as a cause of these disasters, and I said in my own homely way, if the open lamp is one of the causes of these disasters, these scientific men will get at the root of this thing, for true science always goes to bed-rock fact—and they will see that the use of the open lamp comes from that quality of human nature which leads the miner to disregard danger in use of the open lamp because he gets more light from the open than he does from the closed lamp. It

is natural, therefore, for him to want to use it, and he will use it because by its light he will get out more coal. And the way to stop him from using it is not by legislation, but by removing the cause which causes him to use it. How shall this be done? Why, this body of scientists will get down deep and they will say that if there is any cause that leads the miner to use the open lamp, the way to beat that is to produce a closed lamp that will be so much better than the open lamp that the temptation to use the latter will be taken away. (Applause.)

Mr Chairman, the experience I have had with scientific men in the disposition of patent cases for a great many years has led me to the profound conviction that science is at the bottom of commercial success. I feel that this convention should take this thought home with it, and hammer home to their members of Congress and Senate the necessity of sustaining these men of science by liberal appropriations to carry on the great scientific work of this nation. (Applause.) If the news goes out from this convention, as I believe it will, to our representatives and our senators that these men are not carrying on something high up in the air in the way of scientific theoretical investigations, but are coming down to practical questions of modern industrial life, it will do much to aid the development that has been started here today.

I thank you, ladies and gentlemen, for your kind attention. (Applause.)

The Duties of the Federal and State Governments in Relation to the Mining Industry.

BY CONGRESSMAN W. F. ENGLEBRIGHT, OF CALIFORNIA.

Mr. President, Delegates and Members of the American Mining Congress: I was not aware that I had been placed on the program to address this meeting till I arrived here yesterday afternoon. I came here for the purpose of learning all I could about the great mining industry in these portions of the United States with which I am not acquainted. I came here for the purpose not of talking myself, but to hear what you had to say; to get your ideas, and so far as I could to learn your wishes. Coming from the mining districts of California, it is certainly a pleasure to me to be with you and to see such a great interest being taken in this American Mining Congress. Its sessions are of great importance. Your deliberations are of great interest to the mining world, and the result of your deliberations is going to carry great weight in Congress and in the legislative halls of the different states. As a representative in the Congress of the United States, I assure you that I will place great weight upon your recommendations, and shall work in and out of Congress to help carry them out, and to do those things which you suggest are for the good of the great mining industry and which will help to protect the health and lives of our miners.

About a year ago I was in San Francisco to attend a banquet given by the San Francisco Chamber of Commerce to the congressional delegation of California. At that time matters in the United States so far as finance was concerned were a little mixed. The fact was the country had gotten considerable of a jolt, and it was a pretty important subject of discussion at that time. Naturally at that banquet finance was the leading subject of discussion, especially as there were present a number of prominent financiers of the nation. All of them were called upon for remarks, and they expressed themselves very freely, and some of

them went into the details of various theories and propositions that would help out the financial situation.

After a while they called upon me. I told them, that coming from away up in the mountains in the gold mining section, the financial situation did not bother us, that our mines had been continually running, that our miners were at work, that they were being paid, that none of our banks had failed, and that I had not given the subject of finance any particular study, but I thought it was a good time to call their attention to one fact, and that was that while they were busy figuring how the best way was to get more green-backs issued, to issue clearing-house certificates and all that, the miners of my state had been hard at work all the time, and had been sending right into San Francisco $2,000,000 a month in gold; that I thought that was a sort of a practical way to help our their finances, and that I was sure that they had turned that gold over and over again many times, and that it had materially helped them out. While the miners of my district were doing that the other gold mines throughout the United States were all at work, and last year the gold mines of the United States produced almost $100,000,000. Now I think that that hundred million dollars in gold was a very material factor in assisting in straightening out the financial difficulties of the United States. Our other mining industries, lead, zinc, copper, all have been productive during the past year. Our iron mines have produced large amounts of iron, and the great coal mining industry has added its wealth to the United States, so that last year the mining industry, the metallic and the non-metallic industries, produced over $2,000,000,000 in the United States. Such an industry is certainly worthy of the fostering care of the United States Government. And I as a representative in Congress believe every effort should be made at all times to do what we can to brace up this industry the same as other industries are being taken care of.

Yesterday we had the opportunity of witnessing the formal opening of the testing plant in this city, which will take up the various problems in connection with the loss of life in our coal mines. As I saw the plant there, and saw

the work that was being done, I felt satisfied that the money that is being expended there is being expended for a good purpose, and it will undoubtedly result in great good in helping out the mine owners and in saving the lives of the miners. This work has been started on an appropriation that was made last winter by Congress.

