Report of Proceedings

OF THE

AMERICAN MINING CONGRESS

Tenth Annual Session

Joplin, Mo., November 11-16, 1907

PUBLISHED BY THE AMERICAN MINING CONGRESS

At the Office of the Secretary, Denver, Colo., 1908

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Press of the Western Newspaper Union, Denver

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.	
Third.....	June, 1900.....	Milwaukee, Wis.....	Col. B. F. Montgomery.....	Cripple, Creek, Colo.	Passed to June, 1900.
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.....	

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E. R. BUCKLEY.....Second Vice President
E. A. COLBURN.....Third Vice President
J. F. CALLBREATH, JR.....Secretary
DR. W. S. WARD.....Curator

DIRECTORS.

J. H. Richards.....Boise, Idaho
Thomas Ewing.....San Francisco, California
E. R. Buckley.....Rolla, Missouri
E. A. Colburn.....Denver, Colorado
George W. E. Dorsey.....Fremont, Nebraska
C. M. Shannon.....Clifton, Arizona
John Dern.....Salt Lake City, Utah
James W. Malcolmson.....El Paso, Texas
J. Frank Watson.....Portland, Oregon

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E. A. Colburn, Denver, Colorado; E. M. DeLavergne, Colorado Springs, Colorado; Victor C. Alderson, Golden, Colorado; Edward H. Benjamin, San Francisco, California; C. Willard Hayes, Washington, D. C.

BUILDING.

David H. Moffat, Denver, Colorado; E. A. Colburn, Denver, Colorado; A. J. Spengel, Denver, Colorado.

TRANSPORTATION.

Sam F. Dutton, Denver, Colorado; A. G. Brownlee, Idaho Springs, Colorado; Edward J. Wilcox, Denver, Colorado; Henry I. Seeman, Denver, Colorado; J. F. Callbreath, Jr., Denver, Colorado.

MEMBERSHIP.

E. G. Reinert, Denver, Colorado; J. F. Callbreath, Jr., Denver, Colorado; E. M. DeLavergne, Colorado Springs, Colorado.

MINE DRAINAGE DISTRICTS.

D. W. Brunton, Denver, Colorado; E. Lyman White, Denver, Colorado; F. J. Campbell, Denver, Colorado; Phillip Argall, Denver, Colorado; R. S. Morrison, Denver, Colorado; E. A. Colburn, Denver, Colorado.

MINING TEMPLE.

J. H. Richards, Boise, Idaho; E. A. Colburn, Denver, Colorado; Col. Thomas Ewing, San Francisco, California.

DEPARTMENT OF MINING.

Hon. R. W. Bonynge of Colorado, Hon. Francis Newlands of Nevada, Hon. C. M. Shartel of Missouri, Hon. Marcus A. Smith of Arizona, Hon. William Sulzer of New York.

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Hon. George C. Pardee, Sacramento, California; Hon. Robert M. LaFollette, Madison, Wisconsin; Hon. Joseph W. Folk, Jefferson City, Missouri; Hon. Eben W. Martin, Deadwood, South Dakota; Hon. Fred T. Dubois, Boise, Idaho.

Official Roster

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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.

LOCAL EXECUTIVE COMMITTEE.

Colonel H. H. Gregg, Joplin, Missouri.....Chairman
Temple Chapman, Webb City.....First Vice Chairman
J. W. Watson, Baxter Springs, Kansas.....Second Vice Chairman
Gabriel Schmuch, Galena, Kansas.....Third Vice Chairman
T. W. Cunningham, Joplin, Missouri.....Treasurer
Clay Gregory, Joplin, Missouri.....Secretary

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

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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, Frosburg, 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.

Officers for the Year 1908

PRESIDENT,

J. H. Richards.

VICE PRESIDENTS,

Thomas Ewing, E. R. Buckley,
John Dern.

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.
W. F. R. Mills, Denver, Colorado.
John Dern, Salt Lake City, Utah.
Charles M. Shannon, Los Angeles, California.
A. L. White, Lima, Ohio.

SECRETARY,

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

EXECUTIVE COMMITTEE.

Thomas Ewing, E. A. Colburn
W. F. R. Mills.

OFFICERS AND DIRECTORS

COL. THOMAS EWING
First Vice President
Vivian, Arizona

DR. E. R. BUCKLEY
Second Vice President
Rolla, Missouri

HON. J. H. RICHARDS
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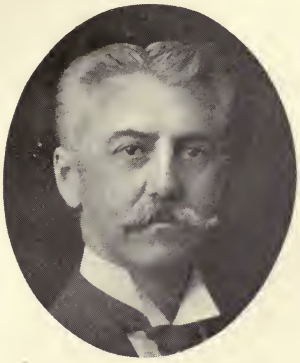
Boise, Idaho

Hon. E. A. COLBURN
Denver, Colorado

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

AMERICAN MINING CONGRESS



C. M. SHANNON
Los Angeles, California

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

JOHN DERN
Third Vice President
Salt Lake City, Utah

A. L. WHITE
Lima Ohio

W. F. R. MILLS
Denver, Colorado

REPORT OF THE PROCEEDINGS

OF THE

Tenth Annual Session of the American Mining Congress

Held at Joplin, Missouri, November 11 to 16 Inclusive, 1907

MONDAY, NOVEMBER 11, 1907.

Evening Session.

Meeting called to order by H. H. Gregg of Joplin, Missouri, Chairman of Committee, at 8 o'clock, p. m., Monday, November 11, 1907.

Invocation by Rev. Dr. Jeffries of Carthage, Missouri.

Music by the Apollo Club.

Hon. Jos. K. Folk, Governor of Missouri, was then introduced and delivered the following Address of Welcome:

GOVERNOR FOLK: Mr. Chairman, Gentlemen of the Convention, Men and Women of Joplin:

It affords me pleasure to welcome this distinguished assemblage to Missouri. It is peculiarly proper that this convention should meet here in Joplin, the richest spot in all the world. Nowhere on this earth can richer mining property be found than in the district of which Joplin is the capital. Joplin today has something like 40,000 inhabitants. I predict that in a few years Joplin will be a city of 75,000 people, and the output will increase from $15,000,000 to $20,000,000 a year, to $25,000,000 to $30,000,000 a year.

Those of you who come from other states may be surprised to learn of the rarity of conflict here between capital and labor. Under the individual system of mining in this district, the laborer of today may become the capitalist of tomorrow and labor troubles are practically unknown.

You of this convention represent an annual output of $1,800,000,000. Each year the interests represented here give to the country something like $100,000,000 of gold to go into the arts and into the commerce of the country. There is no industry in this nation that exceeds in value the output of the mining industry except the agricultural interests, and there is one thing that should be done for the mining interests of this country in order to do justice to those interests; that is, to have a National Bureau of Mining, and a member of the Cabinet secretary of it. (Applause.)

I am glad to welcome you to Missouri. Mining was carried on profitably in this state one hundred years before the first mine was discovered in California. The mining interests of this state are second to those of no other state in this Union. Someone has remarked upon the pride all Missourians feel in their state. There is every reason that this should be so. If a wall were built around Missouri the state could still supply every want of those within. There are fewer mortgaged homes in Missouri than in any other manufacturing state, fewer mortgaged farms than in any other agricultural state, and fewer mortgaged men than in any of the United States. One-tenth of the wheat and one-twelfth of the corn of the entire world are grown in Missouri. In horticulture as well as in agriculture Missouri leads the other states. The largest orchards on the globe can be found in Missouri. We have no silver mines of consequence, but the output of the Missouri hen each year exceeds in value the total production of all the silver mines of Colorado. (Applause.) We have no gold mines, but the minerals the miners bring up from the bowels of the earth into the Missouri sunlight each year exceed in value the total mineral production of the golden state of California. (Applause.) Nine-tenths of the nickel, four-fifths of the zinc, of the United States, are produced in Missouri, and sixty per cent. of it right here in the Joplin district. (Applause.) We have no oil wells, but 26,000 square miles of Missouri soil are underlaid with coal deposits of an approximate value of

$400,000,000,000. Missouri horses can be found in every part of the civilized world and the Missouri mule carries the white man's burden to the remotest parts of the earth. (Applause.) Missouri has more large cities than any other agricultural state, and has more agricultural and mining interests than any other state with large cities. With St. Louis on the east, the great metropolis of Kansas City on the west, St. Joseph in the northwest, with Springfield and Joplin in the southwest, a ready market is afforded for the products of mine, of field, of forest and of factory in every part of the commonwealth. In Missouri about $10,000,000 are spent every year on public education—nearly four times as much as it costs to maintain the state government. Missouri's tax rate is lower than that of any state in the Central West or in the South, and yet Missouri's permanent school fund is greater than that of any other state in the Union. There is a schoolhouse within reach of every Missouri child and the percentage of school attendance in Missouri is greater than that of any other state in the Union. (Applause.) The percentage of illiteracy is less by nearly fifty per cent. than the average in the United States. (Applause.) In every state there are some counties where illiteracy rules. That cannot be said of Missouri. There is not a county in this state that can be said to be illiterate. More newspapers and periodicals circulate in Missouri in proportion to the population than in Massachusetts. More books are read from the public libraries in Kansas City than in Boston. Everywhere virtue is honored and God is worshipped. Secure in her natural position as the future commercial center of these States, strong in her unparalleled resources, confident with that assurance which is born of success; conscious of her dignity and power, Missouri stands in the front rank of civilization today, not demanding but acknowledging the majesty of all. Proud of her past achievements, yet looking to the future; satisfied with her progress, yet determined that the future shall far excel the brilliant past; however great in natural resources; however potent in achievement, in the varied fields of arts and usefulness, Missouri's dearest and fairest possessions are her men and women. It is these that have made Missouri great. It is these who hold the idea that citizenship in a free country implies a civic obligation to enforce the performance of every public trust; it is these that have the idea that laws are made to be obeyed, not to be ignored (applause); it is these who believe that there is an embezzlement of power as well as an embezzlement of money (applause); it is these who believe that patriotism belongs not only to nations, not only to states, not only to cities, but to one's fellow-men as well. What a change has come over the minds of the people in reference to that word "patriotism." Some five years ago there was held in one of our distant cities a banquet attended by a number of prominent business men. After the repast was over the band played "America" and the audience stood and sang the familiar words. As the last strains of the song died away, one of those present turned to his neighbor and with the tears trickling down his cheeks he said, "Oh, I wish I could die for my country!" Just three weeks after that, that same man was humbly kneeling at the feet of justice, confessing that he had bribed a municipal assembly to pass a franchise to further one of his interests. He was willing, he said, to die for his country, but his conduct showed that he was unwilling to live for his country. He had patriotism on his lips and he had treason in his heart.

Many men would be willing, if need be, to give up their lives on field of battle for state or for country, but the man that will live for his country and his state every day is the man that is needed just now. (Applause.)

There may be just as much patriotism in living for one's state or city as in dying for one's state or city. Patriotism does not abide alone in the roar of cannon, amid the din and clash of arms, but in the every-day duties of civic life as well. There is a patriotism of peace as well as a patriotism of war. The man who gives his time to the betterment of civic conditions and in getting better men into office, may be just as patriotic as he who bares his breast to the bullets of the public enemy in time of

war. "How may I serve my city and state?" may be asked. There never was a time when men—real men—were needed more than now. We need more men influenced alone by the public welfare—and fewer of those who are in politics for revenue only. (Applause.) I do not refer to the need for men in public office alone, for one does not have to hold public office in order to serve his city, his state or his country. Some of the greatest men of the nation have never held public office. True greatness consists in service—service of one's fellow-men, service of one's state, service of one's city. If one can do that in public office, well and good, but do not forget that it is just as essential for private citizens to discharge the responsibilities resting upon them as it is for the faithful carrying out of official obligations in the public service. Missourians believe in liberty —liberty under the law; liberty to make law does not mean license to break law. Lawlessness is not liberty.

There are some who have the idea that this may not be a free country because one cannot sell game out of season, or gamble or sell liquor at times the law says they shall not do so, or do other things that may be permitted in some other places. No greater mistake can be made. There can be no such thing as real liberty without laws which a majority of the people made, and to which obedience and respect are given. The laws are the people's laws made in the exercise of their liberty, and if, after those laws are made, they are not obeyed, the liberty of the majority of the people to make the laws is taken away to the extent their law is nullified. If we allow each man to say what laws are good and what laws are bad, the result would be there would be no laws at all. The trust magnate looks with abhorrence on the pickpocket who violates the larceny statute, but thinks he has a perfect right to break the law against combinations and monopolies. The burglar abhors the man who breaks the law against trusts, but he considers the law against house-breaking an infringement upon his rights. The dram-shop keeper believes in the rigid enforcement of the law against the man who robs his cash drawer, but he thinks the law requiring his saloon to close on Sunday is a blue law and one that ought not to be obeyed. It has been my experience that any law looks blue to the man that wants to break it. (Applause.) More respect for law is what is needed. The corporation magnate should be compelled to respect the law that regulates the conduct of the corporation, as he asks others to respect the law that protects the property of the corporation. The anarchy of capital-breeding lawlessness should no more be tolerated than the anarchy of labor-breeding riot and disorder. Gamblers and those who violate the liquor laws should be made to understand that the laws prohibiting gambling or regulating the sale of liquor are just as sacred as the laws that protect them in their lives and in their property. What a wonderful change has come over the American people in the last six or seven years! Look at your dictionaries tonight and you will not find the word "graft" in the sense in which it is now used—and yet every man, woman and child in all this broad land now understands what the term means. Six or seven years ago bribery was the common and accepted thing all over the land. Men gave bribes and thought nothing of doing it; men took bribes and felt no hesitancy in doing so; men purchased votes and bought franchises; legislative halls were often dens of thieves; the touch of the unclean dollar was over all, while the public conscience was asleep. Finally the people awakened to a realization of the fact that a government by bribery was not a government of and for the people, but a government of and for and by the few with wealth enough to purchase official favors. Then from one end of the land to the other there came a stern demand to stamp out the offense that aims at the very heart of free government, and today no man takes a bribe and considers himself an honest man. The public conscience was extended from the domain of the public wrongdoer to conscience has taught men better than that and the energies of this that of the private wrongdoer. Some of the insurance officials were found to have been using trust funds for their own profit. They said they did not know that was wrong. But they have been taught better than that

now. Some of the men high up in the commercial world were found to have been accepting rebates from railroads contrary to law. They said they did not know that was dishonest. That it was all right according to the lights they had before them, but those lights have now been put out and other lights have been placed in their stead. It used to be a saying years ago that a prospect was a hole in the ground owned by a liar. I don't know how true that used to be, but I can say this, and you mine-owners and operators know that it is so, that there is a higher standard in your business and in the mining industry than there has ever been before. (Applause.) Things will not be tolerated for a moment now that six or seven years ago were submitted to in silence. The public conscience has taught you that evil in your business should be eliminated.

So this public conscience has gone on and on, day by day, correcting some evil day after day, remedying some wrong. If things had gone on as they were a few years ago, when bribery was the accepted thing, when lawlessness was looked upon with indifference then the end of the Repub lic itself might well have been prophesied, for we were going the way that other nations have gone who went to their death during the flight of time through the ages. This is not the first nor the oldest republic by any means. If we were to live three centuries longer and then die, we would go down into history as the most brilliant but shortest-lived of all the republics the wrecks of which are strewn along the shores of time.

Rome had a republican form of government for seven hundred years; Florence for three hundred years; Venice for eleven hundred years. All of these republics have long ago tottered off the stage of the world into oblivion. What caused the death of those republics? They did not die for lack of wealth. Many of them or all of them were richer when they fell than ever before, but they ceased to exist for lack of men. They did not die for lack of money, but for lack of morals. They did not die for want of material wealth but lack of moral health. This nation today does not rest upon the wealth of a few people, but it rests upon the moral character and the integrity of the average individual. Poets have sung of the Golden Age that lies buried far back in the history of the world. I believe that the Golden Age is before us, not behind us, and it will come about when there is more of the Golden Rule in our daily lives and less of the rule of gold. (Applause.) It will come about when the doctrine of brotherhood becomes the standard for governmental action, and private conduct. I believe that the world is getting better and better every day, not worse. Even now wealth is not worshipped with the same devotion that it used to be, and gold is not regarded with the same awe as in days gone by. The ideal of the young man is becoming more and more to get right and to stay right, rather than to get rich and stay rich. A new standard has been established—new, yet old—just plain, common, simple honesty, that's all.

Now, this may be ideal, but the business that has ideals will succeed best. The man who has ideals will succeed best. The city or the state or the nation that has ideals will make the greatest progress. Take away the ideal of America and the strength of the nation would soon be gone. Rome built great highways and founded mighty cities while the strength of Roman character ebbed away. When that was gone there was nothing to defend; there was nothing to conquer.. There is an old story of an eastern king who caused a great palace to be erected as a monument of his majesty and power. Stone by stone the structure grew and the heart of the king swelled with pride. One morning the palace was in ruins. "What great treason has been committed here?" the king exclaimed, and a price was put on the head of the traitor who had destroyed the abode of majesty. But a wise man of the court admonished the king. "Great master, there has been no treason here. The house that was great and mighty has fallen down because the builders used mortar without sand, hence their work has gone to ruins." So with the state, so with business. External grandeur counts for nothing. We may count wealth as the sands of the sea, we may as states build the domes of our capitols and the spires of our churches until they pierce the clouds and glitter

among the stars; all must crumble and fall away unless it be welded and strengthened by the principles of morality and justice that constitute the groundwork of enlightened citizenship. Here between two great oceans we have founded an empire such as no conqueror of old ever dreamed of, but the greatness of a nation does not consist in the size of its army nor the strength of its battleships, but in the purity of its ideals and in the intensity of its devotion to those principles that make for right, that make for justice, truth and honor. True to these ideals, we shall be the most powerful amongst all the nations of the earth. Forsaking them, the time will come when our military engines will be as toys in our hands and our strongest naval armament impotent and useless. In vain will we build battleships, fortify our coasts and man our guns unless we bring into every rampart and turret those ideas and those ideals that make the man behind the gun. Our forefathers furnished us with a government guaranteeing rights to the citizens never obtained or exercised by any other people. They fought against the enemies of our country in order that we might have this nation. We must fight against the enemies of peace in order to preserve this as a government for the people and by the people. Let us preserve inviolate the principles of popular self-government, recognizing the largest liberty of the individual citizen consistent with law and order. Let us unite in the enforcement of the laws and in counteracting any attempt to defy them. Let us not array class against class, but let us preserve the rights of all by causing each to respect the rights of the other. Let us not attack business, but the wrongdoing on the part of some of those engaged in business. Let us not assail wealth, but the abuses of wealth. Let us attack not men but the evil that men do. Let us love not money but manhood. Let us appeal not to cunning but to conscience. Let us make the national life clean by making the national conscience clean. This is the Missouri idea. To such a state, with its wealth of mines and of field and of forest and of factory, to such a state with men and women holding to these ideals, I bid you a cordial and sincere welcome.

Hon. Jesse F. Osborne, Mayor of the City of Joplin, was then introduced and delivered the following address of welcome on behalf of the citizens of Joplin:

MAYOR OSBORNE: Mr. Chairman, Gentlemen of the Convention, Ladies and Gentlemen:

It is a great privilege and a great pleasure to have you hold your Tenth Annual Congress in our midst, for we recognize in your body, composed as it is of all that goes to make up what we are pleased to term the mining industry—an ancient, honorable and useful vocation. Ancient, because, look as far back as we may in the pages of history, sacred and profane, we find mentioned the various metals, which presupposes the prospector, the miner and the smelter. It would seem that man's very advancement from the Stone Age was heralded by that first blacksmith, old Tubal Cain, the father of such as work in iron. It was the search for gold that led Cortez to the land of the Montezumas and Coronado in search of the golden city of the Indians named Quiviro. Your vocation is an honorable one. The product you bring to the wealth of the world is in the fullest meaning of the term new wealth and untainted wealth. You take it from no man or set of men. It is not contaminated by any questionable commercial methods in its procurement. It is not haunted by the orphan's cry nor the widow's tear. It is in fact a gift from Almighty God, who at the sunrise of time hid it away in the hills and gulches under Arctic snows and desert sands, from East to West and from pole to pole as an incentive to action and as a reward to him who has the courage and the will to go and seek it out. It is an undoubted fact that your product is an essential and a condition precedent in advancement in all the planes of human endeavor. It has enabled us to span the continents with bands of steel over which is carried the world's commerce. It has enabled us to spiderweb the continents, seas and oceans with wire and cable for almost instantaneous communication between the Occident and Orient. It has enabled us to bridge the great

rivers of all countries, to make the machinery, tools and appliances used in all the various lines of manufacture, to build the framework of the mighty skyscrapers in the cities, and to furnish implements for the tillage of the fields. Some have said that the agriculturalist brings to humanity the greatest in amount of blessings that go to make up the sum-total of human needs, but it can be readily seen that the agriculturalist would make but an insignificant showing if first the metal for the making of his implements of industry were not mined and brought into use. In addition to the base metals, you furnish the gold and silver on which are based the wealth of the world. You furnish the circulating medium or the basis thereof in the world's commerce, and the scarcity or abundance of your product fixes the price level of the world's goods, influences commercial and political policies, makes and unmakes statesmen. And then, when nations depart from the fields of peace, your product is again in requisition for the torpedo boat, the destroyer, the cruiser and the mighty battleship on the seas, in the thundering cannon, the screaming shell, the rattling musketry and the clanking sabre on land. In the search for the hidden treasures of earth no journey has been too long for you to undertake and successfully accomplish, no danger so great that you have not dauntlessly met and overcome it, no clime so unfriendly that you have not successfully withstood it. You have been the pioneers for the colonization of the world. You have been the very advance guard of civilization. What country can you call to mind where the prospector, the miner, did not precede the railroad? The fact is the prospector and the miner go ahead, lay out the trail, spy out the country, report back and the railroad follows on. Thus in all times and in all conditions in the affairs of men from the earliest dawn of civilization down to the present time you have more than borne your burden. You have more than done your part to achieve our present civilization. You have more than done your work in the evolution of humanity. The laborer is worthy of his hire, and as all labor must receive its just reward here or hereafter, your reward is sure, and if you have not found it yet, and if you fail to find it here, let us hope that you may find it in that last great camp just over the Divide, that Eldorado of the Soul where the days never grow old and the streets are paved with pure gold. In your search for the big bonanzas you have gone from camp to camp and from country to country, from California to Nevada, from Pike's Peak to the Black Hills, from Cripple Creek to the Cœur d'Alenes, from the Klondike and Nome to Tonopah and Goldfield, with your ears ever attuned to the far call of the new camp. It is therefore possible that you have given the lead and zinc mines of this district but passing thought. There are those among you I know who are familiar with these mines. To you I need say nothing; but to you who have yet to become acquainted with us it is opportune to say that in all these years the fields of this district have paid their devotees $15,000,000 to $20,000,000 per year without any loss of sleep, any undue excitement, any perceptible rise of temperature. We have gone right on from year to year raising miners to affluence and educating more miners to take the places of those who have received of the beneficence of our district, composed as it is of parts of the states of Missouri, Kansas, Arkansas and Oklahoma. We have no lines or class distinctions in our district worth mentioning. The operator and the shoveler ride or walk together to the mines with perfect confidence, friendship and equality. We have no strikes in our district for the reason that if at any time the miner does not get what he thinks is right, he simply quits and goes out and strikes a mine of his own, and then becomes an operator himself, when he can see the question from both sides. The operator sometimes works his mine out and then to keep his hand in the game, goes into the ground as a spade hand where he gets a look at both sides of the question also. These experiences have a tendency to change the viewpoint, and as a result capital and labor in our district are all experienced. They have both been there, both ways, and as a consequence are the best of friends.

We of this district have a pardonable pride in this happy condition. In behalf of the district, in behalf of our enterprising sister Arkansas to the south, our lively sister Kansas to the West, and I would say our little baby sister Oklahoma to the Southwest if it were not for the fact that, like the veritable Minerva she has sprung full-panoplied from the head of Jove and is in fact a state with the rest of us or will be on the sixteenth of this month when her birth certificate is signed by Dr. Roosevelt, it gives me a great deal of pleasure on behalf of this district, composed of the best American citizenship of the United States, to welcome you to our midst, and on behalf of the city of Joplin I bid you a cordial welcome and invite you to take everything in sight that you want. (Applause.) There is nothing reserved. The town is yours. I know that you will not abuse it, because miners and those engaged in that industry are the best people on earth. We are proud to have you with us. We are glad to have you with us. If you don't see what you want, ask for it, and we will try to get it for you. (Applause.)

Response by Hon. J. H. Richards, President of the American Mining Congress:

PRESIDENT RICHARDS: My friends, as I look into your kindly faces, I recognize that we have received a miners' greeting. When I see the beautiful decorations of this hall and such a multitude come to see us, I recognize also that you have touched the tender chord in the heart of every guest within the gates of your city. They cannot help but go forth to the world and have a kindly feeling for the kindly greeting that you have given us. And don't you know that kindness is the crying need of every heart today in this broad land? We must learn that we are to some extent our brother's keeper. When we learn that we will have less dishonesty, less sorrow and less suffering. The American Mining Congress is an aggregation of men who believe that the best conditions of mining have not been brought out in this great country. Don't you know that in your great government at Washington there is not a bureau or a department that recognizes mining as an industry in this great country? Not one! We intend to continue these gatherings annually, and they will finally speak so loud that they will be heard clear to the city of Washington, the capital of this country. (Applause.)

We believe that all of these mighty resources of this land are simply means to an end and that is to bring out the greatest and noblest manhood that is possible in this great land. When they gave this land to us they were so generous that out of it must come big, generous manhood, and this is being given generously right in your very midst. Missouri has given much to this country. I anticipate it will not be many years until it will give us a President also. (Applause.)

I don't suppose the state from which I come is very well known to you. I have heard it reported that a boy from Missouri was attending a public school and studying physical geography. The teacher asked him at the next lesson to tell the class what was produced by Idaho. He said: "They produce cactus, sage brush, jack rabbits, hair and whiskers." But we are in the business of developing men out there also. We have many from Missouri. We have great mountains there that are an inspiration to any man who beholds them—their giant breasts bathed in constant snow and ice, and yet at their feet rests a beautiful homeland. Our markets now are full in abundance with the second crop of strawberries from the same vines. We are producing sixty-one per cent. of all the lead produced in the United States this year. We expect to be heard from because we expect to follow largely in the wake of Missouri. She has led the van largely in this country, and we are looking for her to do greater things. There is one thing that impresses me most as I listened to your Governor's address and that of your Mayor, and that is the harmony that exists between labor and the mine operator. Why should they not? If both are honest, then there can be no disagreement between them that could not be settled amicably. We believe that this great organization that has now come into your midst can bring out of these conditions that character of manhood that would be worthy of such mighty

opportunity. Now in our sessions from day to day here, as your chairman has said, all are welcome, and coming from the state that I do, I am reminded that the ladies are welcome, because up there in those great mountains the husband and the wife, the brother and the sister face the world together, shoulder to shoulder on a perfect equality before the law. (Applause.) And I anticipate, beautiful as your city is, and others that I have seen, that we can teach you something about municipal government in the way of cleanliness, because the women have a right to vote there, and their voice is heard in that larger phase of housekeeping called muicipal government. (Applause.) I hope that when we have left your midst that you may feel that you have entertained angels unawares. When I heard the beautiful harmonies coming from these miners I felt sure that they would catch the inspiration so beautifully spoken of by your Governor, and I am sure we will all get into harmony by listening to another song from the Apollo Club.

Congressman J. C. Floyd, of Yellville, Arkansas, then responded on behalf of the state of Arkansas.

HON. J. C. FLOYD: Ladies and Gentlemen and Members of the American Mining Congress: I count it both an honor and a pleasure to respond in behalf of the state of Arkansas to the welcome addresses delivered by Governor Folk and the Mayor of Joplin. We have been entertained since our arrival here with all the hospitality that it would be possible to confer by any people. While that is true, I confess that the situation to me is rather embarrassing tonight. The Mayor tells us to take everything in sight that we see and want, and the Governor tells us not to take it unless it belongs to us. (Applause.) My position is embarrassing in another respect. Governor Folk has so eloquently and so thoroughly portrayed the greatness of Missouri. What can I say about Arkansas? (Applause.) I have been introduced to this audience as the guest of Missouri. Can I take issue with the Governor? Certainly not. But I want to tell you a few things that the Governor didn't tell you. He says that Missouri has the greatest apple orchards in the world. That is true. But the finest and best and the biggest apples in the world are grown down in Arkansas. (Applause.) At the Louisiana Purchase Exposition at St. Louis we shipped from Arkansas an apple that weighed 34 ounces, and it took the premium in Missouri as being the largest apple grown. (Applause.) It is true that Missouri had in a glass case a plaster-of-paris cast of an apple that weighed 32 ounces. We can raise bigger apples in Arkansas than Missouri can make out of plaster-of-paris. (Applause.)

Your Governor tells you that Missouri is the greatest zinc producing country in the world. That is true. But for the last ten years at all the expositions where zinc ores were put upon exhibition, Arkansas took the premium on zinc ores. Why, we shipped one specimen, a chunk of zinc ore, to the World's Fair at Chicago, that weighed 12,750 pounds free ore, and it took the premium as being the largest specimen of free ore ever found. The truth is that the best part of this Missouri district lies in Arkansas. (Applause.)

I am glad to be here. We feel an interest in this Mining Congress because we want the mining people of the United States to understand that the Missouri zinc district extends not only into Arkansas, but into Kansas and the Indian Territory, or the new Oklahoma (applause), and I want to say to the people here tonight that a more profitable field for investment in the United States does not exist anywhere than it does through the length and breadth of this great mining district, covering a portion of the states named, and I think that all of the people of this section and of this district are to be congratulated upon the fact that the American Mining Congress saw proper to fix its meeting place in Joplin—the very heart and center of this mineral district and mineral territory. We need to bring to the knowledge of the outside world the undeveloped resources of this field, and as a representative from Arkansas I speak for the undeveloped section of this mineral district. Until about three years ago the Arkansas mineral district had no transportation facilities. Then the St. Louis & North Arkansas Railroad was extended through the

counties of Carroll, Boone, Newton and Searcy, in the southern part of the district, from Seligman, Missouri, and, in the near future, that road will be extended to Joplin. About two years ago the White River Railroad, a branch of the Missouri Pacific, was built from Newport, Arkansas, to Aurora, and thence to Carthage and Joplin, Missouri. Since that road was constructed, the people of the territory lying in the northern part of the district have direct communication with the Joplin fields by railway, so the great obstacle that heretofore existed, want of transportation, no longer is a barrier to the development of those fields, and we invite capitalists to come to our state and to help us develop its wonderful resources.

You will find the people of Arkansas as hospitable, as loyal to those who engage in honest industries, as any state in this Union. Perhaps no state has ever been the victim of so many misconceptions as the state of Arkansas, but those impressions are passing, and the people of the United States are beginning to realize that there are wonderful opportunities within the borders of our state, that it is one of the grand states of the Union. The state works hand in hand with Missouri. In fact, there is not much difference between the people of Arkansas and the people of Missouri, anyway.. (Applause.)

Now, I want to say that this organization has a purpose and an object. This Mining Congress is organized and maintained for a purpose, and as I understand the purpose of this organization it is to build up the mining interests of the United States. One of the objects which they propose, which they ask, and which they demand, is a mining department of the United States, to be one of the leading departments of this government—a cabinet department of this government—and it ought to have it. Why should it not be? We have a department of agriculture. We have a department of the army and a department of the navy. Just think of the thousands and thousands of dollars that are expended every year to maintain the army and the navy, and yet the government has no mining department, and yet if it were not for the miners of this country, if it were not for the men who go into the earth and take out the ores and manufacture them, with all the money appropriated for the army and the navy, you could not make a cannon or a gun, you could not build a battleship, because you would not have any material to do it with. The mining industry of this country deserves this recognition, and as an humble representative in Congress, I pledge to you my support of any proposition to make a cabinet department of the mining industry of this country. (Applause.) Furthermore, I want to make a few suggestions in line with what has been said by your distinguished Governor. This is a time when in all legislative matters there should be one salient principle, one salient policy and that is honesty. Laws should be passed by the respective states to prevent mining frauds, fake stock schemes (applause), to prevent people being defrauded out of their money by dishonest means under form of law. That has hurt the mining industry. There is no industry in this country where a man can honestly acquire fortune—fabulous wealth—so easily as by digging in the earth and mining ores. He takes not a dollar from living man, he robs no one by his discoveries and labor, and he has added to the total of the world's wealth, harming no one. Stamp out these grafters—you know what that means. Governor Folk has told you that all the world has learned what that word graft means in the last five or six years. Now your Governor was modest about it, but I want to say that all the world has known it since District Attorney Folk, of Missouri, now your distinguished Governor, taught them what it meant. (Applause.) Your distinguished chairman said that he expected one day that Missouri would produce a President. He meant Folk. (Cheers.) That undoubtedly may be realized. I listened to a speech in Congress from a distinguished member on the question of railroads and he spoke from the standpoint of one who had interests in corporate wealth, and he argued that the best policy for the railroads was to be honest with the people. Said he: "If you would squeeze the watered stock out of railroad corporations; if you would open your books and let the public into your

confidence; if you would lay before the public your transactions, the amount of money in your investments, and the public would see it and read it; a railroad bond would be equal to a government bond." Don't you believe he was right? The same way in your mining propositions. If you will put upon the statute books laws that will punish those who would deal dishonestly, those who would swindle the public, then you increase faith in the legitimate industry, and in legitimate development of the mining interests of this country. I understand from talking with members of your association, that that is another one of the leading objects of this organization. I wish you godspeed in its accomplishment.

We should all stand for good citizenship, for the upbuilding of our material wealth, and for the upbuilding of the citizenship of our country. The public temper is ripe for reforms along that line, and I think that the public temper is right, and that every man in the United States, regardless of party, should stand for these reforms, and keep the movement rolling on until every corrupt man is swept from high public place, and until every law behind corruption is swept from the statute books, and wholesome laws are put upon the statutes for the protection of the people's rights. (Applause.) If we are to have a great state we must have honest laws and honest administration of the laws in that state. If we are to have a great government, a great nation, we must have honest laws, and we must have an honest administration of the laws of this nation. This much I say in approval of what has been said by your distinguished Governor. Thanking you for your very patient attention, I will close my remarks.

Col. T. J. Vest then responded to the addresses of welcome on behalf of the state of Kansas.

COL. T. J. VEST, OF GALENA, KANSAS: Mr. Chairman, Members of the American Mining Congress, Ladies and Gentlemen: Within the last four decades of time a general uneasiness and anxiety grew up among the young men of the eastern part of the American continent. Eventually they emigrated to the West; they crossed the broad fertile plains of Ohio, Illinois, Iowa and Missouri, but resisted all of the temptations that these states at that time were offering to the home seeker; they stopped in Kansas; they first erected shelter to protect their dependent ones and themselves from the inclemency of the weather, and immediately thereafter they erected what is known as the "Kansas School House," so that one traveling over the broad state would no sooner get out of the sight of one school house, but he would come in sight of another. The good work so ably started has developed until we have today at Manhattan, Kansas, the largest agricultural college in the world, with its two thousand students, and at Emporia, Kansas, stands the largest normal school in the world, with its two thousand two hundred students, and at Lawrence stands the Kansas University, which takes second place to no institution of education in America. As a result of the efforts of these pioneers, Kansas adds to the world's wealth from an agricultural and horticultural standpoint three hundred million dollars per annum; they have in Kansas today, as shown by the state bank reports, a circulating per capita of ninety dollars for every man, woman and child—as compared to our thirty-two dollars per capita circulation of the United States. Kansas is the wheat field of America, and ranks about fourth as a corn producer. If there was a wall built around the state of Kansas to keep confined within that territory its agricultural products its population would be submerged under its own production.

As miners, we are something of a figure; as coal producers, for the year 1907, we will add to the world's wealth seven millions of dollars. The output of our cement works, seven in number, will exceed six millions of dollars, and of our other clay products—brick, tile and building stone (by the way, many of the streets are paved and buildings erected in our sister state of Missouri on the east out of Kansas brick)—amounts to a total of six million dollars per annum; the oil wells of Kansas add to the world's wealth one million five hundred thousand dollars per annum; our gas product is of the value of three millions five hundred thousand dollars

per annum; and, by the way, the gas of Kansas is warming the cities of this part of Missouri as well as the cities on the north.

We also have zinc mines in Kansas that add to the world's wealth two millions of dollars per annum; and in the thirty years of her existence she has added the sum total of fifty three millions of dollars to the world's wealth.

We people began mining about thirty years ago, and in a small area of country, but as yet we have not reached the 80-foot level. It has been our boast for years that it is the poor man's camp, and we venture the assertion here and defy contradiction, that any poor man that has lived in Galena, who has been sober and industrious has been rewarded for his efforts; that he is in easy circumstances, or has grown rich. But it is no longer a poor man's camp, but now a rich man's field; we have prospected the earth from 80 feet to 500 feet in depth; we have been rewarded for our efforts by the discovery of rich veins of ore at all the levels, but the poor man is no longer able to provide himself with the equipment necessary to proceed further, on account of the large bodies of water encountered below, and we now consider it the rich man's field, and we say to the rich man: "Your hopes will be realized."

As a manufacturing state, we are something; our people have paid some attention to the smelting of zinc ore; refining it into the spelter of commerce, and from a bulletin issued recently by the Geological Survey of the United States, we find that Kansas produced in the year 1906 one hundred and twenty-nine thousand tons of spelter, with a commercial value of fourteen millions of dollars. The eight smelting companies that are located in Kansas say to the people who are mining in the southwest of Missouri and southeastern Kansas, produce ore to your utmost capacity, we will purchase it from you; and say to Missouri, produce all the ore you can, we can take care of it; to the new state of Oklahoma, they say, produce all the ore you can, we will take care of it; they say to Arkansas, produce all the ore you can, we will take care of it, and when all of them have put forth their best efforts of increasing their tonnage, the smelters of Kansas are still calling for more. The result is, that they have gone to the states of the West, to New Mexico, Colorado and Utah, and still not being supplied with a sufficient tonnage, they have gone to British Columbia and Old Mexico, and are still asking for more.

We are also lead smelters, and buy a supply in what is known as the Joplin district, and add to the world's wealth the refined article to the value of half a million dollars per annum.

Mr. Chairman, on behalf of this great state of Kansas, and on behalf of Galena, we bid you welcome to this general mining district, and we further promise to lend our aid to you in establishing at Washington a department of mines and mining, for the betterment of the mining interests of America.

Hon. John Dern then responded to the address of welcome on behalf of the state of Utah.

HON. JOHN DERN, OF UTAH: It seems that this meeting of the American Mining Congress is being held far enough south to come within the scope of that hospitality for which the South has ever been famous.

In behalf of the Utah delegation I take pleasure in saying that we are delighted with our reception, and we are grateful for the charming manner in which we are being entertained. This hospitality we find no less hearty and whole-souled than that of the western prospector, who welcomes you to his lonely camp, and stranger though you be, kills the fatted calf in honor of your visit. It may be true that the fatted calf comes out of a tin can, and that it is more often known as embalmed beef, but the welcome is no less sincere for all that, and if you happen to come to his camp while the owner is not about, you are expected to help yourself to the grub, and the only thing expected of you is that you wash the dishes before you depart. That is our western idea of hospitality, and, as I said before, we have found the southern brand to compare favorably with it.

It has been an especial pleasure to be welcomed by the distinguished Governor of the great state of Missouri. When a man reaches eminence

not as the result of political accident, but as a recognition of valuable public services, the American people are proud to do him honor.

The great work done by Joseph W. Folk in purifying politics, in promoting honesty, and in advancing lofty ideals, has influenced not Missouri alone, but every state in the Union, and he has endeared himself to every patriotic American heart.

Let the inspiring example set by Governor Folk in civic matters serve as a motto for the deliberations and actions of the American Mining Congress, and there can remain no doubt of the purity of its purpose, or the value of its work.

The welcome extended to us by your Mayor in behalf of all the citizens of Joplin, I assure you is fully appreciated, and we will carry home with us most pleasant remembrances of the hospitality extended to us by the citizens of the city in the great lead and zinc district of Missouri.