But I want to call to your attention that it is only a special appropriation; that there is nothing regular about it; that at the present time there is no law providing for such an appropriation. It was tried very hard to get this appropriation inserted as an amendment in the Appropriation Bill in the House of Representatives, but by reason of there being no law to provide for it, it was subject to a point of order and was not inserted in the bill. The amendment would not stick. It was only by the courtesy of the United States Senate, who can do things if they want to, that they inserted in the Legislative Appropriation bill this item, so that it came back to the House of Representatives as an amendment, and was not then subject to a point of order. It had many friends in the House of Representatives, and by reason of their friendship the amendment became a law. This is one of the reasons why we are anxious to have the Mining Bureau bill passed, which will give a proper foundation not only for appropriations for this work, but for other work for the good of the great mining industry and for all parts of it.

We need a proper law upon which legislative action can be had. We need a proper department that can take up any and all subjects for the good of mining, that will furnish all the proper information upon which to base proper legislation, not only in Congress, but by the various state legislatures. I assure you that in all matters we expect the American Mining Congress to take up these various subjects, to consider them carefully, to consider them in detail, make their recommendations on a conservative basis so that your representatives in Congress and in other places can take up your work, and follow it to a successful conclusion.

I thank you. (Applause.)

Alaska and Its Mineral Resources.

BY ALFRED H. BROOKS, U. S. GEOLOGICAL SURVEY.

Geography.

Three years ago I had the honor of addressing this Congress on the subject of Alaska mines. At that time the value of the annual mineral production was $16,500,000. In 1907 the value of the total mineral output was nearly $21,000,000. In this fact may lie a justification for again calling your attention to the mineral wealth of this northern field.

Many have difficulty in appreciating the size and extent of Alaska, which includes 586,400 square miles, or one-fifth the area of the United States. Its east and west width is as great as the distance from the Atlantic to the Pacific, and its most northerly and southerly points are as far apart as the Mexican and Canadian boundaries. It can, therefore, have no great uniformity of climate, physical features, or resources. These are, in fact, as varied as those of the United States.

Its southernmost point lies in about latitude 51 degrees 30 minutes, that is, almost the same parallel as Copenhagen in Denmark, while Juneau, the capital, is in about the latitude of Edinburgh, Scotland. Alaska stretches northward through 27 degrees of latitude, and Point Barrow, its most northerly cape, is but little nearer the pole than North Cape, the northernmost point of Europe. To consider the longitude, the meridian of the westernmost of the Aleutian Islands passes near the New Hebrides and through New Zealand. The territory and its islands in their extreme width include 54 degrees of longitude. A person traveling from the Atlantic coast to the most westerly island of the Aleutian chain has accomplished less than half the journey, measured in an east and west direction, when he reaches the Pacific seaboard.

Alaska, the largest outlying possession of the United States, is that great land mass which is thrust out toward Asia from the northwestern part of the American continent. Its main mass, a peninsula nearly rectangular in outline, is cut off from the continent by Mackenzie Bay on the north and the Gulf of Alaska on the south. South of it lies the Pacific Ocean. On the west it is bounded by Bering Sea and Bering Strait, and west and north by the Arctic Ocean.

The geography of Alaska can perhaps best be understood by comparing it with that of the western United States and Canada, which is better known. A broad mountain belt, including the coast ranges of California, Oregon and Washington, the Sierra Nevada and Cascade, and continued northward into western Canada by other ranges, constitutes the Cordillera, termed the Pacific mountain system. Inland of the Pacific mountain system is a province of lesser relief—the so-called Great Basin or Plateau region, which also finds its counterpart in Canada. This province is marked on the east by the Rocky Mountains, which again, like the western Pacific mountains, extend into Canada. To the east of these the Great Plains extend northward to the Arctic waters. These four topographic provinces of the United States, which are fairly well defined throughout western Canada, find a continuation and similar geographic features in Alaska.

You will note that the coastal parts of the territory are occupied by a broad mountain belt made up of a number of different ranges. Inland lies the plateau region, and north of this is the Rocky Mountain system. This latter Cordillera is separated from the Arctic Ocean by a broad region of low relief.

These larger geographic features have an important influence on commercial advancement, for they dominate the routes of approach. You will please note that a series of mountain ranges cuts off the inland portions of Alaska from the Pacific seaboard. This central region is one of comparatively low relief and opens out to Bering Sea, into which it drains. But this sea is locked in the ice for seven months

in the year. Hence the inland province can only be reached with railways from waters, navigable throughout the year, by finding a route of approach through the coastal barrier.