There should be no doubt in the minds of any of us that we are here for a definite tangible purpose, and that we have certain laudable aims in view, for otherwise there would be no excuse for the existence of our organization. In making this statement, I have given myself an opportunity to enumerate the objects of the American Mining Congress. Of that opportunity, however, I do not intend to avail myself in this brief address. I merely desire to touch upon a few matters which I conceive to be of great importance. Some of them have been discussed in previous meetings of the Congress, while others have received little or no attention.

All of us will admit that we are passing through a great epoch in our public affairs. The tremendous movement against corruption, and for more exact equality before the law, which in its political application was begun by Folk in Missouri, and which has spread until it has permeated the affairs of the nation, and the affairs of the states, entering the domains of business as well as the field of politics, should be considered by this organization of the mining industry, to the end that we may keep pace with the advancing business standards. If the rules of the game need revising, let them be revised; if there be housecleaning needed, let it be done. In short, let us advocate and press any measures that will elevate the business of mining.

Some of us are fond of saying that when properly conducted mining is just as safe as any other business. With this view I cannot fully agree, because there is undeniably a greater element of chance in seeking mother earth's hidden treasures than there is about a mercantile or manufacturing business, where success almost invariably rewards ability, industry, enterprise and foresight; if these qualities be properly displayed.

In mining no amount of energy can make a mine if the mineral is not in the ground. The risky nature of mining is at once obvious when we know the large proportion of meritorious prospects which result in disappointment, even though they be honestly and economically managed. It will be better for us all if the hazardousness of mining be freely and candidly admitted. At the same time, there is no doubt that the risk in mining ventures may be very greatly reduced, and this Congress can do no greater service to the mining industry than to lend its aid to making mining more safe, conservative and legitimate.

I am not prepared to submit a comprehensive plan for bringing about this desirable condition, but I think I am safe in saying that the more frequent employment of engineering advice, and the extermination of the festive wildcat would help wonderfully.

In many sections of the country mining is regarded as a gamble pure and simple. The banker or merchant who invests money in a mine often must do so secretly or his reputation as a safe and sane business man will be ruined. Why is this? Because experience has shown that most such ventures have resulted in loss. Why so? Generally because the investment was ill-advised. Too many people depend upon their own inexperienced judgment in making mining investments, or else they act upon incompetent advice. Some times the fool and his money are parted by the convincing figures and bright promises of a prospectus. Some times the unscrupulous promoter does the trick By the way, there are promoters

and promoters; some of them achieve big things. For the others, let me say that they are more often ignorant than wilfully dishonest. Hence, to invest upon such advice is another case of the blind leading the blind. If we could educate the public to patronize the mining engineering profession more freely, there would be fewer aching hearts, and less cursing of the mining business. I am aware that there are also engineers and engineers, and the profession has suffered because of dishonesty and incompetence in some of its members. But we do not condemn the medical and legal professions just because there are a few quacks and shysters. and we should be equally fair to engineers. There are lots of honest, bright and high-minded men in the noble profession of mining engineering, and by due inquiry one can easily find out who they are. A reasonable fee paid to such a man will very often save many times its amount for a prospective investor.

Speaking for my own state of Utah, I do not wish to claim that we have been entirely free from mining abuses. Mining in our state has had a wonderful development in the past few years, and no doubt the optimistic dreamer has in some instances impressed this fact upon the investor, to the latter's ultimate regret; and yet I believe it cannot be denied that honest, legitimate mining has been the rule in Utah, and that it has produced wonderful results. Through the aid of science capital is making Utah one of the most important copper producing states, and our mines and reduction works are the wonder and admiration of engineers and metallurgists the world over.

I need not refer to the statistics which show Utah's rank as a producer of the other metals. Our gold and silver mines have long been famous, and our lead production has an important effect upon the supply of that metal; nor is Utah restricted to metal mining, coal, salt, asphaltum, and other hydrocarbons, gypsum, fireclay and other wealth-making products we have in abundance. Utah people some times go away from home to mine, but generally they come back with the verdict that as a mining state Utah has no superiors.

One of the subjects that will probably be discussed in this meeting is the transportation problem. I need not remind you that this question is one of the most vital, and one of the most concrete that confronts us. The life of many mines is absolutely dependent upon transportation facilities and rates. If we approach this subject in a spirit of fairness, desiring justice for ourselves without injury to others, I have no doubt that the discussion here may lead to improved conditions wherever abuses exist.

One of the primary objects of the American Mining Congress is to secure the creation of a department of mines and mining in the National Government. The establishment of a new cabinet portfolio is never easily brought about, and no new department has ever been introduced before a strong, intelligent demand for it was aroused. It is for the members of this Congress to carry out a campaign of education, so that the representatives of the people may know that there is a genuine need for such a department. It has often occurred to me that a good many of our members and prominent mining men of the country are lukewarm about this subject. They admit that a department of mines and mining would be a good thing, but they have not worked up sufficient enthusiasm to make them put forth earnest unremitting efforts to get such a department instituted. I venture to say if each and every one of us were imbued with a religious conviction of the value, the justice and the importance of this movement, the desired object could be obtained in a comparatively short time. If, as I have said, there are mining men who do not display a deep interest in this work, I am sure it is because they have not given the matter careful attention. My experience has been that any one who studies the plan deeply is sure to become one of its pronounced advocates. I hope, therefore, that every member will take pains to inform himself on this subject, because it is axiomatic that a man cannot do good work for the advancement of a cause unless he understands it, and unless he wholly and sincerely believes in the righteousness of that cause. If we can make of ourselves a band of ardent missionaries, preaching in every state

that is here represented, the need of a department of mines and mining, our Senators and Members of Congress would soon take heed of the demand and act accordingly.

In this brief address I cannot adequately give voice to the reason why the department of mines and mining would be desirable and beneficial. I want, however, to emphasize one or two fundamental principles which may help to impress miners with the dignity and importance of their calling. In the first place, the original source of all wealth is the soil, or the earth's crust. Everything we eat, drink, wear or use is supplied us by our mother earth. The earth's products may be broadly divided into two branches—vegetable and mineral. The vegetable kingdom, including animal life, subsisting thereupon, is represented in our government department of agriculture. I am firmly convinced that one of the most wise and statesmanlike steps taken by our government in the past quarter century was the establishment of the department of Agriculture. It takes years to get such a department into condition to do the most good, but already this department has great achievements to its credit. Without anything paternalistic in its plan, it has before it a scope of work that cannot fail to grow into helpfulness to the entire nation. I contend that the mineral kingdom is entitled to similar representation in our government, and that a department of mines and mining would primarily benefit the mining industry, and thereby as an inevitable consequence prove a good thing for the nation. As a hint of the help which could be expected from a mines department, let me mention the splendid work that has been done by the United States Geological Survey, whose special surveys of particular mining fields have served as intelligent guides for the prospector and mine operator in those districts. Very many of the features of mining could be helped in a similar manner if there were a department specially devoted to this branch of human activity. There might be experimental stations for mining as well as for agriculture, with who knows how great advantage to the world.

A second point which I desire to emphasize is the importance of the mineral industry. Many of us, when we speak of mining, think only of gold, silver, lead, zinc and copper mines. Important as these are in themselves, do they not look secondary when we place them beside the tremendous values represented by the production of iron, coal, petroleum, brick and other clay products, building stone and other non-metallic minerals? Let us bear in mind that the mineral industry stands for all of these, as well as for the more precious metals. Let us remember that mining is just as essential to human progress as agriculture itself. Indeed, agriculture could not have advanced except for mining, because without iron man would still be tilling the soil with a crooked stick. We have every reason to be proud and to glorify the work in which we are engaged. A man can render no greater service to his race than to find minerals and adapt them to the use of mankind. There are many other arguments in favor a department of Mines and mining, and before this meeting adjourns, I hope they will be ably set forth, and that they will receive the careful attention of every member present, but it seems to me that the considerations which I have mentioned ought alone to convince us all that the propaganda for a secretary of mines and mining deserves our hearty and unqualified support.

Col. Thomas Ewing then responded on behalf of the territory of Arizona.

COL. EWING. OF ARIZONA: Mr. President, Delegates to the Mining Congress, Citizens of Joplin, and of the Great State of Missouri: The great state your distinguished Governor has lauded to the skies, and made us love so well, has made us rejoice that we are here tonight, and makes us long to come back to Missouri. Having been born in the great state of Missouri, it is unnecessary for me to be born again. The men who have responded here have an idea they must laud the state they come from. We don't have to blow the horn for our state. We will be heard from in the future. Down in the state I come from, the territory I represent, we have a large crop of horned toads and lightning lizards. We also have

mines down there that produce a vast amount of metal. Our copper mines are the greatest in the world. Our silver and gold ores are wonderfully rich, and our mines productive.

We also have a good crop of grafters, as well as other people, down there. They fill your papers with advertisements of ten-cent stocks and fifteen-cent stocks that next week will be worth $2.50. We ought to get a law passed to take care of the people who are foolish enough to buy any of them. The mining interests suffer great detriment because of this kind of cheap stock, and the people who advertise them should be punished. These frauds should be stopped, and every state in the Union interested in mining should take up this matter and pass laws, as your Governor recommends. I want to say this about your great reform Governor: He is very popular out in the West. We hear every day about him and what you people in Missouri do.

Your Mayor so kindly turned the whole town over to us, and has told us to take everything we see. By jove, we want to take the whole of you with us. You will be bored by convention after convention in this great city, I am afraid. I expect every one will want to come here every year after seeing the way you have entertained us and opened your hearts to us all.

I am not here to make a speech tonight, and I thank you on behalf of Arizona very much for the kind welcome you have given us, and I will be only too glad to stay with you as long as I can.

PRESIDENT RICHARDS: I want to say to you that I am authorized to express the gratitude of the American Mining Congress for this generous welcome, and if you want to show us the highest courtesy you can, give us the pleasure of your attendance here at our sessions. We will now listen to the closing song by the Apollo Club.

TUESDAY, NOVEMBER 12, 1907.

Morning Session.

The Congress was called to order at 9:30 o'clock a. m. by President Richards.

PRESIDENT RICHARDS: The committee having arranged for a continuance of the responses to the addresses of welcome, Mr. Richard Riepe, of Nevada, will new respond on behalf of his state.

RICHARD RIEPE, OF NEVADA: Mr. President, Ladies and Gentlemen: The great trait of the people of Nevada in the present financial crisis has been confidence. When the banks of "Reno" and of a great many other places in the state of Nevada opened their doors after a few days of temporary suspension, the deposits exceeded the withdrawals.

The confidence of the people of Nevada is due to their unshakable faith in their state.

It is faith based on knowledge, and born of experience. Nevada has the most surprising recuperative powers of any commonwealth in the Union.

Instead of being the petted and pampered member of the Sisterhood of States, she is the Family Football.

Her chief industry has been silver mining. The Congress of the United States demonetized silver in 1873. The year after the demonetization, she was at the height of her prosperity. She did not know she had been touched. Nearly twenty-four years after demonetization, to clinch matters, the country went on a gold standard. The blow was delivered below the belt and given without warning. Nevada took it cheerfully, and went to looking for gold. It might be incidentally said that the country had just emerged from a desperate panic (which you all well remember a harder one than the present one) in which, of course, Nevada was compelled to share.

Nevada after this found her gold, and again became the most prosperous state in the Union.

Then the knockers took a hand. The following publications are some of them: "Collier's Weekly," "Harper's Weekly," also, "The Saturday Evening Post," and a host of subsidized sheets. They made a general onslaught on the state of Nevada "And My Beloved People."

Nevada took her medicine smiling and bravely, and said to them: "What fools you mortals be."

A few days ago a great many banks suspended in a great many places and cities in Nevada temporarily. Our money in the eastern part of the state is mostly loaned and kept in Salt Lake City, while the western part of Nevada has its funds in the banks of San Francisco, California, to build up that city from ashes. "Phoenix-like," Nevada faces it all, undisheartened and undismayed; "Her head is bloody, but unbowed."

She has the recuperative power of the proverbial cat with nine lives.

She cannot be killed or down trodden. Nevada is the mainstay of the nation at the present time, and always will be, just as she was from 1861 to 1865, and in the years following she was, when the resumption of payment was the chief problem of "our nation and statesmen."

Won't this dirty, lying sheet that I mentioned before admit that we people of Nevada sustained the credit of Uncle Sam and the nation.

Did he not use our three electoral votes in the electoral college to save the Union?

Did he not use the votes in the Senate of that great man the "Hon. William M. Stewart," the father of our federal mining laws? And that man helped save the Union. Did not the old reliable Comstock throw six hundred millions of money in Uncle Sam's lap?

Did we not uphold and sustain the credit of the nation? Business is based on credit. Credit on money Money on gold. Nevada is producing the stuff that all the world wants. Nevada will produce this year more than twenty millions in gold. A few more states producing an equal amount would have prevented the present financial troubles. I believe, and am satisfied in my mind, that Goldfield and Tonopah will produce twenty millions alone. Where are there two other camps that can make the same showing?

I already see the clouds roll by and notice in the distance far beyond "a silver lining." Nevada will again be riding the crest of the wave of prosperity, Serene, indifferent of fate, glorying in her own strength, relying in her own resources, proud of the past and secure in her future.

The latch string always hangs out. Our state is the state of prosperity, and her future is greater and brighter than any other state in the Union. We have camps and cities like Goldfield, Tonopah, Bullfrog, Rhyolite, Beatty, Yerington, Fairview, Wonder, Manhattan, Seven Troughs, Round Mountain, Rawhide, the last baby boy born. Stout, and a healthy one he is; only six weeks old, but fifteen hundred people are there. Hotels and stores and all kinds of business houses are put up. Also the inevitable saloon is there, represented in numbers. So if you go there you need not go dry, but can irrigate if you want to. Rawhide is the latest and newest camp in Nevada. To keep track of the new camps in Nevada a person needs an automobile up to date. They come like mushrooms, during the night.

A word or two for the "Old Camps." There is Pioche, which is just connected with a railroad, "The Las Vegas or Los Angeles and Salt Lake City;" Tuscarora, Eureka, Belmont, Tyo, Austin, Battle Mountain, and a great many others, coming to the front again. But not the last one and not the least, I should mention my dear old stamping ground Ely, which is bound to be heard from soon. From the Pacific to the Atlantic ocean will she sound the trumpet, whenever we blow in our smelters. We are building the greatest smelter in the United States, or under the sun. The first unit of a ten-million reduction works will blow in about the first of the year. We have one of the best railroads—the Nevada Northern—to connect us with the Central Pacific, or, rather, Southern Pacific System. We have everything in our midst, except elevators and street cars, and when I meet you again, "God willing," I hope I will be able to say to you,

"We have those comforts, too." A street car franchise will be given or passed the next meeting of our city council.

The elevators will come before we know it. We are going to have the greatest copper camp in Ely, Nevada. It will be a second Butte City. What Butte City is in Montana, Ely will be in Nevada. I don't care how bad the present situation is, we have the mines. We have the bulk of ore. Mountains of it. Nevada Consolidated has sixty million tons blocked out, while the Giroux Consolidated has forty million; and the Cumberland and Ely twenty million tons inside, and a great many others beside.

We can produce copper cheaper than any other place in the United States. We can produce it for less than seven cents a pound.

We people of Nevada are the people, and going to be. I invite you all to come to our state.

Don't knock, walk in.

PRESIDENT RICHARDS: My friends, in introducing the gentleman I now introduce, I feel that I am justified in saying that I regard him as one of the greatest minds of the West, and I know you will all enjoy hearing him: Victor C. Alderson, of Colorado, president of the Colorado School of Mines, who will respond on behalf of his state.

VICTOR C. ALDERSON, OF COLORADO: Ladies and Gentlemen: I am sorry for that introduction, because if it were true I should have to buy a new hat, and currency is exceedingly scarce. I must, I am afraid, continue to wear my old one. The Judge is exceedingly kind, but I am afraid his judgment has been warped a little by his kindness. I cannot help but think of a remark made by the Governor last night. It explains what I observed yesterday in coming into Missouri. As I looked out of the car windows I saw my favorite bird, the hen. The hens I saw had a worn, weary, tired look. I did not understand why they should look so. The hen is a favorite bird of mine. I prefer her perhaps in the form of a chicken fry Missouri style, perhaps, but when the Governor said last night what he did about the poor Missouri hen yielding a product in excess of the silver product of Colorado, I know the reason why that hen was so tired and that was because she had worked for a record. (Applause.) So, I quietly suggested to the Governor when it was all over that he gather together the most tired out of the Missouri hens and send them to Colorado for a vacation, and after he had thoroughly recuperated them, that we could send them back, and then perhaps we could guarantee they would exceed in their product the gold production of Colorado. (Applause.) If it has not been already thoroughly stated, it ought to be, that this is the tenth birthday of the American Mining Congress. It ought to be stated most emphatically that she has received the most cordial, the most enthusiastic reception she has ever received anywhere. (Applause.) We who gather from the West, from Montana and from Utah, and from Colorado, and came sliding down this way, we just gathered enthusiasm as we came. It seemed as though the nearer we came to the great state of Missouri the warmer we felt the welcome. We even had to stay over in Kansas City for a few hours, and there, much to my surprise, while I had heard of the harvest moon and the golden moon, and several other kinds of moons, and duplicate moons, I had never until that time seen a blue moon, and some of our party not only saw one blue moon, but quarreled about their being two or three.

The nearer we came to Missouri and the nearer we came to Joplin, the warmer and more cordial it seemed to be, and, as I said, culminated last night in the finest reception this Congress has ever had. We are here, I think, because we have now to do perhaps the greatest work that has ever come before this Congress. It seems auspicious that we should come to a great mining center like this to do that work. We have great problems before us. I sincerely hope that in the one problem in which I have taken the most interest that we shall be successful at the next session of Congress. I believe in going after what is within reach. I have in mind the work of this Congress towards getting governmental recognition at Washington. I have been unpopular, perhaps, at times in saying

that I did not believe it was within the range of possibilities to get a department. I have been in Washington a little, and I have felt from getting close to the people there that a department was an absolute impossibility at one stroke. Now, those of you who are fathers of interesting girls know how you get worked. If your little girl wants $5 for something, if she is smart, as she probably is, she does not say, "Daddy, please give me $5." Not at all. She begins on a dollar and you loosen up on one dollar, and she afterwards talks for a second dollar and you loosen up on the second dollar, and before you know it, she probably has the $5, and perhaps $10 or more, because you are easy. It is a gradual process. It is exactly the same way in getting governmental recognition in Washington. We have none now. If we can get in on something, then we will get another dollar and another dollar, and in a few years we shall get all that we want, but if we should refuse to take what we can get, we will be a long time knocking at the door. I thoroughly believe that if President Roosevelt has recognized our just deserts, recognized what we are entitled to now, that is a bureau, we had better unite our forces and go after a bureau, and after we get that, unite our forces and go after a department. It is the logical order of things. That to me is one of the great things before this Congress. I hope it will come up and be discussed in the right way, and that the right forces will be put at work to get that governmental recognition at Washington, because without some governmental recognition we can expect exactly nothing in the way of legislative help or anything of that sort. But I have already taken too long. I thank you.

PRESIDENT RICHARDS: The last gentleman I will introduce to you this morning is perhaps the most persistent and consistent worker for the objects of this Congress of any man in the East throughout the years that it has been in existence, and that is Dr. J. A. Holmes of the United States Geological Survey, who is here both as a member of the Congress and as a representative of the state of North Carolina.

DR. J. A. HOLMES of North Carolina: Members of the American Mining Congress, Ladies and Gentlemen: Your President said to me a moment ago that the members of the Congress were slow in coming in and he would like to have a few more minutes' time occupied by some one, so he has asked me to respond on the part of the state of North Carolina to the greeting which was given us in so hearty a manner on last evening.

That state, which I am informed by one of the Vice Presidents of this organization, was at one time spoken of a "strip of land between South Carolina and Virginia," and we are told further that people coming from that state used to say that they came "from North Carolina near the Virginia boundary." You will be glad to know that such a condition is a thing of the past. Now people passing through thtis strip of land take off their hats with respectful courtesy because they recognize the fact that this commonwealth has made such progress during the past twenty years that today it is one of the most progressive of those old commonwealths—grown young again—which made up the original thirteen.

Mr. President, North Carolina has something to say in reference to the mining interests of this country, because this one state which secured rights originally from the crown of England has been mining ever since, and the man in North Carolina who migrated from that state to the West to engage in mining have done well in California, Colorado and elsewhere, some of them are now coming back to the great old North State.

North Carolina sends greetings to this Congress in behalf of equal justice and equal opportunity for all men in mining work. It has always stood to the aid of the individual in the struggle for existence and opportunity against combinations, whether state, federal, corporation or of a private character.

It is the purpose of this Congress in connection with its mining interests to help the individual miner, and when we see the development of corporate wealth in this country so that perhaps seven-eighths of the

wealth of the country is now said to be in the hands of less than one per cent. of the population; when we see the mineral wealth of the country accumulated during thousands and even millions of years, and for the creation of which no man has had to do, now under the control of the few, we see the ways along which the individual needs help. He needs to be supplied with accurate information. He needs the help of proper legislation, such as will safeguard the interests of the individual, as well as those of the strong corporation, and encourage individual effort.

In this Joplin district, both the individual and the corporate spirit is good; legislation and community practice both encourage individual effort. The general natural conditions have been such as to foster the individual element; and I know of no part of the country where we see it developed more than within this district. The governor said we would find here a larger percentage of successful individuals in connection with this Joplin mining development than we would find in any other part of the country; and I believe he is correct.

We are going to ask this Mining Congress to march into the coal field and capture the help of the mining interests in the central portion of the United States. Then with the concentrated effort on the part of the mining men from all sections of the country we may be prepared to obtain the co-operation and help from both the federal and state governments to which we claim the mining industry is entitled.

We are today using up our mineral resources so rapidly that we are consuming both our own share and the share belonging to the future. We are dealing with great national problems as never before in the history of our mineral development; and we must consider and solve these problems in a true national spirit. In this connection the American Mining Congress must capture the East and the South as it has the West. Let us, therefore, hold our next two meetings, one in the heart of the Mississippi valley coal fields, and another in the heart of the Alleghanies, (probably at Pittsburg). We will thus gain in eastern membership and influence, and will become truly representative of the great American mining industries. We will then the more easily accomplish the great national purposes for which we have our being.

North Carolina thanks Joplin for this cordial greeting. She assures the Congress of her co-operation in carrying out its great purposes.

PRESIDENT RICHARDS: I think you will notice that I did not introduce Dr. Holmes to respond on behalf of North Carolina, because I did not wish to limit him to that state, notwithstanding its greatness, because, in my judgment, he is becoming a national character so far as mining is concerned, and I wanted him to talk from that standpoint without limitation.

I desire to announce the appointment of the credentials committee as follows:

Capt. E. O. Bartlett, of Joplin.

C. W. Wilker, of St. Louis.

C. F. Hutchinson, of San Francisco.

The resolutions committee should go to work at once, as it is one of the most important committees of the Congress. We therefore request that each state hand to the secretary the name of the man who it is desired should represent that state upon that committee. I want to suggest another thing. All resolutions that are introduced are to be first handed to the secretary that they may be read to the Congress, and that he may number them and keep track of that part of the work. Then they will go to the Resolutions Committee, where they will be acted upon and reported to the chairman of that committee. The next on the program is report of the committee on a uniform law governing metalliferous mining and quarrying in the various states, W. R. Ingalls, of New York City, chairman. The report was read by the secretary as follows:

To the American Mining Congress.

Gentlemen: The committee on the drafting of a law to govern metalliferous mining and quarrying reports that it has organized and has entered upon consideration of the subject. For the present it recommends only that the American Mining Congress cause to be printed for general distribution the existing laws of the various states on this subject. The purpose of the committee in making this recommendation is to invite suggestions from mine operators and all who are engaged in mining operations, which will be helpful to the committee in its consideration of the subject.

Respectfully submitted,

W. R. INGALLS,
Chairman.

PRESIDENT RICHARDS: As the report is short and some explanation seems to be required, we will call upon Mr. Ingalls to make further explanation.

MR. W. R. INGALLS, OF NEW YORK: Members of the Congress: The report of this committee you have just heard read is extremely brief and it would seem to me, as the president has suggested, that a few words of explanation are in order. The task upon which the committee has entered is one of such magnitude that it is evident that a full consideration of the subject is a matter which will occupy several years. The purpose of the committee is not to consider the laws of the states affecting mining titles or anything of that character, but simply the laws of the states governing or pertaining to the matter of safety in mining operations—matters which come within the police functions of the various states. Many of the states at the present time have such laws. Many states in which mining is extensively carried on have no laws whatever of this character. Even so important a mining state as California has no law governing mining. There is a demand on the part of the men who work in our mines that every possible precaution shall be taken and insured by adequate legislation to insure their safety. Certainly that is a demand in which all honest operators can join. The committee appointed to consider this question consists of Mr. John Hays Hammond, of New York, Dr. James Douglas, Mr. J. Parke Channing, Mr. J. R. Findlay and myself. The appointment of the committee, or, rather, the acceptances, were made so late in the spring that most of the members had already gone away for their summer vacations, and consequently it was an impossibility to bring them together until shortly before this meeting. Progress has been made in securing copies of the existing laws, and the committee has considered that the best recommendation it can make at the present time is the one that is contained in the report that the secretary has read to you; that is to say, that the existing laws of the states shall be printed so that they will be available in convenient form to be submitted to those interested in mining. The purpose of this recommendation being to invite suggestions upon the part of all who are interested in the question.

PRESIDENT RICHARDS: The opportunity is extended to any one on the floor to make any suggestions he may desire for the welfare of this work. We will be glad to hear from any of you at this time.

W. F. R. MILLS, OF COLORADO: Is it proper at this time to make a motion that this committee represented by Mr. Ingalls be continued for another year?

MR. RICHARDS: I think so.

Mr. George Otis Smith, Director of the United States Geological Survey of Washington, then responded on behalf of Maine and the District of Columbia:

GEO. OTIS SMITH: Members of the American Mining Congress: I am embarrassed at the start by this double honor thrust upon me. Speaking for Maine and the District of Columbia as two of the greatest mining districts of the Union, I hardly know where to begin.

Let me represent first the state of Maine. As a mining state, as a producer of important minerals, Maine must rely largely upon her pro-

duction of such products as granite, slate and ice. Some years ago I planned to write a paper on the mineral resources of the state of Maine, and in planning this paper I at once thought of the tin deposits, meaning by tin deposits those deposits that come to Maine annually along with the summer visitors—the Maine natives being especially expert in their methods by which the tin is extracted from these summer visitors. One of my friends—one of those geologists who attaches much importance to the shape in which ore bodies occur—asked me in what form these ore bodies usually occurred, and I said in pockets. (Applause.) That paper as yet has not been published, and this is simply an advance bulletin which I am giving you.

Maine, however, in spite of the small annual production of articles of mineral wealth, has been foremost in the support which it has given the mining industry. The dollars have flowed from Maine annually in the support of the mines and the non-mines of the West, and with the charity that is characteristic of the Yankee, they have always given the most of their wealth to the places where it was most needed, and in very few cases has it been true that the bread thus cast upon the waters has ever returned.

Now may I speak for a moment of that other mining district—the District of Columbia. It is a place where we are not endowed with the rights of suffrage or of free speech, and if I hesitate in speaking my mind at this time you will know the reason. We are not given that permission to so indulge ourselves in Washington. Representatives from all your states take upon themselves this duty of speaking and also of law-making in our behalf. However, we cannot speak of the District of Columbia without mentioning that we are also producers. I suppose that we lead the Union in the production of gold and silver—certificates, and probably no state in the Union has so large a reserve of gold and silver. There are many things which we do there, but in the few moments that I am allowed, I could not mention them all.

I am, however, glad of this opportunity of expressing to you the interest which all of us at Washington feel in the reforms which you are advocating and which this Congress is working for—governmental recognition. (Applause.) While we of Washington do not see at our doors the need of reform in the mining laws, many of us have been in a position to observe the workings of the present law in the Western country, and we are thoroughly in accord with all that you desire. We are glad of the opportunities that we have had to observe. We will be glad to use these observations in your behalf and to help you in bringing about those reforms which you believe and we believe are so much needed. I also wish to thank the President of your Congress for the visit that he has made us recently. It is a pleasure to be brought in touch with your organization through such a mediator. All that we ask in behalf of the District of Columbia of those interested in the mining industry of the country is that we may know you better, and that you may know us better. I thank you, gentlemen.

MR. MILLS: I will then make a motion to the effect that the committee of which Mr. Ingalls is chairman be continued for another year in the same work.

Being duly seconded, the motion was put and carried.

MR. JOSEPH, OF UTAH: I suggest that each state, through its chairman, announce now publicly from the floor of the convention the name of its member of the committee on resolutions so that we can become acquainted with each other.

PRESIDENT RICHARDS: If there is no objection, the secretary will call the roll. As the name of each state is called the chairman of the delegation will please announce the name of the man selected to serve on this committee.

Committee on Resolutions.

State.	Name.	City.
Arkansas	A. W. Estes	Yellville
Arizona	Col. Thos. Ewing	Vivian
California	C. T. Hutchinson	San Francisco
Connecticut	Dr. L. D. Huntoon	New Haven
Colorado	W. F. R. Mills	Denver
Idaho	H. F. Samuels	Wallace
Indian Territory	W. F. Sidell	Bartlesville
Illinois	Dr. H. Foster Bain	Urbana
Iowa	D. O. Campbell	Cleveland
Kansas	Dr. Erasmus Haworth	Lawrence
Montana	Carl Galigher	Butte
Missouri	Elias S. Gatch	St. Louis
Minnesota	F. A. Brown	Duluth
Nebraska	Col Geo. W. E. Dorsey	Fremont
Nevada	Richard A. Riepe	Ely
New Mexico	Prof. A. K. Adams	Socorro
New York	W. R. Ingalls	New York
Ohio	F. Wallace White	Cleveland
Oklahoma	Dr. Chas. N. Gould	Norman
Pennsylvania	H. H. Stoek	Scranton
South Carolina	H. L. Scaife	Clinton
Utah	H. S. Joseph	Salt Lake City
Washington	R. H. Kemp	Spokane
West Virginia	Dr. H. M. Payne	Morgantown
Wisconsin	E. T. Wright	Milwaukee
Wyoming	M. N. Grant	Laramie

Officers.

Col. Geo. W. E. Dorsey, Nebraska, Chairman.
Dr. Chas. N. Gould, Oklahoma, Secretary.

Sub Committee.

W. F. R. Mills, Colorado, Chairman.
W. R. Ingalls, New York; Dr. H. F. Bain, Illinois; C. T. Hutchinson, California; Elias S. Gatch, Missouri.

PRESIDENT RICHARDS: The next on the program is an address, "Prospecting for Gas and Petroleum," by Dr. Erasmus Haworth of the State University, Lawrence, Kansas.

Dr. Haworth's address will be found on Page 247 of this Report.

PRESIDENT RICHARDS: I am sure we feel grateful for the address we have just listened to. The Secretary has some announcements to make.

The Secretary then read Resolutions as follows:

Resolution No. 1.

(Introduced by Lewis E. Aubury of California.)

Resolved, By the American Mining Congress in convention assembled: That we favor the enactment of a law by our National Congress, in which shall be incorporated the following:

"On all patents for lands classified as other than mineral, and which may hereinafter be issued, all mineral rights shall be reserved by the governments, and that separate patent shall issue for such mineral rights after the proper requirements have been complied with.

Resolution No. 2.

(Introduced by W. H. Graves of Colorado.)

Whereas, There are many real or self-styled mining engineers, practicing in the United States as consulting mining engineers, who have not the best interests of their profession, or of the investing public, at heart, and who give aid to the promotion of fraudulent mining schemes of vari-

ous kinds by making false reports on properties, or reports intended to mislead, for the purpose of defrauding investors or others, and

Whereas, Those mining engineers who are following their profession in a legitimate manner, making honest reports on properties for honest purposes, are injured by the general discredit cast upon the profession by the dishonest ones, and

Whereas, In the opinion of many, the time has come when some action is necessary for placing control, or restraint, over all consulting mining engineers, whereby the dishonest ones can be prohibited from practicing their profession; be it

Resolved, That the President of the American Mining Congress in session at Joplin, Missouri, appoint a committee of five members of this Congress—at least three of whom are to be mining engineers—whose duty it shall be to investigate this matter in its various phases and to consider the matter of drawing up a bill designed to remedy the evil, perhaps by requiring all consulting mining engineers to be licensed, which bill is to be brought before the legislatures of the several mining states; this bill to be presented for ratification at the 1908 session of the American Mining Congress.

Resolution No. 3.

(Introduced by Samuel R. House of Colorado.)

Whereas, It is apparent that the free importation of foreign zinc ores into the United States is inimical to the direct interests of the miners of zinc ores in the United States, and

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

Resolved, By the American Mining Congress in convention assembled, that the Congress of the United States be urged to impose such a duty on the importation of zinc ores into the United States as will protect the interests of the miners of zinc ores.

Resolution No. 4.

(Introduced by H. S. Joseph of Utah.)

Whereas, One of the primary objects of this Congress is to promulgate the creation of a National Department of Mines and Mining, and

Whereas, The several legislatures of the several states have from time to time passed memorials to Congress petitioning that such a department be created, and

Whereas, No definite action has as yet been taken by National Congress on this proposition, and

Whereas, All the mining states, irrespective of political affiliation and beliefs, are most vitally interested in having such a department created, and

Whereas, It should be made incumbent upon the representatives to the National halls of Congress and the President of the United States, representing, as they do, the people of the United States, to advocate the establishment of a national Department of Mines and Mining, therefore,

Resolved, That the conventions of each national party meeting in 1908, for the selection of candidates for the Presidency of the United States, and the selection of a national platform, be memorialized by this Congress to insert in their respective platforms a plank pledging its respective candidates to the establishment of a Cabinet Department of Mines and Mining as a part of the system of national government, and,

Resolved, Further, That a copy of these resolutions be forwarded to each delegate elected to the leading national conventions and his earnest support of the same be solicited, and that a copy of these resolutions be presented, by the Secretary of this Congress, to the committee on resolutions of each leading national convention held in 1908.

Resolution No. 5.

(Introduced by Dr. E. R. Buckley of Missouri.)

Recognizing the fact that much of flotation of worthless mining stock by unscrupulous promoters is based upon the reports of inexperienced or fictitious mining engineers and geologists, therefore be it

Resolved, That there be appointed by the President of the Mining Congress a committee of five, consisting of two geologists and three mining engineers, whose duty it shall be to investigate and place on file with the Secretary of the Mining Congress a record of the training and experience of geologists and mining engineers practicing in America, in so far as such records can be obtained;

Resolved, Further, That the professional geologists and mining engineers be invited to furnish such committee with a statement of their training and experience;

Resolved, Further, That the said Secretary of the Mining Congress be instructed to furnish members of the Mining Congress or others with a copy of such record upon application, without comment or comparison with the records of other geologists or engineers.

PRESIDENT RICHARDS: If there are no further suggestions we will stand adjourned until 2 o'clock, p. m.

TUESDAY, NOVEMBER 12, 1907.

Afternoon Session.

The Congress was called to order by Col. Geo. W. E. Dorsey.

Dr. E. R. Buckley of Rolla, Missouri, then delivered an address on "Lead and Zinc Mining in the Ozark Region."

Dr. Buckley's paper will be found on page 282 of this Report.

Mr. S. Duffield Mitchell of Carthage, Missouri, then delivered an address, "Tariff on Zinc Ores."

Mr. Mitchell's paper will be found on page 219 of this Report.

CHAIRMAN DORSEY: It being too late for any discussion on this most interesting topic, we will now take an adjournment until 8 o'clock this evening, when we will hear the Annual Address by our President.

TUESDAY, NOVEMBER 12, 1907.

Evening Session.

The Congress was called to order at 8 o'clock, p. m., by Vice President Dr. E. R. Buckley.

VICE PRESIDENT BUCKLEY: It has been customary, ladies and gentlemen, at each of the sessions of the American Mining Congress, to have an address by the President outlining the aims and purposes and the work of the Congress, to review the past work of the Congress, the work which has been accomplished, and to look into the future and point out the work which lies before the Congress. It is the work of the President of this Congress to direct the activities of this body. We have found in the past that the annual address of the President of this organization has been most helpful to the members, the delegates and the visitors, and to the Board of Directors. Ladies and gentlemen, members of the American Mining Congress and delegates to the American Mining Congress, I have great pleasure this evening in introducing to you Hon. J. H. Richards, the President of the American Mining Congress.

President Richards' address will be found on Page 298 of this Report.

WEDNESDAY, NOVEMBER 13, 1907.

Morning Session.

The Congress was called to order by President Richards.

PRESIDENT RICHARDS: It was suggested to me that I did not make clear one point that I attempted to express last evening relative to the purpose of the Mining Congress to eventually secure a Mining Department. While I stated that the President said that he would recommend a Bureau, I stated to him that that was satisfactory because it was all we could ask for at this time as a foundation for a Department. That our purpose was to ultimately get a Department. I think, while we are waiting for several to come in I will call attention to just what I presented to Secretary Garfield when I met him in Washington, which seemed to him to justify us in our claim to the right to a Department. It is short; I will read it:

How the Government Can Aid the Mining Industry.

(1) By the granting of continued and larger appropriations for the investigations by the Geological Survey, so that the results may be reached rapidly enough to more nearly meet the growing needs of the country, including:

(a) The classification of the public lands;

(b) The exploration, surveying and mapping of the geological formations, ore bodies, mineral deposits, etc.;

(c) The investigations of the nature, extent and origin of these deposits and of the origin of the soils of the country;

(2) By the establishment at this time of a Bureau of Mines, with ample authority and funds for the investigation of and inquiries into:

(a) The methods and processes employed in the mining and quarrying industries and in the handling and treatment of mineral products with a view to aiding these industries, preventing mine and quarry accidents, and recommending appropriate legislation;

(b) The wise utilization and conservation of our mineral resources through the prevention of waste, the development of more efficient methods, etc.;

(c) The mining conditions, and the most efficient methods for the handling, treating and using of ores and other mineral products in foreign countries, with a view to benefiting American mining, quarrying and other mineral and metallurgical industries;

(d) The publication, in such form as to be readily available, of the information obtained from all these investigations and inquiries; the wide and prompt distribution of these publications among the mining men of the country; and co-operation of impartial government experts in this educational work by public addresses in mining camps and at the meetings of men associated with mining and quarrying industries—with a view to the prevention of accidents, the preventing of waste, and more efficient work.

(3) The above action is recommended with a view to the establishment from time to time of other allied bureaus and ultimately the establishment of a Department of Mines if the conditions may warrant such action.

(4) By revising existing legislation relative to mineral lands and mining:

(a) To provide for the separation of surface from underground ownership, with a view to the independent development of the mining and of the agricultural or forest industries;

(b) To prevent fraud in the entry and patenting of mineral lands; and

(c) To facilitate the disposition of these lands by lease, sale or otherwise, under such conditions as will best facilitate legitimate and practical mining.

When that was presented to Secretary Garfield, he said "I think you are entitled to a Bureau," and he is with us, although opposed to us in the first instance. Our ambition is to finally get a Department but at this time we must be satisfied with a Bureau.

DR. BUCKLEY OF MISSOURI: I want to make a few remarks this morning. In the first place I wish to announce that before the close of this session there will be a daily program issued by the program committee giving the members the program for the remainder of the day, also announcing the resolutions to be considered by the resolutions committee and the time and place where these resolutions will be submitted. Anyone wishing to introduce resolutions please take note.

I wish to say further that the members of the delegations to this Mining Congress will find that there is a less percentage of fictitious promotion being carried on in this district than in any other district of a similar size in the United States. (Applause.) I wish to say also that any fictitious promotion which is being carried on in this district so far as I know has not emanated from anyone who may reside in this district or operating in this district, but by men who live in the eastern or far distant cities who have secured holdings of uncertain value and of which they have uncertain knowledge and which they are trying to unload on people of the East who are equally ignorant. I make this statement because I believe the people of this district are worthy the commendation and respect of the mining sections of this country.

PRESIDENT RICHARDS: The meeting is open for discussion on any subject desired to be discussed by anyone.

JOHN R. WOOD of Colorado: It seems to me that it is very appropriate if it has not been done and I have been in nearly every session so far, and yet away a little of the time, so I may be out of order in that regard. If it has not been done I would think it very proper that this session or the Congress should send a message to our President at Washington, through the Secretary of this Congress, notifying him that we are in session, and of the work that we represent, and so I move that the Secretary of the Congress send a telegram to President Roosevelt in this regard.