These coastal mountains include many high peaks of which St. Elias, 18,090 feet in altitude, is one of the highest. Inland of the St. Elias Range is an irregular group of volcanic peaks embracing mountains from 10,000 to 16,000 feet in altitude.

The Alaska Range, forming the inland member of the Pacific mountain system, includes the highest peak of the North American continent, Mount McKinley, 20,300 feet in height, is a great dome of granite, whose summit stands over 10,000 feet above the crest line of the adjacent range.

The Rocky Mountains of Alaska fall off by a sharp declivity to a broad plateau sloping toward the Arctic Ocean. This plateau in turn slopes off to the bleak Arctic plain forming a part of the great tundra belt which encircles the Polar Sea.

Mineral Resources.

The gold deposits of Alaska are for the most part associated with belts of altered sediments, classed as metamorphic rocks. The one skirts the coast of Southeastern Alaska and, trending to the northwestward, finds its continuation in the Prince William Sound and Kenai Peninsula regions. This is the locus of most of the present auriferous lode mining. A second belt of metamorphic rocks lies in the central portion and embraces a broad area lying between the Tanana and the Yukon rivers. Within this belt are the most valuable of the Alaskan placer deposits. A third belt of metamorphic rocks occurs in the northern part of Alaska, and its continuation is found in the Seward Peninsula, where it includes some important placer districts. Over ninety-seven per cent. of the value of Alaska's mineral production has come from these three belts of metamorphic rocks. But they are by no means the only centers of possible mining of the future.

I would also call your attention to the belt of intrusives which forms the Coast Range of Southeastern Alaska and is continued by broken areas of igneous rock which occur in other parts of the territory. In Southeastern Alaska the contact of these intrusives has been found to be zones of mineralization, and the same probably holds true in other parts of the territory. This being the case, the distribution of these igneous intrusives becomes an important commercial feature.

The most important centers of placer mining are the Yukon-Tanana region and the Seward Peninsula. These two provinces now have an annual production of from fourteen to sixteen million dollars in value. At the western end of the Seward Peninsula there are also some tin deposits which have made a small output. The developed gold and silver lodes are confined, for the most part, to Southeastern Alaska and will be discussed in somewhat greater detail further on. The productive copper deposits are confined to two districts; the one lies in Southeastern Alaska and embraces the central portion of Prince of Wales Island; the other on Prince William Sound, 500 miles to the northwest. There is also a copper belt on the southern slope of the Wrangell Mountains, where considerable prospecting has been done and one large deposit has been opened up; and a second belt, which follows the northern slope of the Wrangell Mountains, where many prospects have been found. Some copper and gold-bearing lodes occur in other parts of Alaska, but cannot be considered here.

In 1907 Alaska produced upwards of five million pounds of copper.

In Southeastern Alaska a heavy forest will furnish the miner with timber. The relief is bold, so that the lodes can usually be reached by tunneling, and no hoisting of ore is required. The ore is carried to tidewater by gravity trams, and the coast line is such that there are excellent harbors. This district can be reached by a two-day steamboat trip from Seattle and has the advantage of ocean freight rates. It is, par excellence, probably one of the best fields in the world for cheap exploitation.

The Treadwell mines, the fourth in size in the world, need no introduction to a mining audience. They are located, as you know, on an island opposite the town of Juneau and have the benefit of all the features that have been mentioned, which makes for low cost of production. In fact, the exploitation of the Treadwell ore body, with its low values, has been an object lesson for the mining world, The aggregate output of this group of mines is valued at thirty-five million dollars, and the annual production is now about three million dollars. The magnitude of this enterprise, with its 900 stamp mill, has served to obscure the fact that there are other extensive mining operations in the adjacent area of the Juneau district.

The Copper River region has been a focal point of interest in Alaska for the last three years, largely because of the plans for reaching it by rail from Pacific tidewater. The ores, which are sulphides along with some native copper, occur at and along the contact of the so-called Nikolai greenstone, an igneous rock, and the Chitistone limestone.

Alaska first began to draw the attention of the whole world when the famous Klondike gold fields were discovered in 1896. At that time the inland portions of the territory were producing less than a million dollars in gold, and all the mining operations were of a distinctly frontier type, of a very primitive character. This field now produces about ten million dollars' worth of gold annually. The Klondike, which is, of course, in Canadian territory, represents the eastern extension of this belt. An interesting feature of this section is the wide distribution of the auriferous deposits. Beginning at Fortymile to the east, we find indications of auriferous gravel throughout a belt 250 miles long by 75 miles wide, including the Birch Creek, Fairbanks, and Rampart districts. Though this district now supports a population of seven to eight thousand people, only a small part of it has been carefully prospected, and there is every reason to believe that other discoveries of auriferous gravels will be made.