The motion being seconded and put by the chair was unanimously carried, and the Secretary was instructed to send a telegram to the President announcing that the American Mining Congress is in session and expressing the appreciation of the Congress for the interest he has taken in its purposes.

In accordance with the above resolution the following telegram was sent.

Joplin, Mo., Nov. 14, 1907.

The Honorable Theodore Roosevelt, President of the United States, Washington, D. C.:

The American Mining Congress in Tenth Annual Session assembled tenders to you its greetings and its sincere appreciation and commendation; first, for your efforts in behalf of the wise conservation and intelligent use of the great natural resources of this country; second, for your co-operation in the work of this organization through the agency of the United States Geological Survey; third, for your promised recommendation for Congressional action, looking to the establishment at the approaching session of Congress of an independent Bureau of Mines under the Department of the Interior, which, through its investigations, inquiries and recommendations, will begin at once to further co-operate with the American Mining Congress and with the mining interests in all parts of the country in improving the increasingly complex and difficult conditions under which this industry is now being conducted.

J. H. RICHARDS,
President.
JAS. F. CALLBREATH,
Secretary.

F. WALLACE WHITE of Ohio: I would like to ask the chair if the members of this Congress have been advised that three members of the Board of Directors are to be elected at this session? I ask if they have taken into consideration or thought of the question of this organization branching out into a national movement that unquestionably will need the support of men in the East, and with that end in view, whether it might not be expedient to increase the number of our directors. After correspondence with the Secretary I was advised to lay the matter before you and I would like to get information from the chair as to the proper proceedings necessary.

PRESIDENT RICHARDS: The organization was incorporated under the statutes of the state of Colorado. Nine members were selected because it was the feeling that when you have a large membership little can be accomplished in a public meeting, and that the most of the business would be transacted by the directors. I am not entirely familiar with the method by which you can increase a Board of Directors under the statutes of Colorado, but I presume that it can be done. It is usually so in the different states. The Board has considered the question of getting men to work with us from the East especially in the coal mining regions, and that is one of the purposes I suggested last night—we are trying to travel eastward to get that class of men identified with us. I have undertaken to induce the board to select some eastern man in my place, but they have not done so. I think the same is true of each member on the board—they would be glad to be relieved from duty and would be glad to encourage a change along those lines.

MR. F. WALLACE WHITE OF OHIO: The thought in my mind was not to replace the President at all, but to increase the Board of Directors, so we could put some of these Eastern men on. I had in mind some of the men I have talked with who might be induced to go on our Board. I only wish to get information on the subject, and if there is any way to revise our By-Laws to accomplish this, I would be glad if it could be done.

PRESIDENT RICHARDS: You cannot do it by amending the By-Laws. You probably have to file an application with the Secretary of state or some other official, if the rule in Colorado is the same as in Idaho, asking for permission to increase the Board of Directors. It is purely a legal matter. The articles of incorporation fix the number of the board.

W. P. DANIELS of Colorado: All that is necessary is for the members, if they so desire, to ask that the articles of incorporation be amended increasing the Board of Directors.

PRESIDENT RICHARDS: We have undertaken to so organize our Congress that the membership of the board should be increased as the needs required.

MR. DANIELS: I suppose the discussion as to the advisability of increasing the board is not in order at the present time. That would properly come before the members themselves, perhaps, but I think it would be extremely well if the members who think of advocating an increase in the membership of the board would consider that the larger the body, with members scattered over a vast territory at considerable distances apart, the more difficult it is to hold meetings of the Board of Directors to transact business that is absolutely necessary. If I am not mistaken, there has already been some difficulty in getting a quorum of the present board together at some time during the past, and it seems to me that it is a question that should be carefully considered, and that that particular thing should be taken into consideration. The smaller the body is as a general rule, the more direct the responsibility, and the more attention is given by the member himself in fulfilling his responsibilities, and so far as I am concerned, personally, I believe it would be a bad move at this time at least to take any steps toward increasing the number of our directors.

H. J. CANTWELL of Missouri: I am not at this time a member of the corporation, but I would suggest before the meeting of the members that the Secretary announce the terms of initiation to become members so that those who are not now members may become such, and I would suggest further in this connection that while the argument is a very good one that the Board of Directors should be limited to a small number, yet it might be possible, even though the laws of Colorado may not provide for a large directory to accomplish the same result by constituting what might be called an advisory committtee of members through which the Board of Directors could communicate and who would accomplish all of the benefit of increased membership in the directory. My idea being to have a standing advisory committee, one member for each state. Not being a member I have no right to make a move in that direction but only advance the suggestion for what it is worth.

PRESIDENT RICHARDS: When you take into consideration that it costs from $300 to $1,000 a year to be a director, to pay expenses to attend these meetings and also takes considerable valuable time, it is not always easy to find a man to act in that capacity. It takes a pretty generous heart to do the work.

Any further matters you wish to take up?

The Secretary will make a statement, as suggested by the gentleman from Missouri, relative to the membership matter.

SECRETARY CALLBREATH: The laws of Colorado permit corporations for pecuniary profit a directorate of thirteen. We have nine directors. In order to change our By-Laws it is necessary that an amendment be submitted in writing to the Secretary of the organization forty-five days before an annual meeting of the members. The Secretary is required by the by-laws to send that notice to each member of the Congress thirty days before such meeting. It is necessary to follow this procedure to bring about an amendment to the By-Laws. It is possible to increase the number of directors to thirteen without question. There is some question under the laws of Colorado whether a directorate shall be enlarged above that number. The law speaks of organizations for pecuniary profit, but in the opinion of many of our lawyers it does not apply to organizations like this, not organized for pecuniary profit.

An amendment to the By-Laws can be made by giving notice of forty-five days before any annual meeting of the members.

Any person interested in the mining business may become a member of the American Mining Congress by paying an admission fee of $15 and annual dues of $10. An application for membership must be passed on by the Membership Committee, and after being accepted, a membership card and certificate of membership are issued to the member. At this point I desire to say that persons who have become members but have not yet received membership cards will please call my attention to that fact and the matter will be attended to. The qualifications for membership are, first, an interest in the mining business, and, second, a willingness to co-operate with us, by paying dues and doing such work as may be necessary to make the organization a success.

PRESIDENT RICHARDS: One thing that the Secretary omitted—a suggestion that came from Missouri, through Dr. Buckley—that we have a life membership in which the fee is $100, and no further charge after that, and that Dr. Buckley was the first life member of this organization.

If there are no further matters you desire to bring up, we will proceed with our program.

We will now have the pleasure of listening to an address which I know you will be delighted to hear, by a man fully qualified to speak on his subject. He is working under the federal government. As I understand his work it is investigations relating to the precious metals. His subject is, "Will the Increase of Gold in the World Keep Pace With the Increasing Demands of Commerce and Trade?" I take pleasure in introducing Dr. Waldemar Lindgren of Washington.

Dr. Lindgren's address will be found on page 265 of this Report.

DR. BUCKLEY of Missouri: Mr. President, I think that it is the intention of the Program Committee that these papers be discussed. Dr. Lindgren's is one of peculiar interest and such that the members and delegates should have an opportunity to discuss. If there are any questions which they care to ask, or suggestions which they care to make, it might be a good idea for them to express it at this time. I, myself, would like to ask Dr. Lindgren a question. I would like to ask Dr. Lindgren if he believes that the present economic conditions respecting labor and other matters are having a sufficient influence in curtailing the output of gold in the world to give any substance to the contention or the desire on the part of the Mining Congress that the United States government interest itself in decreasing by means of experimental stations or otherwise the cost of production of gold. I wish to ask what he thinks would be the tendency of such action on the part of the government.

DR. LINDGREN: I certainly think it would be desirable for the government to investigate the processes and improve the processes as far as possible. It is a rather new departure, of course. The United States government has not undertaken, as a rule, investigation into mining production processes, but the subject is a very important one, and I see no reason why they should not from a scientific standpoint.

DR. BUCKLEY: You think that the possibilities in that direction are sufficient to warrant such investigation—the possibilities in the direction of reducing the cost of production.

DR. LINDGREN: I think it certainly will be necessary to do something in that line, and, as I said, I think that the government would be justified in examining into those subjects. At the present time we have no such experimental stations.

FRANK E. WIRE OF ILLINOIS: I would like to ask the Speaker what is his estimate of the proportion of the gold produced last year and year before and this year that goes into the arts and sciences?

DR. LINDGREN: Of the $400,000,000 produced there annually goes into the arts and sciences about from $90,000,000 to $100,000,000; that is to say, about one-fourth.

MR. WIRE: Is the amount of gold that is going into the arts and sciences on the increase or decrease?

DR. LINDGREN: Decidedly on the increase. A few years ago it was $70,000,000 or $80,000,000. The world is now spending from $90,000,000 to $100,000,000 a year for rings and nick-nacks and things of that kind.

HORACE V. WINCHELL: I am not clear in my own mind as to the answer to the question "Will the Production of Gold in the World Keep Pace With the Increasing Demands of Commerce and Trade?" I understand that Dr. Lindgren informed us that about fifteen years ago the world's production of gold was $115,000,000 or $119,000,000. At the present time it is over $400,000,000. I should like to inquire whether it is a fact that the world's commerce and trade has increased in that proportion, and if it has not, whether a constant production at the present rate will be sufficient to keep pace with increasing commerce and trade, and whether the gold production must also increase beyond what it is at present.

DR. LINDGREN: I would not be able to answer the question definitely as to whether the demand of trade has increased in the same proportion. It certainly has increased vastly—probably not fully in the same proportion, although I have not the figures at hand to support my position conclusively. As to what it will do in the future, I have just tried to explain that it involves questions which are so difficult that I am very doubtful about the wisdom of committing one's self with definite statements about it. I have simply tried to give you the conditions at present, but what next year's conditions will be, I would be glad to tell you, but I cannot.

MR. WINCHELL: Is it not a fact that production at the present rate is adding so rapidly to the world's supply of gold that in a few years

the total amount of gold in the world is likely to be excessive—is likely to exceed the actual demand in proportion to its consumption for the past one hundred years in commerce and trade?

DR. LINDGREN: I do not think so. I think, of course, an excessive increase at this present time in one year or two years might work serious disturbances, but I do not think the increase at the rate of the last fifteen years—which has been about $20,000,000 a year—would be out of proportion. That is to say, I think the world's commerce is amply able to take care of this increase.

PRESIDENT RICHARDS: We will now have the pleasure of listening to Dr. E. W. Parker of Washington, D. C., who has always been an earnest worker in this Congress for many years. His subject is "How Long Will the Supply of Coal Meet the Increasing Demands of Commerce and Trade?"

Dr. Parker's address will be found on page 239 of this Report.

An adjournment was taken until 2 p. m.

WEDNESDAY, NOVEMBER 13, 1907.

Afternoon Session.

PRESIDENT RICHARDS: The Congress will be in order.

The Secretary then read the report of committee appointed to draft a side line law to be presented to the Federal Congress, of which Mr. James D. Hague of New York City is chairman, Mr. Hague not being present, as follows:

18 Wall Street, November 8, 1907.

James F. Callbreath, Jr., Esquire,
Secretary The American Mining Congress, Denver, Colorado.

Dear Sir: Since writing you recently I have received further communications from certain members of the Vertical Side Line Law Committee and other committees concerned in the revision of mining law, from which it is evident that the first-named committee can do nothing more at present than to report progress, as proposed in my letter to you dated October 24th, with the suggestion that the American Mining Congress, at its Joplin meeting, continue the said committee with authority and instructions to act as indicated in the above cited letter, co-operating, so far as practicable, with the Douglas Committee (appointed by the Public Lands Commission), and seeking to effect through that committee the desired introduction to the Federal Congress of a law abolishing all extra-lateral rights in patents to be granted by the United States after some fixed date, without affecting in any way any previously existing interests or vested rights.

Very truly yours,
JAMES D. HAGUE.

P. S.—I shall be unable to attend the meeting of the Congress at Joplin.

MR. DORSEY OF NEBRASKA: I move that the committee of which Mr. Hague is chairman be continued until the session of 1908.

Which motion, after being dluly seconded, was put and unanimously carried.

The Secretary then read resolutions as follows:

Resolution No 6.

(Introduced by W. D. Sidell, of Bartlesville, I. T.)

Los Angeles, Cal., November 9, 1907.

American Mining Congress, Joplin, Missouri.

Gentlemen: Our body has been informed that Congressman George A. Bartlett, of Nevada, has in course of preparation for introduction on the opening day of Congress, December 2, 1907, a bill which is of peculiar interest to all mining men throughout the country. It provides for the suspension, during 1907, of the Federal statute which requires that at least $100.00 worth of work shall be done yearly upon each claim in order for the present owner to retain title thereto.

As a result of the present financial depression, the mining sections are in a very unfortunate condition. In fact, there is no section of the country which has felt this strain more acutely than the mining section, unless it be the center of the speculating world, known to us as Wall street. It is necessary for mining men to obtain more or less of their working capital from the outside, and as is evidenced by the fact that all of the money centers are now on a clearing house certificate basis, it is next to impossible to obtain the necessary funds to carry on this work.

In addition to the above reasons, there can be found a precedent for the proposed action of Congress, in the fact that a measure with similar provisions became a law during the panic year of 1893. Unless this relief can be obtained from the National Congress there are a great many men who are making honest efforts to live up to the requirements of the Federal mining statute by developing the mineral resources of the country, who will lose all of their rights because of their inability to do the work themselves, or obtain the money to hire others.

In this way a fine opening will be made for a set of unscrupulous and scheming persons who are known as "jumpers" and whose business it is simply to wait for the expiration of the time limit and then rob the honest operator of his property. There is a practice among this class of citizens to keep a close watch upon property which is likely to lapse, and who will then take possession under a location notice, which gives them ninety days in which to perform a very small amount of work. Then at the end of this ninety days, unless they have been successful in selling out, they re-locate, thus gaining another ninety days. These never intend to mine in reality, but are simply the rankest kind of speculators, who live by their wits.

We sincerely hope that you can see your way clear to pass a resolution by your body endorsing the suspension of the assessment work as stated in this letter.

We feel sure that you appreciate the importance of such legislation, as it effects a great number of mining men and therefore have no hesitancy in asking you to take an especial interest in the proposed measure.

Thanking you in advance for what you will no doubt be glad to do, we are, with great respect,

Yours truly,

LOS ANGELES-NEVADA MINING STOCK EXCHANGE.

By M. J. MONNETTE, Pres.
By F. IRVIN HERRON, Sec.

COL. DORSEY, OF NEBRASKA: I move that the letter just read be referred to the Committee on Resolutions.

PRESIDENT RICHARDS: There being no objections it will be so referred.

The Secretary then read resolution No. 6, introduced by W. D. Sidell, of Bartlesville, I. T., as follows:

Resolved, That we deplore the unfavorable conditions brought about in that portion of the mid-continent oil and gas field lying within Indian Territory, by the recent rulings and regulations of the Secretary of the Interior, resulting practically in a suspension of operations, and resulting in incalculable loss and damage to the operators; that we extend our sympathy to the oil and gas operators in Indian Territory, and tender our co-operation in their efforts to have more equitable and salutary regulations adopted; that we urge upon the Secretary of the Interior the necessity of a speedy and radical change in existing regulations governing the leasing and operation of oil and gas lands in the Indian Territory; and particularly do we urge upon him the fairness and justice of the demands of such operators for the rescinding of the ruling of October 14, 1907, whereby the royalty to be paid the lessors may be arbitrarily increased beyond that named in the leases, and whereby the operators and lessees are required to divide their net profits with the lessor; that we believe these terms are not only unprecedented and unjust, but that they must necessarily result in permanent loss and detriment not only to the operator, but also to the Indian lessors; and, be it further

Resolved, That as a means of permanent relief to the oil and gas operators in Indian Territory, we would impress upon Congress and the

President the necessity of the removal of all restrictions upon allotments of the members of the Indian tribes therein, except such as may be necessary for the proper protection of the interests of full bloods and minors; and, be it further

Resolved, That a copy of these resolutions be furnished by the Secretary of this Congress to the members of the United States Congress and the United States Senate, and that they be asked to use their influence in securing the relief herein mentioned.

Resolution No. 7.

(Introduced by Dr. Victor C. Alderson, of Colorado.)

Whereas, the education of young men for the mining profession is a most important element in the upbuilding of the mining industry and the placing of it upon a substantial and economic basis, and

Whereas, The National Association of State Mining Schools has been energetic in urging legislation in behalf of mining education, and

Whereas, The interests of the National Association of State Mining Schools and the American Mining Congress are in many ways identical, therefore be it

Resolved, That the National Association of State Mining Schools is hereby invited heartily to co-operate with the American Mining Congress in the securing of its objects, and particularly in its efforts to secure a Department of Mines and Mining.

Resolution No. 8.

(Introduced by Mr. John Dern, of Utah.)

Whereas, Pending the building and equipment of a suitable mining temple at the headquarters of this Congress, it appears wise to make use of a mining and metallurgical laboratory already equipped at some central point in the West; and

Whereas, The University of Utah, through its duly authorized representatives, has tendered to this Congress the privilege of using the mining and metallurgical laboratories at its School of Mines, making no charge therefor, except such as will cover actual expenditures in conducting tests; and

Whereas, It appears that the laboratories at said Utah School of Mines are amply equipped for all necessary and practical tests in connection with concentrating, leaching, furnace work and other methods of testing ores; and

Whereas, Said Utah School of Mines, located at Salt Lake City, is in the heart of a region where metallurgy on a commercial scale presents a greater variety of practice and is conducted on a larger scale than in any other center of the West; therefore be it

Resolved, That the American Mining Congress does accept the offer so tendered by the University of Utah, and that said laboratories shall hereafter be the official experiment station of this Congress.

PRESIDENT RICHARDS: I think perhaps this would be a proper time to ask the Secretary to read to you the letter addressed to me as President of this Congress by Secretary of the Interior Garfield in relation to a Bureau of Mines.

The Secretary then read the letter as follows:

Secretary's Office, Department of the Interior,
Washington, D. C., Nov. 9, 1907.

Judge J. H. Richards, President American Mining Congress, Joplin, Mo.:

My Dear Sir—I have been greatly interested by your presentation of the needs of the mining industry of our country, and I am in hearty sympathy with your desire to have the national government do much more for this industry, which is one of the most important in our commercial development.

The Interior Department has been dealing with some phases of the problems which you present. I am convinced that it has not done as much as it should do and that there is now the opportunity for greatly increasing not only the work but its effectiveness as well. The classifi-

cation of the public lands; the exploring, surveying and mapping of the geological formations and mineral deposits; the investigation of the nature and extent of these deposits; the testing of fuels and building materials, the publication of information, are all subjects with which the Department, through the Geological Survey, deals. It is my earnest hope that Congress will so largely increase the appropriation available for these purposes that I can immediately increase the volume and scope of the work to meet the pressing and proper demands of legitimate mining.

I do not mean to limit my co-operation with your work to the agencies now in existence in the Department. Whatever is shown to be necessary and possible of attainment will receive my hearty support. If a special bureau be required to more successfully work out mining problems, it should of course be established.

The American Mining Congress can supply much information to the Congress in relation to whatever proposition may be presented, either in the way of additional appropriation or the organization of an additional bureau should one be thought advisable. I beg to suggest in this connection that this information be presented at the earliest moment, to the end that it may be available during the early days of the next session of Congress.

I trust I will be given the opportunity to confer with such committee as you may appoint to consider proposed legislation. If federal legislation can be suggested which will prevent much of the fraud that has been perpetrated upon the public through improper mining schemes, Congress should be urged to act. This matter, I am advised, has already been taken up effectively in some of the states. In so far as possible under the constitution, such state legislation should be supplemented by federal legislation, applicable to the greater mining corporations engaged in interstate commerce.

I trust that your committees will consider most carefully the problem of conserving and using what is left of our coal supply. The coal land laws need immediate and radical change, to the end that the growing needs of the people should be met and, at the same time, the remaining coal supply should not be wasted nor be monopolized by private interests.

I regret I cannot be present at the meeting of your Congress. Mr. Smith, director of the Survey, and Mr. Holmes, the head of its technologic branch, will, however, be there for the Department and present in detail its work. Assuring you of my appreciation of the invitation, I am,

Very truly yours, JAMES RUDOLPH GARFIELD,
Secretary.

PRESIDENT RICHARDS: If there is no objection I will refer that letter to the Committee on Resolutions to see if there is any action necessary to be taken upon a careful consideration of it.

We now have something that I know will interest you as the next on the program, and that is an address by Mr. E. G. Acheson, of Niagara Falls, N. Y., on the "Deflocculation of Non-Metalic Amorphous Bodies." Mr. Acheson is the discoverer of the process for making carborundum, the hardest known abrasive, and of which over 8,000,000 pounds are made annually in the electrical furnaces of Niagara Falls. He also discovered the process for siloxicon, a material used for refractory purposes. He has also given to the world a process for making artificial or manufactured graphite, of which product many tons are now made annually by electric furnace process and operation in Niagara Falls. His latest invention is "Deflocculated Graphite."

Mr. Acheson's address will be found on page 256 of this Report.

MR. F. WALLACE WHITE, OF OHIO: It seems to me that having listened to this scientific as well as practical illustration, I think we ought to thank Mr. Acheson.

I move that we extend a vote of thanks to the gentleman who has so nicely entertained us during the last hour.

Which motion being duly seconded, was put and unanimously carried.

The Secretary then read resolution No. 9, introduced by Maj. F. C. Vincent, of Missouri:

Resolution No. 9.

Whereas, The promiscous exploitation of illegetimate and fraudulent mining schemes throughout the United States, Canada and Europe, especially during the past year, by unscrupulous so-called promoters has resulted in the wholesale defrauding of the general public, and especially the small investor, and

Whereas, The above unlawful acts still obtain and continue unabated, and

Whereas, No other condition has so tended to discredit the fair name of the American Mining Industry throughout the world, and

Whereas, The public press has been the chief instrument used by the said dishonest promoters in their predatory efforts, now, therefore, be it

Resolved, By the American Mining Congress in annual convention assembled, that the attention of the Department of Justice of the United States and the various Attorney Generals of several states of the Union be favorably called to these flagrant violations of the laws of the states and the United States and that immediate action be taken under the law to prevent further swindling operations as herein outlined; that it is the sense of this body that such unlawful acts are in fact violations of the statutes to prevent "obtaining money by false pretense" and "general swindling," and that the public press of the country are herewith earnestly urged to assist this body by refusing further to lend its aid to this particular kind of wholesale and organized robbery.

MR. RICHARDS: We will now have the pleasure of listening to an address by Dr. J. A. Holmes, of Washington, D. C., on "The Waste of the Nation's Mineral Resources."

Dr. Holmes' address will be found on page 273 of this Report.

PRESIDENT RICHARDS: We now have on the program the report of the committee that was appointed to investigate the question of "Smelter Rates" and the controversy between the ore producers and the smelters.

MR. H. S. JOSEPH, OF UTAH: In view of the fact that most of the delegates have been burdened with a great deal of work to-day and that this is a matter of very vital importance to every ore producer, not only locally but in the whole United States, I move you that the reading of the report of the Committee on Smelter Rates and the consideration thereof be made a special order for to-morrow morning at ten o'clock.

Which motion being duly seconded, was put and carried unanimously.

An adjournment was thereupon taken until eight o'clock p. m.

MINUTES OF ANNUAL MEETING OF MEMBERS.

Held at Joplin, Mo., November 13th, 1907, 8 O'clock P. M.

PRESIDENT RICHARDS: The annual meeting of members will be in order.

The Secretary then read his annual report, as follows:

Financial Statement of Secretary for Period October 1, 1906, to November 1, 1907.

Receipts.

Cash on hand, October 1, 1906	$ 147.79
Received from life memberships	1,500.00
Received from annual memberships	2,675.00
Received from annual dues	2,990.00
Received from contributions	3,990.00
Received from Information Department	45.50

Received from exchange	8.80
Received refund Cripple Creek trip	72.25
Received refund representatives' traveling expense	5.25
Total receipts	$11,434.59

Disbursements.

(Covered by Vouchers Nos. 168 to 395½, inclusive, excepting Nos. 368 to 393 not used.)

Secretary's salary	$ 3,600.00
Stenographers' salaries	1,452.40
Organizers' salaries	625.00
Furniture and fixtures	6.50
Office expense	311.69
Printing and stationery	2,118.44
Postage	430.00
Secretary's traveling expenses	128.50
Representatives' traveling expenses	1,540.90
Miscellaneous expense, exchanges, etc.	1,028.04
Total disbursements	$11,241.47
Total receipts	$11,434.59
Total disbursements	11,241.47
Balance on hand November 1, 1907	$ 193.12

Respectfully submitted,

JAS. F. CALLBREATH, JR.,
Secretary.

SECRETARY CALLBREATH: I desire to state in connection with this report that all disbursements are represented by vouchers, the bills being first audited by the Auditing Committee appointed by the Board of Directors. The Auditing Committee has also prepared their report, which I will read as follows:

Denver, Colorado, Nov. 1, 1907.

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	$ 147.79
Receipts as follows:	
Life memberships	1,500.00
Annual memberships	2,675.00
Annual dues	2,990.00
Contributions	3,990.00
Information Department	45.50
Exchange	8.80
Refund Cripple Creek trip	72.25
Refund representatives' traveling expense	5.25
Total receipts	$11,434.59

Disbursements.

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Representatives' traveling expenses	1,540.90
Miscellaneous expense, exchanges, etc	1,028.04
Total disbursements	$11,241.47
Total receipts	$11,434.59
Total disbursements	11,241.47
Balance on hand November 1, 1907	$ 193.12

(Signed) E. L. WHITE,
E. J. REINERT,
Members Auditing Committee.

It was thereupon duly moved and seconded that the Secretary's report and the Auditing Committee's report be approved and placed on file. Said motion being duly seconded, put and carried, it was so ordered.

PRESIDENT RICHARDS: The next in order, unless you have some other matters to bring up at this time, is the selection of the committee on nominations. I will request the Secretary to read Section 3 of Article VI. of the by-laws.

The Secretary then read as follows:

Sec. 3. For the purpose of facilitating the selection of directors, there shall be elected at the annual meeting of the members, a committee of five members to be known as a nominating committee, whose duty it shall be to present to the members for their consideration the names of such persons as such committee may deem advisable to act as Directors for the ensuing year.

PRESIDENT RICHARDS: The reason of that by-law is this that while we want the members to control the selection of the board of directors, it is advisable always to find some man who is willing and will agree in advance that he will attend the sessions of the board when possible so that we may know that we are going to have an active board of directors, so that the purpose of the selection of this committee is to find out this man who will agree to serve if elected. It is for you to elect that nominating committee and for that committee to find out and recommend those men who will agree to serve from whom you will select your directors.

THOMAS HOWELL, OF COLORADO: Colorado nominates as member of that committee R. L. Martin of Denver.

C. B. BELL, OF ARIZONA: Arizona nominates Mr. Thomas Ewing.

COLONEL DORSEY, OF NEBRASKA: I nominate Mr. H. S. Josephs of Utah.

MR. H. S. JOSEPH, OF UTAH: I take pleasure in nominating Colonel H. H. Gregg of Missouri.

MR. WHITE, OF OHIO: I take pleasure in nominating Mr. C. T. Hutchinson of California.

It was moved and seconded that the nominations be declared closed. Motion carried. It was moved and seconded that the Secretary be authorized to cast the ballot of the organization for the five members named.

Which motion was put and carried, and ballot was cast in accordance with resolution.

PRESIDENT RICHARDS: That committee will immediately retire and organize and report as early as possible.

MAJOR F. C. VINCENT, OF MISSOURI: Mr. President, I would like to ask what steps are being taken to increase the membership of the American Mining Congress. I am a new member, Mr. President, and I rise to ask this for reasons that are to me vital. I am much interested in the work of the American Mining Congress. It has been my policy in the past whenever I have been affiliated with a body of this character to do my level best to make the work a success. It seems to me there never was a grander opportunity before the American Mining Congress

than the one that presents itself at this time. Some resolutions have been presented by myself at the suggestion of myself and friends of Kansas City which I do not wish to urge at this time but which will come before this body later on, but it has occurred to me, as I have stated, that there never was a grander opportunity than that which presents itself to this body. The prospects of the American Mining Congress are splendid and I feel that the time is now opportune and I hear it discussed on every hand by the mining men that the need of this great body of men interested in mining and the welfare of mining interests in every phase was never more felt than it is today. That is the reason I ask, Mr. President, what the Congress is doing to increase its membership.

PRESIDENT RICHARDS: Under the old system the money for carrying on the work of the Congress was provided by the locality where the Congress held its session, but the system was unsatisfactory because it was almost entirely given to entertainment. And I want to say as I find out from the miners of this Congress that it is not entertainment they want so much as to do business and to feel that localities interested are in sympathy with them. And therefore they took occasion to establish this body on the membership basis. We decided upon an initiation fee of $15 and $10 annual dues. Under our present membership it brings us now about $5,000. We scarcely have enough to meet the legitimate expenses of the Congress and we hope the time will come when the mining men will become so deeply concerned that we will have a membership large enough to pay the ordinary expenses of the Congress. We are just now in a formative condition, trying to get members who will pay their annual dues and help us in this work. That is the dignified way to do it. Then when we go to hold our sessions at any point, we won't ask for anything but pay our own expenses—simply ask them to give us a hall where we can meet, but we have not been able to reach that point yet. Therefore before we get a large membership it is necessary for the locality in which we hold these meetings to contribute as Joplin did, toward these expenses, but we are trying to get the communities where we go not to expend money so much for entertainment—yet these affairs of the kindly greetings that you give us here are more than money to this Congress. But we would like to be able to support it by membership dues. It takes not less than $11,000 to meet the ordinary expenses of this Congress. So far they have always been met and I hope the time will come when the miners will have enough interest in this association to join us and furnish a dignified way of supporting this institution.

MR. JOSEPH OF MISSOURI: I would very much like the chair to explain as to the qualification of any one voting upon the place for the holding of the next Congress. It appears that some have the idea that only accredited delegates can vote. Others have the idea that only members themselves who have paid their regular dues can vote. I would be much obliged if the chair would explain this for the benefit of those who are in doubt.

PRESIDENT RICHARDS: Under our system a delegate has all the rights during a session of the Congress that a member has except the right to vote for directors and that belongs to the membership only, but as to the question of determining where the next session shall be held, the delegate has the same right that a member has. We desire their advice upon the matter and the board of directors has always followed the suggestion of the delegates and members on that question. It is very desirable to have you advise us, but you can readily understand that it was necessary to have the power lodged somewhere that in the event something had transpired, after you had advised where you wanted the next session, that would make it almost impossible and inadequate for the Congress to meet there. We had to lodge the power somewhere to change that place of meeting—to make that change is necessary. The directors will follow your advice wherever possible. A delegate has the same right as a member to vote on that question.

I have been asked concerning life memberships. What is called a life membership is where a man has a right to join as a life member

by the payment of $100. It was determined (I forget just when) but it was decided that that fund should be an accumulating fund to be set aside to be used for some especial occasion when we secured our permanent building. Quite likely some man will be generous-hearted enough to help us in building our permanent home. This fund could be used to erect a statue of that man fitting for the occasion in the assembly hall in his memory. It may well be that some of the mining men of the West who have been so abundantly supplied by Nature and their energies with this world's goods and have accumulated their millions, might want to dedicate a portion of that bounty to the service of the mining men. In that case we have an accumulating fund which the Congress could use to express their appreciation of anything of that kind.

MAJOR VINCENT, OF MISSOURI: It seems to me what you need now is the sinews of war. I listened to the admirable report of the Secretary and while listening it occurred to me the work accomplished in the past is almost phenomenal considering the small amount of money used to bring it about. What we need is money now and work now. In order to get this, I think we ought to put our shoulders to the wheel. It does not seem to me that the mining men of the United States- can afford to stand up before this nation as a poverty-stricken body. It seems to me that if necessary we ought to go down in our pockets and until such time as the organization can take care of itself, furnish the necessary money. This work ought to be done. I believe that the great campaign of publicity ought to be forwarded. I believe that every mining man ought to have the interest of mining at heart and the welfare of the people at heart, and ought to take pride in this work. I believe this Congress is the body to do it, and in fact, it is the only one that would do it. What we need is money, and I want to say that people of Kansas City have talked these things over and I wish to say that the new Kansas City Mining Exchange will do its share toward furnishing you with the sinews of war. (Applause.)

SECRETARY CALLBREATH: I wish to say a word in reply to the first question of the gentleman from Missouri as to what is being done to increase the membership. We have had a traveling representative in the field since last February, who has traveled over a large part of the western territory. He has presented this matter to a great many people. He has gotten opinions on the work that ought to be done, and we have in our office a tabulation of the point of view of a large number of men whom he has interviewed during the past six months. We also have received quite a large number of members as a result of that work. We have also been in correspondence with a large number of people and have secured members through that correspondence.

With reference to the amount of money necessary to carry on the work of this organization, I wish to say to you gentlemen, there is no limit to the amount of work that ought to be done. We have tried, in our office at Denver, with a small amount of money at hand, to carry on several enterprises. We have an information bureau through which a man may make inquiries concerning mining investments. In order to carry on that work successfully the information should be gathered in from year to year, and we are doing this, and in time will have in our office informations of all the important mines.

It is the purpose of the Mining Congress to have information on all lines. We want to be able to furnish answers to any questions our members may ask concerning the mining industry. In order to do this we must have a library and one of the things we are going to have some day is a complete mining library. There is not such a thing in the world today. We want the American Mining Congress to have one so that if you come to that library you can make your own investigation. If you cannot come there, it will be the duty of the Secretary to make such investigation for you.

There are so many lines of work in which this organization can engage that as I state the amount of money which we can expend legiti-

mately and properly for the benefit of the mining industry is practically unlimited, and we hope all of our members will work for the increase of our membership. If every member would bring in another during the year it would double the returns.

MAJOR VINCENT, OF MISSOURI: We will bring in ten.

SECRETARY CALLBREATH: We must extend our influence not only to bring in members but also to carry out the idea of building a mining temple in Denver which will be one of the wonders of the world. We hope to have in that a complete mining library. We hope to have there a complete and permanent exhibit of the mineral resources of the nation, and when we have all those things in that Mining Temple and under its roof which can be used in the upbuilding of the mining industry. I believe this organization will be one which will be of substantial advantage to every member, and that he who pays his dues to the organization will be getting a substantial return for his money. I would be glad if you gentlemen would each and every one constitute himself a committee of one to increase the membership. Another thing. Whenever you feel that another Secretary can do the work better than I can you will find my resignation in your hands promptly.

H. S. JOSEPH, OF UTAH: Some of the expressions of our Secretary have lead me to think. The Utah delegation are naturally of an inquisitive sort but since coming to Missouri they have been imbued with that indomitable spirit of "show me." We have been shown a great many things by the people of Missouri. We have been shown some of the best mines in the United States, and we have been shown the best hospitality that I remember having been shown during my experience with the American Mining Congress, which extends over a period of five years. We have also been shown some of the prettiest girls I have seen west of the Mississippi. Now, Mr. Chairman, I think we are entitled to be shown by the officers of the American Mining Congress or by those who represent Colorado as to that mining home that the Secretary referred to. Some three years Salt Lake City entered into the arena and battled against Denver for the permanent headquarters of the American Mining Congress. We were beaten fairly and squarely, and we yielded as every man or every member of a community ought to do, but three years have passed, and we yet have to see the foundation stone of that temple laid. We have been promised by several individuals of Colorado, but as yet the promises are still in the air. Utah now calls upon Colorado to give an account of their stewardship. Where is the temple, the wonder that was going to be built?

MR. GALIGER, OF MONTANA: I do not wish to take sides in this controversy between Utah and Colorado, but I believe I have the same right to take the floor in the defense of Montana in the same way that Dr. Buckley had to take the part of Joplin, Missouri with reference to the paper which has been presented here. I feel that no member of this Congress, if matters not what the proposition is—has the right and the right should not be delegated to him, of making a report on a mining property which, as Dr. Buckley has said, he is not fitted to judge. We have excellent and competent mining engineers who have passed through the various colleges, have paid their money to become educated so that they may be able to advise the public, and who are in a position to report correctly, and who are at this time endeavoring to have laws passed whereby they will be responsible for reports which they will make upon the various mining properties; and therefore I say that it ought not to be within the province of you or I or any other member of this Congress to make reports, or knock against any man's proposition. We call that knocking in our country. What right would I have to make a report on a mining property located in Nevada or anywhere else, that I had not seen. None whatever. Now I say this in the kindliest of feeling, but I think it is wrong, and I think that those propositions should be referred to our mining experts and to those men who have studied mines and minerals and who shall receive a just compensation for the work which they have before them. Thank you. (Applause.)

COLONEL EWING: The report of the Committee on nomination is ready.

The Secretary then read the report of the Committee of Nominations as follows:

Joplin, Mo., Nov. 13, 1907.

Your Committee on Nominations makes the following nominations:

For three years,

John Dern of Utah,

George W. E. Dorsey of Nebraska,

Dr. E. R. Buckley of Missouri.

For one year term,

A. L. White of Ohio.

R. L. MARTIN,
Chairman.

DR. HOLMES, OF WASHINGTON, D. C.: I make the motion that the Secretary be instructed to cast the ballot of the members of this organization for the four names that have just been read as directors of this organization.

MR. WHITE, OF OHIO: I second the motion.

The motion being then put by the chair was unanimously carried and the Secretary was so instructed.

SECRETARY CALLBREATH: In accordance with your instructions I have cast the unanimous ballot of the members present for John Dern, George W. E. Dorsey and E. R. Buckley to serve as directors for three years, and for A. L. White to serve as director for one year and until their successors are duly elected and qualified.

PRESIDENT RICHARDS: This elects four directors for the terms stated. These four men of course I know personally and I have never seen such devotion to the cause in my life as I have seen from these men that have just been elected as members of this board. They have spent their money and given their time, and I think that it is an expression of confidence in those men to re-elect them which they will fully appreciate.

MR. JOSEPH, OF UTAH: I renew my question of information about the mining temple. We are entitled to know something of what has been done.

PRESIDENT RICHARDS: I really have no control over the Colorado delegation.

MR. JOSEPH: Here they are.

PRESIDENT RICHARDS: They don't seem ready to respond.

T. M. HOWELL, OF COLORADO: I want to state, Mr. Chairman and fellow delegates, when I was elected chairman of our delegation, I did not suppose for one moment that they were going to call upon me to respond to anything in the convention. It was simply to look after the men here. I will state, however, that looking over the program I find our ex-Governor C. S. Thomas was to report on this matter. I saw Governor Thomas a few days before I left Denver, and it was the understanding that he would be here, but Governor Thomas was detained in Iowa as I understand it, before the Iowa Supreme Court, and could not be here. I think probably some other member of the delegation knows more about the temple proposition than I do. I am simply offering this as an explanation of why the report has not been made. As far as talking about the temple is concerned, there are quite a bunch of orators in our delegation. I don't happen to be one of them.

DR. J. A. HOLMES: There is a point with reference to increasing the membership of the Congress. The growth of an organization depends upon the work of the organization, upon the enthusiasm, and the conscientious straightforward work of the members, and the effort made by the members of this organization toward inducing others to join the organization. It is worth a great deal more than any effort which any one person can make or any small number of persons. I am glad the Secretary has made the efforts which he has by sending a representative through the country, in soliciting memberships for this organization, but I think the way to get members from this time on is through the individual

effort of members already existing in the organization. I think the suggestion made that every member should secure not one or two or three or four members but ten, as the gentleman suggested, a point to be considered by the enthusiastic worker as the minimum of the influence he would bring to bear and the number of members he would look forward to bringing into the organization and the policy to work to. I believe if the 400 active members of this organization will be active in reality that we will have not 400 but several thousand of members within the next few years. I think that is within the possibilities, and I think it is within the practical, and I think it is the thing to do.

MR. R. H. KEMP, OF WASHINGTON: It appears to me that there should be a great deal more publicity about the Mining Congress and some means should be devised whereby its objects and aims should be promulgated throughout the United States. I may be on delicate ground, being editor of the Northwest Mining Journal, but I think this Congress ought to be more thoroughly advertised. Not long ago in the city of Spokane in the office of the ex-district judge of the territory of Washington, an ex-United States senator was present, when your representative called and talked to him regarding the American Mining Congress. After some conversation the ex-United States senator scratched the bald place on his head and said: "An institution I know nothing of." After being entertained as I have been in the state of Missouri—the greatest entertainment I have ever had upon the Atlantic or Pacific coast, I am almost ashamed to say that that ex-United States senator was born in the state of Missouri. I take the responsibility of saying that we need more publicity. We want others to know what we are, what our objects are and what we are doing.