The Fairbanks district is, from the standpoint of production, by far the most important of the inland districts,

its annual output being now between eight and nine million dollars in value. In this field the gold gravels lie at considerable depth, varying from 20 to 300 feet, and most of the mining is done by underground methods.

The Seward Peninsula, which forms the western projection of Alaska, has produced in the aggregate forty million dollars' worth of gold since the first discovery in 1898, and is now the scene of many important mining enterprises. You will note that lode deposits, including gold, copper, antimony, and galena, have been discovered in various parts of the peninsula, and, among the non-metalliferous deposits, we have both graphite and coal. Only one auriferous lode thus far has been on a productive basis, though some work has been done on others. On the whole, the outlook is favorable for the development of the lode mining industry in this field. The western end of the peninsula is the tin-bearing district, where both lode and stream tin deposits have been exploited, though the production has as yet been small.

The general distribution of Alaska coal-bearing rocks has already been discussed, but I desire to lay particular emphasis on two of the most important coal fields, at least, the two that are most important from the standpoint of early exploitation. Both of these are tributary to the Pacific seaboard, which is open to navigation throughout the year. The one, known as the Bering River or Controller Bay coal field, lies within 25 miles of tidewater, in the central part of Alaska. The other, which is the Matanuska field, lies about 30 miles northeast of the head of Cook Inlet, but about 200 miles distant from a port open throughout the year. The Controller Bay coal field embraces about 45 square miles known to be underlaid by workable coal seams, includes three grades of coal, namely, anthracite, semi-anthracite, and semi-bituminous, and includes good coking coals. The workable beds vary from 6 to 20 feet in thickness. The high grade of this coal, whose fixed carbon varies from 72 to 81 per cent., will make them an important source of fuel for the western coast. It should be noted also that they lie close to the locus of a

railway which is under construction to the copper deposits, already described. They will, therefore, undoubtedly furnish a supply of coke for important smelting operations in this part of the territory.

The relief in this coal field is strong; the drainage channels are sharply cut, and much of the coal lies 500 to 2,000 feet above the present water courses. This will render the coal readily accessible and decrease the cost of exploitation.

Though these coal fields lie only about 25 miles from the coast, yet the Pacific seaboard at this point offers no good harbors. Plans are on foot, however, for the construction of breakwaters near Katalla, which will give adequate shelter for vessels. It is proposed to connect these breakwaters by a railroad with coal field.

Another plan for reaching these coals by railway is to construct a line from Cordova Bay, the eastern arm of Prince William Sound. This construction would require about 100 miles of track, and the coastal terminal of the railway would be on a good harbor. This railway is now being built as a part of the line which is to go up the Copper river.

The Matanuska coal field embraces an area lying within the drainage basin of the Matanuska and its tributary to Cook Inlet. The known coal-bearing area is about equal to that of Controller Bay, though the coal field itself is probably considerably larger. The Matanuska contains a large amount of high-gradé bituminous coal and some anthracite. The rocks are folded and faulted. As the head of Cook Inlet is closed for five months of the year, it is necessary to find an outlet for this coal field on the outer side of Kenai Peninsula. The port Resurrection Bay has been chosen, and from this point a railway is under construction to the coal fields, a distance of abut 200 miles. Something over 50 or 60 miles of the road has been completed.

The fuel of these two coal fields compares with our best eastern coals and will form an important source of fuel for the western seaboard. It is higher in fuel value than any coal west of the Rocky Mountains.

Placer Mining.

The total mineral production of Alaska up to the close of 1908 is valued at about one hundred and fifty million dollars, of which over a hundred million is represented by the output of the placer mines. The exploitation of the placers has, therefore, in the past been the most important mining industry of the territory, though there can be no question that in the times to come the other mineral deposits will form a much larger percentage of the value of the mining output. Up to a decade ago placer mining was limited almost entirely to the most primitive methods. Then the output of gold was dependent on the activities of the individual miner who worked with pick and shovel and rocker or sluice box, the latter usually made of whip-sawed lumber. This phase of placer mining, however, is passing away in the larger mining districts. Today such machines as dredges are being introduced and hydraulic mining is also playing its part in the advancement of the industry.

These alluvial deposits of the inland regions and of the Seward Peninsula are usually frozen and require thawing, either by action of the sun or through artificial means. In the so-called deep gravels artificial methods of thawing are usually employed. A shaft is sunk until the gold-bearing strata are reached, and these are followed by means of drifting and stoping. The ground is thawed by means of steam introduced in pipes, which are driven into the ground. The material is then hoisted and the gold is separated by sluicing.