MR. FRANK E. WIRE, OF ILLINOIS: Relative to the matter of obtaining more members for the American Mining Congress I think that we ought to adopt some plan to bring about an increased membership. I have a little suggestion to make along this line and it is this: That every member of the American Mining Congress give three names of desirable people, of his best friends, to the Secretary, and that the Secretary write to these three individuals and say "Mr. John Smith, your friend, has suggested that I write you relative to your becoming a member of the American Mining Congress." Write him a nice letter, giving him information concerning our organization, its purposes, etc. Tell him that Mr. John Smith would be glad to give him further information. Let the Secretary keep in touch with these people. I believe in this way we could greatly increase our membership. I believe that fifty per cent. of these names could be brought into the organization. I believe this is practical and feasible and that it will work. What we want here is active work and not theories. We want something to do, something we can act on, and if everyone constitutes himself a committee of one to go out and get members, we will get members. In the first years of its life the American Mining Congress was a joke, but now it is compelling the respect of not only people in high places in the government of the United States, but by foreign consuls in this country, for the careful management for its ideals and for the enthusiasm its members have shown for the good of mining interests and the work of the organization. Another thing, the American Mining Congress used to be considered a Western or a Southwestern Congress; it was not considered as an American institution, but the progressive policy of its management has now placed it where it is a national mining congress, an American Mining Congress in reality. I would like to see the plan which I have suggested tried.

MAJOR F. C. VINCENT, OF MISSOURI: I would like to take issue in some respects with the gentleman from Illinois. When Dr. Bell first invented the telephone he was a joke. When Morse invented the telegraph he was a joke. When practically all the institutions we now enjoy first came to the notice of the people they were jokes. I believe the American Mining Congress is and always has been a dignified institu-

tion from the time of its inception and that it has reached that postion where it is a representative body of representative mining men.

Now, as to the matter of correspondence. I think personal work can do much more than letters. I have not the least hesitancy in the world in turning down my best friend through a stenographer, but when my best friend takes off his coat and spends two or three hours with me, stays with me and keeps after me week in and week out and month after month and gives me no peace until I do what he wants me to, it is pretty likely that he will get me on his proposition. I find in my own business that a long distance proposition does not appeal to me. But if a man comes where I am and gives me a personal talk, if his proposition is any good, I am usually in the end with him. This endless chain proposition will work, as it did with the National Druggist Association, which started with twenty members and now has 20,000. Its the personal work that counts.

MR. JOHN DERN, OF UTAH: I know that my friend Mr. Joseph will not be satisfied unless his inquiry as to the present status of the mining temple is answered, I believe that before closing this session this matter, which concerns us all, should be taken up and that it is the duty of the board of directors to give the report called for, so that all of us present may know what has been and is being done. We would like to know the present status. Our worthy Secretary, Mr. Callbreath, I believe is in a position to give us this information and I ask him to explain it to every one present so that we may know in just what state the American Mining Congress Temple is.

SECRETARY CALLBREATH: After the location of the permanent home in Denver, various plans were discussed. Your Secretary undertook to bring about the adoption of a plan to erect such a building from the proceeds of a sale of bonds. The plan was carefully prepared upon the basis of a bond issue of $300,000, it being expected that the bonds would be issued for a long time and at a low rate of interest, and that individuals could be induced to subscribe for these bonds partly as an investment and partly as a matter of assistance to the American Mining Congress in its work. It was proposed at that time to put up a business block, to keep one or two floors, or whatever space might be necessary, for the work of the Congress and to lease out the other rooms, and as our departments should grow, to cut down the space occupied by tenants, and eventually to have the building to ourselves. That these bonds could be paid out of membership dues, and fees and from the revenue derived from the building.

This plan was presented to your board of directors. Your President and one or two of the other directors felt that when this building was completed, it should be paid for, and after conference with prominent mining men in Denver, who also agreed with the directors the bond plan was not approved. It was thought best to postpone the entire matter until provisions could be made to raise the cash necessary for such a building. It was believed the building should be paid for when completed, that it should be a monument to the mining industry, and that it should be so arranged as to its ownership that it would not be possible that it should ever be used for any other purpose. It was also suggested that the legislature pass a bill providing that the state of Colorado should hold in trust such building and appropriating $250,000 for the purpose of building this temple. Such a bill was presented to the legislature but it was found that there was no money available in the state fund out of which the money could be appropriated.

The matter was presented to the finance committees of the two branches of the legislature and they agreed if it was possible to find the fund that the money would be appropriated, to be held in trust by the state of Colorado for the benefit of the Congress, to be used in the building when arrangements were completed. We did finally succeed in getting a small appropriation for that purpose—an appropriation of $10,000 and the bill was passed in that form so that we are now ready to proceed

along that line. The Colorado members of the Congress have not been asleep. The President and the Directors have believed that some mining man in this country, having made his millions, will donate money for this purpose, with the idea of making this temple so magnificent that there will be nothing like it in this western country. It is now proposed to raise $1,500,000 for that purpose.

PRESIDENT RICHARDS: It may be fitting for me to say something in this connection. I do not want to shirk responsibility in this matter. It is evident that the Secretary has shifted responsibility on my shoulders. The Colorado people came before the Board of Directors and presented the outline of a plan to raise money for a mining temple by the issuance of bonds, and a large part of the directors were in favor of this plan. After hearing what they had to say, I said to my colleagues, "That is entirely too cheap according to my ideas. I believe that the mining men of this country, when they bring the great possibilities of mining before the American people, and the American miner, that he has got generosity enough in his heart to build on that great site in Colorado, with that magnificent view in front of him, a temple that will be worthy of the mining industry of America." I said, "If I am the man that ever gives enough to build that temple, I want it dedicated to that use forever. I don't want it sold out under a bond foreclosure or a mortgage foreclosure, and let somebody get it for nothing. I don't want it sold on a debt or for taxes. I want to know the building is to be dedicated for all time to come to the uses and for the benefit of the mining industry of this country." I said "Don't be in a hurry. When you get this thing in shape. When you need this money, you will get it." My aim is to get on a foundation worthy of this Congress and of the mining men of the country. I said "That is the foundation on which I want it to rest—not on a bond foreclosure. I have no question in my mind about the money. That is a small thing. What I want to do is just to get the hearts of the mining men united. I haven't any question about our getting two million, if we need it, not a bit. I haven't any doubt about it. It is possible, if you are not in too big a hurry. (Applause.) The thing to do is to get the hearts of the mining men warm, to insure their co-operation, and when their hearts are right, we will get the money.

I am perfectly willing to assume the responsibility of this delay. I did state to those men, if we raise money to build the temple, Colorado must endow it so that it wll be a monument to the mining interests forever. They have agreed to do that or we will take it somewhere else where they will do it. What Colorado will not do, somebody else will. I believe we will erect there in the midst of those great mountains, a temple that will express all that is grand, beautiful and enduring in mining, and I believe the men will come forward for that purpose. And I believe when that is done, we will have interest enough in those men who have made it possible to erect this temple, that the statues of those men will be placed in the temple as an inspiration to the mining men of this country for all future years. That is why I stated to you that we were putting aside a permanent fund for that purpose.

I know in the years that are yet to come a few more of those great big mining men like you saw sitting on the stage last night with the fidelity they have shown during the last five years will join us, and we will command the respect of this great country for our generation. We have it now. When we go down there and have a conference with the Secretary of the Interior and at the first conference he says "No. You are not entitled to that;" at the second conference he says: "I am in doubt;" and at the third conference, he says: "Your are right," we are gaining ground. We have sent annually to the President of the United States, ever since the present one has been in office, resolutions and letters asking his support. We never have had it so far, but when you go right directly before him, representing with full authority to speak for the mining men of the Western country, he says "What do you mining

men want." I told you last night what we told him, and we got it in a minute. He is that kind of a man, and he will do just what he said he would do. We will get the law passed and on that we will found a department. That this nation will be brought to give us the same service it renders to the agriculturist.

Suppose it takes ten years to build our temple. Our ideas may change in that time, but when we get it, it will represent all that is beautiful and grand and enduring and useful. If I am wrong in that, I am glad to be corrected, but I think I am responsible to a large extent for the delay in this matter because I am trying to work out a problem.

I am glad to hear these expressions from you, no matter whether you agree with me or not. It is better that you should disagree so that the best may be brought out. I may not be expressing that which is best, but if I am not, you ought to express it. I think at this time I am justified in saying that I agree in the remarks of the gentleman from Montana about this information bureau. It has never pleased me. It does not seem to me it is along the right lines. I know we undertook it for a while with my tacit consent, but I am not pleased with it. It does not impress me favorably, but at the same time if any good can be brought from it, I am willing to put aside my personal views along that line.

I want you to express yourself—what you think in these matters so that I can catch a good thought from you. You have placed me here this year to guide the deliberations of this body next year. I have no words in which to express the gratitude I feel for the confidence that has been placed in me for the past five years. When you can find a better man than myself for the place, I hope for the sake of every one you will select him in my place, and I will be the first man to support him, but until you do and you feel you need me, you have the right to command me.

It has been suggested to me that on account of the time which it has taken and the expenses I have incurred I ought to have a salary. I said "When you undertake to put me on a salary, I withdraw. When you undertake to give me a salary, you take away my power, just as they did with Sampson when they cut his hair. I want to do this work, because I want to arouse the best of the mining men of the country. I have directors for the next year in whom I have the most absolute confidence. Let us hear your expression on these matters. I hope I have not detained you too long.

If there is no further business to come before this meeting, if there is no objection, we will stand adjourned until tomorrow at 9:30.

THURSDAY, NOVEMBER 14, 1907.

Morning Session.

VICE PRESIDENT BUCKLEY: The Congress will come to order.

COL. DORSEY: As Chairman of the Resolutions Committee I report the following substitute for resolutions No. 1, which I will ask the Secretary to read.

The Secretary read the resolution as follows:

Resolutions No. 1.

The following is offered by the Committee on Resolutions as a substitute for Resolution No. 1, and embodies the resolution introduced by Mr. Lewis E. Aubury, of California:

Whereas, Many evils are recognized to exist in the acquisition of title to the public lands of the United States under the present laws of the United States; and,

Whereas, It is recognized that the present laws of the United States do not adequately provide for all the conditions under which mineral deposits are now known to occur, neither sufficiently protecting the rights of the people against the speculative acquirement of large areas of the

national domain, nor enabling the honest acquirement of such areas of territory as modern conditions have shown to be necessary in many cases. Therefore, be it

Resolved, That the American Mining Congress, in convention assembled, urges upon the Congress of the United States, the immediate revision of the public land laws in such a way as to correct the evils cited above. And be it further

Resolved, That pending the passage of such a revised general land law the American Mining Congress recommends the enactment of a law providing that on all patents for lands classified as other than mineral which may be issued in the meanwhile, all mineral rights shall be reserved by the government and that separate patents shall be issued for such mineral rights after the proper requirements have been complied with.

Upon motion duly made, seconded and put, the resolution was adopted.

COL. DORSEY: The Committee on Resolutions then reported back Resolution No. 7, offered by Dr. Alderson, with an amendment striking out "Department of Mines and Mining" and substituting therefor "Bureau of Mines and Mining." with that exception Resolution No. 7 is recommended for adoption. The Secretary will read the Resolution as amended:

The Secretary read the Resolution as follows:

Resolution No. 7.

(Introduced by Dr. Victor C. Alderson, of Colorado.)

Whereas, The education of young men for the mining profession is a most important element in the upbuilding of the mining industry and the placing of it upon a substantial and economic basis, and

Whereas, The National Association of State Mining Schools has been energetic in urging legislation in behalf of mining education, and

Whereas, The interests of the National Association of State Mining Schools and the American Mining Congress are in many ways identical, therefore be it

Resolved, That the National Association of State Mining Schools is hereby invited heartily to co-operate with the American Mining Congress in the securing of its objects, and particularly in its efforts to secure a Bureau of Mines and Mining.

Upon motion duly made, seconded and put, the Resolution was unanimously adopted.

COL DORSEY: Mr. President, a letter from the Nevada and Los Angeles Mining Stock Exchange and a telegram from Congressman Bartlett of Nevada, asks this Congress to adopt a resolution recommending that the assessment work required for the year 1907 be omitted, was referred to this comittee. It would be impossible for Congress to take action during the month of December. Such a proposition could scarcely be introduced in time to take effect during this year, so your committee deem it wise to ask that this matter be laid upon the table. I therefore make a motion that it be laid upon the table.

Which motion being duly seconded, and put, was unanimously carried.

Report of Credentials Committee made as follows:

Joplin, Mo., Nov. 14, 1907.

To the Tenth Annual Session of the American Mining Congress:

We, the members of the Credentials Committee, find upon examination of the credentials presented that the following number of persons, from the different States, respectively, are entitled to seats in this Congress as Delegates:

Alaska	2
Arizona	5
Arkansas	32
California	4
Colorado	21
Connecticut	1

District of Columbia	7
Idaho	5
Illinois	27
Indiana	6
Indian Territory	5
Iowa	1
Kansas	43
Massachusetts	2
Mexico	1
Michigan	1
Minnesota	3
Mississippi	1
Missouri	105
Montana	2
Nebraska	2
Nevada	6
New Mexico	5
New York	4
Oklahoma	7
Ohio	12
Pennsylvania	5
South Carolina	1
South Dakota	2
Tennessee	3
Texas	1
Utah	9
Washington	2
West Virginia	2
Wisconsin	4
Wyoming	5
Total	344

(Signed) E. O. BARTLETT, Chairman.

(Signed) H. W. WILKER, Secretary.

(Signed) CHAS. T. HUTCHINSON.

List of Delegates.

ALASKA.

Yarmell, L. G.	Nome
Baldry, H. G. C.	Fairbanks

ARIZONA.

Bell, C. B.	Douglas
Badger, S. S.	Douglas
Dooglan, S. S.	Douglas
Lewandowski, J. A.	Douglas
Royce, W. K.	Tucson
Ewing, Col. Thos.	Vivian

ARKANSAS.

Bunch, J. A.	Harrison
Campbell, W. P.	St. Joe
Estes, Ambrose W.	Yellville
Gehr, P. H.	Mountain Home
Crane, A. T.	Kenden Springs
Duncan, G.	Dodd City
Hand, J. H.	Yellville
Por, A. A.	Harrison
Purdue, A. H.	Fayetteville
Smith, H. W.	Led Hill
Zimmerman, Ed.	Harrison
Floyd, J. C.	Yellville

Layton, W. E. ..... Yellville
Jackman, H. H. ..... Fort Smith
Brown, L. L. ..... Zinc
Crampton, E. J. ..... Leslie
Buie, Henry T. ..... Buffalo
Fredricks, L. G. ..... Buffalo
Payne, H. R. ..... Yellville
Lane, L. M. ..... Eureka Springs
Lane, Mrs. L. M. ..... Eureka Springs
Lane, Zella ..... Eureka Springs
Barham, E. ..... Zinc
Cane, D. W. ..... Zinc
McDonald, John ..... Helena

CALIFORNIA.

Ward, W. W. ..... San Francisco
Hutchinson, Chas. T. ..... San Francisco
Sargent, Geo. M. ..... Los Angeles
Harper, J. H. ..... Los Angeles

COLORADO.

Alderson, Victor C. ..... Golden
Comstock, A. R. ..... Idaho Springs
Clerc, F. L. ..... Denver
Daniels, Wm. P. ..... Denver
Hoskin, Arthur J. ..... Golden
Howell, T. M. ..... Denver
Koch, W. A. ..... Denver
Gardner, J. M. ..... Cripple Creek
Proske, T. H. ..... Denver
Wetherill, W. C. ..... Denver
Thomas, W. B. ..... Canon City
Thompson, H. L. ..... Denver
Wood, John R. ..... Denver
Martin, R. L. ..... Central City
Dubbs, Capt. J. A. ..... Denver
Callbreath, Jas. F. ..... Denver
Davis, Robert W. ..... Silverton
Davis, Mrs. R. W. ..... Silverton
Downey, Chas. J. ..... Denver
Pease, L. A. ..... Slater
Mills, W. F. R. ..... Denver

CONNECTICUT.

Huntoon, L. D. ..... New Haven

DISTRICT OF COLUMBIA.

Hess, Frank L. ..... Washington
Campbell, M. R. ..... Washington
Lindgren, Waldemar ..... Washington
Smith, Geo. Otis ..... Washington
Brooks, Alfred H. ..... Washington
Upham, Nellie C. ..... Washington
Holmes, Dr. J. A. ..... Washington

IDAHO.

Samuels, H. H. ..... Wallace
Berkshire, J. H. ..... Boise
Berkshire, Mrs. J. H. ..... Boise
Whitsel, R. P. ..... Wallace
Richards, J. H. ..... Boise

ILLINOIS.

Bain, H. Foster ..... Urbana
Baxter, E. J. ..... Nauvoo
Clark, H. S. ..... Chicago
Christy, G. ..... Murphytown
Douglan, W. A. ..... Chicago

DeWolf, F. W. . . . . Champaign
Ede, J. A. . . . . La Salle
Fisher, A. C. . . . . Chicago
Holman, J. W. . . . . Chicago
Tisley, Lyman A. . . . . Chicago
Kutch, W. G. . . . . La Salle
Murray, Hugh. . . . . Equality
Murray, Mrs. Hugh. . . . . Equality
George, C. W. . . . . Chicago
Greene, L. A. . . . . Chicago
Moravia, W. . . . . Chicago
Newson, R. . . . . Peoria
Noon, Thomas F. . . . . Peru
Girley, L. A. . . . . Chicago
Skinner, M. B. . . . . Chicago
Treat, Curt M. . . . . Chicago
Terrill, H. . . . . Colchester
Wire, Frank E. . . . . Libertyville
Lake, John. . . . . Perry
Elmer, H. M. . . . . Chicago
Rice, G. S. . . . . Chicago

INDIAN TERRITORY.

Colman, G. L. . . . . Miami
Neal, W. B. . . . . Miami
Robinson, J. F. . . . . Miami
Pelson, F. D. . . . . Wallace
Rozelle, F. M. . . . . Wallace

IOWA.

Campbell, D. O. . . . . Cleveland

KANSAS.

Cooley, B. . . . . Galena
Hazen, J. H. . . . . Curranville
Moore, J. C. . . . . Galena
Mackie, D. J. . . . . Scammon
Mackie, Mrs. D. J. . . . . Scammon
Gilday, F. . . . . Pittsburg
Clure, A. W. . . . . Galena
Nevins, E. S. . . . . Pittsburg
Fry, G. A. . . . . Iola
Stevens, C. V. . . . . Iola
Rodgers, J. O. . . . . Iola
Keplinger, Mrs. M. E. . . . . Baxter Springs
Cooke, H. H. . . . . Lawrence
Holliday, John. . . . . Pittsburg
Vest, T. J. . . . . Galena
Watson, J. W. . . . . Baxter Springs
Watson, Mrs. J. W. . . . . Baxter Springs
Ping, Robert. . . . . Galena
Bramlette, S. A. . . . . West Mineral
Gilman, Robert. . . . . Pittsburg
Young, C. M. . . . . Lawrence
McClure, W. H. . . . . Iola
Pompeney, Dr. Jos. A. . . . . Frontenac
Lindsay, W. M. . . . . Pittsburg
Spencer, Chas. . . . . Stippeville
Bickell, Peter . . . . . Frontenac
McManus, P. L. . . . . West Mineral
Haworth, E. . . . . Lawrence
Sneever, C. D. . . . . Columbus
Mason, E. E. . . . . Independence
Fletcher, Joseph. . . . . Fontenac
Lynch, John. . . . . Pittsburg

Mason, L. C. . . . . Independence
McElhenie, A. J. . . . . Pittsburg
Howat, Alex. . . . . Pittsburg
Sweeney, C. M. . . . . Weir City
Williams, J. H. . . . . Weir City

MEXICO.

Gregory, J. R. . . . . Boutery

MISSOURI.