The placer mines of Alaska are for the most part situated in regions where there is a low precipitation. For this reason the water supply is often inadequate for hydraulic mining. There are, however, plenty of exceptions to this rule, and hydraulic methods of moving gravel are now extensively used. There will probably never be, however, in most of the mining districts of the inland region of Alaska and the Seward Peninsula any such extensive hydraulic mining operations as there have been in California, for the reason that there is neither adequate water supply nor sufficient grade for removing the tailings.

There are, however, some smaller districts where both grade and water supply invite hydraulic mining enterprises, and both in the Yukon and Seward Peninsula there are certain localities where these methods can be used.

The dredge is a mechanism which has been devised for the working of auriferous alluvium in regions where either the topographic conditions are unfitted or the water supply inadequate for hydraulic mining. This method of mining promises to have a wide application through much of the Yukon basin, as well as on the Seward Peninsula. The cost of operation is small, because a dredge requires only three to five men for its operation. The original investment is of course large, varying from one hundred to two hundred thousand dollars, depending on the character of the construction or the locality where it is operated. Dredge mining will undoubtedly play a large part in the future mining operations in the territory. It is unfortunate, however, that so many ill-conceived schemes are being advocated for dredging where the preliminary investigations have been entirely insufficient to give a certainty of returns. Nowadays dredge mining can be made an absolutely sure investment, providing sufficient prospecting is done in advance of the installation of the plant.

Transportation.

The cost of all mining operations in the interior portions of Alaska, as well as parts of the Seward Peninsula, is at present very high. This is chiefly because of the inadequacy of the transportation facilities. There are a few short railroads, but practically all of the transportation is dependent on the use of ocean-going vessels or river boats during the open season, which lasts from about the first of June until October. The Alaska placer miner probably on the average pays from two hundred to five hundred dollars a ton for all of the material and supplies which he uses in his operations. Such a tax would be impossible were it not for the extraordinary richness of the deposits now being worked. As a matter of fact, there are very extensive areas of auriferous alluvium which cannot now

be handled at a profit because of the high cost of operating. These operating costs can be in part reduced by the introduction of machinery and by the employment of skilled engineers, which are sadly lacking in most Alaskan mining enterprises. But for any material reduction in cost it will be necessary to establish systems of transportation which will reduce the expenditure for freight.

The transportation conditions are seriously hampering mining advancement in the inland regions. There has, however, been tremendous progress in this matter during the past decade. During the Klondike excitement thousands of tons of freight were carried over the Chilkoot Pass on the backs of men. A second route of approach was over the White Pass, where the declivity is not as steep, but where the distance from tidewater of the Pacific to navigable water inland is about twice as great as along the Chilkoot route.

No account of Alaska travel would be complete without some reference to the mosquitoes which worry man and beast throughout the summer months. Horses have to be protected from these pests, as well as men. Animals soon learn that a smudge helps to keep away the voracious insects.

Those whose familiarity with Alaska and its mineral resources gives them the right to an opinion, believe that there is here a large field for mining which can only be developed by the construction of a railway from the Pacific seaboard to the Yukon basin. There has been much turmoil in the Alaska railroad situation during the past three years. Efforts have been made to show that one or the other of three routes is the only feasible one, that one has a decided advantage over the other. There are advantages in all three as main routes. The route to parallel the St. Elias Range bisects territory such as neither of the other two, which run transverse to the main axis of the mountains, does. The Copper River route is the only one which would develop the copper deposits of this district and also reach the Controller Bay coal fields, while, on the other hand, the route from Resurrection Bay to the Tanana is the

shortest to the placer districts and also must be built to develop the Matanuska coal fields. All of these routes have been surveyed, and railways are now being constructed along two of them. One of these is to ascend Copper river and also to reach the Controller Bay coal field. The other has the Matanuska coal field for its immediate objective point. These two railways will bring those valuable coals to the seaboard, and the Copper river line will also tap the copper deposits of the Chitina valley. One or both will ultimately be extended to the Yukon.

The coastal barrier once passed, there are few difficulties to railway construction.

Possibly I am over optimistic, but in my opinion, not only will these railways be completed, but others will be built. The time will come when we shall have several trunk lines, with many branches, making all the mineral-bearing parts of the territory accessible at all times of the year. These schemes may appear visionary, but when we reflect that Alaska, with its primitive systems of transportation, has already added to the world's wealth to the extent of over a hundred and fifty million dollars, there seems to be some justification for this opinion.