Ameling, H. R. . . . . St. Louis
Clushong, J. F. . . . . Fredericktown
Torr, Mrs. A. L. . . . . Alba
Buckley, E. R. . . . . Rolla
Buckley, Mrs. E. R. . . . . Rolla
Thomas, R. C. . . . . Bevier
Brinsmade, R. B. . . . . St. Louis
Bowles, W. A. . . . . Granby
Bowles, Mrs. W. A. . . . . Granby
Hogan, W. G. . . . . Kansas City
Underwood, J. R. . . . . Granby
Underwood, Mrs. J. R. . . . . Granby
Buehler, H. A. . . . . Flat River
Veatch, J. C. . . . . Webb City
Bruce, F. D. . . . . St. Joe
Watson, Wm. . . . . Webb City
Durley, John. . . . . Carthage
Warne, G. W. . . . . Carterville
Erner, Mrs. C. A. . . . . Alba
Watermann, C. H. . . . . Aurora
Elliott, Mrs. C. E. . . . . Oronogo
Wilker, H. W. . . . . St. Louis
Hevghill, J. P. . . . . Joplin
Monurl, George. . . . . Moberly
Kingston, J. . . . . Granby
Ground, C. W. . . . . Carthage
Kirby, E. B. . . . . Flat River
Newell, J. P. . . . . Carthage
Leonard, W. D. . . . . St. Louis
Perkins, E. . . . . Granby
Moore, Mrs. J. A. . . . . Oronogo
Perkins, Mrs. E. . . . . Granby
Gamm, G. P. . . . . Monett
Ragland, W. . . . . Webb City
Gatch, Elias S. . . . . St. Louis
Smith, C. H. . . . . Carterville
Brand, J. H. . . . . Canon City
Cantwell, Harry J. . . . . St. Louis
Lamgenhol, A. D. . . . . St. Louis
Spencer, Mrs. N. C. . . . . Sarcoxie
Moore, Miss M. D. . . . . Sarcoxie
Vincent, Maj. F. C. . . . . Kansas City
Vincent, Mrs. F. C. . . . . Kansas City
Crall, J. S. . . . . Kansas City
Shephard, Prof. E. M. . . . . Springfield
Cole, Amadee B. . . . . St. Louis
Ladd, G. E. . . . . Rolla
Scott, W. H. . . . . Aurora
Coleman, M. L. . . . . Aurora
Reppy, W. E. . . . . Carl Junction
Jones, T. C. . . . . Webb City
Swinford, C. G. . . . . Pickering
Morse, P. R. . . . . St. Louis
Boyd, J. S. . . . . Carthage

Robinson, R. C. . . . . Kansas City
Johnson, R. C. . . . . Carl Junction
Tandum, C. W. . . . . Carthage
Etter, J. F. . . . . Kansas City
Proudfit, H. K. . . . . Kansas City
Burkhardt, G. L. . . . . Joplin
Clark, Hon. . . . . Kansas City
Germern, A. H. . . . . Webb City
Brihir, D. J. . . . . Webb City
Wing, L. W. . . . . Joplin
Whiteside, ... Carthage
Bowlen, J. A. . . . . Kansas City
Cole, H. C. . . . . Carterville
Campbell, W. J. . . . . Kansas City
Kane, W. B. . . . . Carterville
Stone, R. S. . . . . Carterville
Gondborn, W. J. . . . . Carterville
Campbell, H. C. . . . . Carterville
Kelton, Mrs. T. W. . . . . Aurora
Miller, Mrs. E. B. . . . . Aurora
Mathis, Mrs. M. . . . . Aurora
Pfan, Mrs. E. W. . . . . Aurora
Horstman, G. W. . . . . Kansas City
Sinclair, P. R. . . . . Aurora
Sinclair, Mrs. P. R. . . . . Aurora
Elliott, C. E. . . . . Oronogo
Elliott, Mrs. C. E. . . . . Oronogo
Marchbank, H. B. . . . . Joplin
Fortis, J. B., Jr. . . . . Kansas City
Gounde, C. W. . . . . Carthage
Wampler, W. W. . . . . Webb City
Ayers, J. F. . . . . St. Louis
Newell, J. P. . . . . Carthage
Malcolmson, J. W. . . . . Kansas City
Jansen, L. H. . . . . Kansas City
Young, L. E. . . . . Rolla

MICHIGAN.

Richmond, N. S. . . . . Calumet

MINNESOTA.

Winchell, H. . . . . Minneapolis
Winchell, Mrs. H. . . . . Minneapolis
Brown, F. A. . . . . Duluth

MISSISSIPPI.

Roach, Miss E. . . . . Sardis

MONTANA.

Galiger, C. . . . . Butte
Galiger, Mrs. C. . . . . Butte

NEBRASKA.

Dorsey, Geo. W. E. . . . . Fremont
Oberfelder, R. S. . . . . Fremont

NEW YORK.

Fowler, S. N. . . . . New York City
Porter, William M. . . . . (Madison Sq. Garden) New York City
Ingalls, W. R. . . . . (505 Pearl St.) New York City

NEW MEXICO.

Whiteside, D. B. . . . . Cappertoe
Whiteside, Mrs. D. B. . . . . Cappertoe
Adams, A. K. . . . . Socorro
Bent, Geo. B. . . . . Tularosa
Marschall, B. F. . . . . Albuquerque

PENNSYLVANIA.

Stoek, H. H. . . . . Scranton
Owens, W. D. . . . . Pittsburg
Wilkins, W. O. . . . . Pittsburg
Kirkwood, A. B. . . . . Pittsburg
Weeks, W. S. . . . . Pittsburg

NEVADA.

Riepe, Richard A. . . . . Ely
Ladd, N. P. . . . . Carson City
Bride, Edwin L. . . . . Reno
Burk, P. . . . . Yerington
Burk, Mrs. P. . . . . Yerington
Hanby, J. Walter. . . . . Yerington
Hanby, J. Walter, Mrs. . . . . Yerington
Elkins, John T. . . . . Goldfield

OHIO.

Harmon, B. H. . . . . Columbus
Patrick, Fred L. . . . . Columbus
Caylor, Edward H. . . . . Columbus
Bassell, John Y. . . . . Columbus
Lentz, John J. . . . . Columbus
Bennan, E. H. . . . . Cleveland
White, F. Wallace. . . . . Cleveland
White, Mrs. F. W. . . . . Cleveland
Bartlett, C. O. . . . . Cleveland
White, Arthur L. . . . . Lima

OKLAHOMA.

Flagger, E. D. . . . . Perry
Flagger, Mrs. E. D. . . . . Perry
Gould, D. N. . . . . Norman
Sidell, Wm. T. . . . . Bartletsville
Gault, D. A. . . . . Bartletsville
Gault, Mrs. D. A. . . . . Bartletsville
Vore J. H. . . . . Stillwater

SOUTH CAROLINA.

Scaife, H. L. . . . . Clinton

UTAH.

Andrew, W. B. . . . . Salt Lake
Bradford, R. H. . . . . Salt Lake
Dern, John. . . . . Salt Lake
Joseph, Harry S. . . . . Salt Lake
Lehman, B. N. . . . . Salt Lake
Riter, Geo. W. . . . . Salt Lake
Brimhall, Geo. H. . . . . Provo
Knight, Jesse. . . . . Provo
Knight, Mrs. Jesse . . . . . Provo

WASHINGTON.

Krury, R. H. . . . . Spokane
Kemp, Randall H. . . . . Spokane

WEST VIRGINIA.

Payne, Dr. Henry M. . . . . Morgantown
Paul, James W. . . . . Charleston

WISCONSIN.

Wright, E. O. . . . . Milwaukee
Dugdale, R. I. . . . . Platteville
Smalley, S. E. . . . . Cuba City
Fox, Morris F. . . . . Madison

WYOMING.

Minimn, A. E. ..... Casper
Grant, M. N. ..... Laramie
Saul, Henry. ..... Laramie
Rife, Ed. H. ..... Rock Springs

LIST OF MEMBERS OF THE AMERICAN MINING CONGRESS.

Life Members Marked (L).

Abbott, A. F. ..... Denver, Colorado
Acheson, Edward G. ..... Niagara Falls, New York
Adams, Arthur K. ..... Socorro, New Mexico
Adams, Everett F. ..... Reno, Nevada
Airis, E. H. ..... Salt Lake City, Utah
Akers, C. H. ..... Phoenix, Arizona
Alderson, Victor C. (L.) ..... Golden, Colorado
Alexander, F. J. ..... Denver, Colorado
Allen, C. A. ..... Deadwood, South Dakota
Allen, Watson ..... Seattle, Washington
Ameling, H. R. ..... St. Louis, Missouri
Anderson, Chas. H. ..... Denver, Colorado
Anderson, G. Scott ..... Wallace, Idaho
Arkell, Edwin ..... Reno, Nevada
Armstrong, L. K. ..... Spokane, Washington
Atwood, Mrs. E. C. ..... New York City
Auerbach, S. H. ..... Salt Lake City, Utah
Ayers, Geo. V. ..... Deadwood, South Dakota
Azbell, Chas. C. ..... Eaton, Arkansas
Bailey, G. E. ..... Los Angeles, California
Bailey, R. W. ..... Denver, Colorado
Baker, E. P. ..... Laramie, Wyoming
Baker, Henry C. ..... Ogden, Utah
Baldwin, M. M. ..... Cripple Creek, Colorado
Bartlett, C. O. ..... Cleveland, Ohio
Bartlett, Sydney E. ..... Cheyenne, Wyoming
Baumgartner, Matt (L.) ..... Spokane, Washington
Becker, Chas. M. ..... Victor, Colorado
Bedell, S. A. ..... Needles, California
Beeler, Henry C. ..... Cheyenne, Wyoming
Beekman, Edd A. ..... Washington, D. C.
Belcher, J. R. ..... Salt Lake City, Utah
Bell, C. B. ..... Douglas, Arizona
Bell, Edward ..... Cripple Creek, Colorado
Bellamy, Chas. N. ..... Evansville, Indiana
Bentley, L. B. ..... Organ, New Mexico
Benzie, W. R. ..... Denver, Colorado
Bernier, R. L. ..... Chicago, Illinois
Bettles, A. J. (L.) ..... Salt Lake City, Utah
Beveridge, A. E. ..... Salt Lake City, Utah
Bidwell, Geo. F. ..... Omaha, Nebraska
Blatt, John A. ..... Lead, South Dakota
Blochberger, F. R. ..... Portland, Oregon
Blumenberg, Henry Jr. ..... Daggett, California
Borden, Gail ..... Los Angeles, California
Bowen, H. M. ..... Oakland, California
Bracking-Ebbley Inv. Co. ..... Wallace, Idaho
Bradbury, Mrs. Jennie ..... Denver, Colorado
Brady, P. A. ..... Greenhorn, Oregon
Brandes, Juan Felix ..... Denver, Colorado
Bransford, W. H. ..... Salt Lake City, Utah
Bridgman, W. E. ..... Denver, Colorado
Brooks, Alfred H. ..... Washington, D. C.

Brougher, W. ..... Carson City, Nevada
Brown, C. T. ..... Socorro, New Mexico
Brown, T. H. ..... Prescott, Arizona
Brownlee, Col. A. G. (L.) ..... Idaho Springs, Colorado
Brunton, D. W. (L.) ..... Denver, Colorado
Bryant, W. G. ..... Carterville, Missouri
Buckley, Dr. E. R. (L) ..... Rolla, Missouri
Buie, Henry T. ..... Buffalo, Arkansas
Bunch, John A. ..... Harrison, Arkansas
Burke, G. M. ..... Joplin, Missouori
Busch Bros. ..... Rhyolite, Nevada
Butler, Edgar T. ..... Denver, Colorado
Butler, Geo. E. ..... Needles, California
Butler, Jos. G. Jr. ..... Youngstown, Ohio
Cable, Dr. E. E. ..... Portland, Oregon
Caffey, B. F. ..... Salt Lake City, Utah
Calahan, Henry C. (L.) ..... San Francisco, California
Calavan, W. C. ..... Redding, California
Caldwell, Bros. Co. ..... Seattle, Washington
Caldwell, Jas. N. ..... Denver, Colorado
Calkins Newspaper Syndicate ..... San Francisco, California
Callbreath, Jas. F. Jr. ..... 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, Harry J. ..... St. Louis, Missouri
Capp, William ..... Denver, Colorado
Carder, Jas. L. ..... Los Angeles, California
Cargo, L. M. ..... Denver, Colorado
Carpenter, A. B. ..... Los Angeles, California
Carpenter, F. R. ..... Denver, Colorado
Carrigan, D. ..... Custer, South Dakota
Carroll, Jas. ..... Needles, California
Carroll, John ..... Voctorville, California
Carter, W. T. ..... Los Angeles, California
Cary, R. J. ..... Denver, Colorado
Case, R. H. ..... Organ, New Mexico
Catlin, W. P. ..... Carson City, Nevada
Caulkins, W. R. ..... Carthage, Missouri
Cazin, Franz ..... Denver, Colorado
Chaney, H. E. ..... Missoula, Montana
Chilberg, J. E. ..... Seattle, Washington
Child, Wm. H. (L.) ..... Salt Lake City, Utah
Chittenden, W. H. ..... Denver, Colorado
Clark, H. S. ..... Butte, Montana
Clark, J. Ross ..... Los Angeles, California
Clark, Wm. F. ..... Glover, Vermont
Clark, V. V. ..... Reiter, Washington
Clegg, Dr. J. W. ..... Fairview, Nevada
Clipper Mining Co. ..... Seattle, Washington
Cobb, E. M. ..... Chicago, Illinois
Colbath, L. U. ..... Salt Lake City, Utah
Colburn, E. A. (L.) ..... Denver, Colorado
Coles, A. P. ..... El Paso, Texas
Collins, Glenville A. ..... Seattle Washington
Collins, T. Shields ..... Globe, Arizona
Comstock, A. R. ..... Denver, Colorado
Comstock, Chas. W. ..... Denver, Colorado
Cooley, B. ..... Galena, Kansas
Cooney, Frank H. ..... Butte, Montana
Cooper, Wm. ..... Georgetown, Colorado
Coplen, J. D. ..... Globe, Arizona

Costello, Frank, F. (L.) ..... Colorado Springs, Colorado
Cousins, A. B. ..... Portland, Oregon
Crampton, E. J. ..... Leslie, Arkansas
Crandell, Jas. H. ..... Denver, Colorado
Crane, Chas. E. ..... Seattle, Washington
Crawford, Geo. ..... New York City
Crawford, G. H. ..... Denver, Colorado
Crawford, Capt. Jack ..... Chicago, Illinois
Creelman, G. R. ..... Detroit, Michigan
Crouch, O. M. ..... Portland, Oregon
Crowther, H. M. ..... Salt Lake City, Utah
Cullen, J. F. ..... Los Angeles, California
Cutler, John C. ..... Salt Lake City, Utah
Dahl, Henry P. ..... Cripple Creek, Colorado
Damours, C. A. ..... Virginia City, Montana
Dana, L. N. ..... Joplin, Missouri
Daniels, Wm. P. ..... Denver, Colorado
Davis, Jack (L) ..... Goldfield, Nevada
Day, Eugene R. ..... Wallace, Idaho
Day, Harry L. ..... Wallace, Idaho
Davis, Robt. W. Jr. ..... Silverton, Colorado
Degge, W. W. ..... Boulder, Colorado
De La Vergne, E. M. ..... Colorado Springs, Colorado
Dempster, A. .....
Denair, John ..... Needles, California
Denver Eng. Works Co. ..... Denver, Colorado
Dern, John ..... Salt Lake City, Utah
Devereaux, T. E. ..... Fort Dodge, Iowa
Dickson, W. H. ..... Salt Lake City, Utah
Dignowity, C. L. ..... Reno, Nevada
Dignowity, F. A. ..... Reno, Nevada
Dillman, L. C. ..... Seattle, Washington
Dirks, Martin H. ..... St. Joseph, Missouri
Dittmar, M. E. ..... Redding, California
Dodge, Wm. H. ..... Portland, Oregon
Dondaldson, A. M. ..... Denver, Colorado
Dondaldson, W. N. ..... Boise, Idaho
Doolittle, C. H. ..... Salt Lake City, Utah
Dornbach, Geo. W. ..... Belleville, Illinois
Dorsey, Geo. W. E. ..... Fremont, Nebraska
Doty, L. C. ..... Eureka, Utah
Douglas, Dr. Jas. ..... New York City
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
Duncan, John A. ..... St. Joseph, Missouri
Dunyon, Newton A. ..... Salt Lake City, Utah
Dutton, Sam F. ..... Denver, Colorado
Dwight, F. L. ..... Los Angeles, California
Dwyer, Daniel ..... Joplin, Missouri
Dwyer, E. P. ..... Joplin, Missouri
Earle, Henry ..... New York City
Eastman, A. F. ..... Tacoma, Washington
Eaton, Jos. H. ..... Silver Plume, Colorado
Ede, J. A. ..... La Salle, Illinois
Edwards, Henry W. ..... Denver, Colorado
Elkins, John T. ..... Kansas City, Missouri
Ellingwood, C. O. ..... Salt Lake City, Utah
Emberson, A. L. ..... Denver, Colorado
Enderlee, Edw. ..... Forest, Idaho
Eng. & Mng Journal ..... New York City

Erisman, J. F. ..... Denver, Colorado
Estes, Ambrose W. ..... Yellville, Arkansas
Evans, C. W. ..... Ashland, Oregon
Evans, Evan E. ..... Denver, Colorado
Evans, Mark G. ..... Denver, Colorado
Evans, R. J. ..... Salt Lake City, Utah
Everett, Thos. B. ..... Denver, Colorado
Ewing, Thos. (L.) ..... Vivian, Arizona
Ewing, W. E. ..... Vivian, Arizona
Fellows Walter C. ..... Needles, California
Felt, J. H. ..... Kansas City, Missouri
Ferguson, N. E. ..... Needles, California
Fergusson, S. W. ..... San Francisco, California
Ferry, W. Mont. ..... Salt Lake City, Utah
Fiduciary Company, The ..... Chicago, Illinois
Finch, Marcus ..... Denver, Colorado
Finnerty, Michael ..... Denver, Colorado
Fletcher, Geo. T. ..... Joplin, Missouri
Fletcher, John D. ..... Medford, Oregon
Fletcher, John G. ..... Kennett, California
Foley, W. R. ..... Denver, Colorado
Foote, Arthur De Wint ..... Grass Valley, California
Foote, Robt. W. ..... Breckenridge, Colorado
Foster, Ernest Le Neve ..... Denver, Colorado
Forbes, A. M. ..... Tucson, Arizona
Francis, W. E. ..... Tucson, Arizona
Fredericks, L. G. ..... Buffalo, Arkansas
Fukuda, R. ..... Berkeley, California
Gabrowsky, Theo. ..... Howardsville, Colorado
Gallagher, Jas. F. ..... Joplin, Missouri
Gardner, F. L. ..... Salt Lake City, Utah
Gardner, Percy S. ..... Reno, Nevada
Garm, J. E. ..... Joplin, Missouri
Gatch, Elias S. (L.) ..... St. Louis, Missouri
George, Jas. A. ..... Deadwood, South Dakota
Gifford, A. W. ..... El Paso, Texas
Gilbert, M. P. (L.) ..... Los Angeles, California
Givens, & Co. J. G. ..... Seattle, Washington
Godfrey, Jas. J. ..... Seattle, Washington
Godshall, L. D. ..... Needles, California
Godthorpe, Edwin T. ..... Benton, Wisconsin
Goodale, C. W. ..... Butte, Montana
Goodall, Arthur ..... Drytown, California
Goode, H. W. ..... Portland, Oregon
Goodier, G. P. ..... Denver, Colorado
Goodsell, B. W. ..... Chicago, Illinois
Granberg, H. O. (L.) ..... Oshkosh, Wisconsin
Grant, M. N. ..... Laramie, Wyoming
Graves, W. H. ..... Denver, Colorado
Gray, John (L.) ..... Deadwood, South Dakota
Gray, W. A. ..... Winlock, Washington
Greenough, W. D. ..... Mullan, Idaho
Gregg, H. H. (L) ..... Joplin, Missouri
Gregg, Mng. Inv. Co. ..... Denver, Colorado
Grier, T. J. ..... Lead, South Dakota
Grigsby, W. W. ..... Skidmore, Missouri
Gunnell, Alva H. ..... Grant's Pass, Oregon
Hale, Irving ..... Denver, Colorado
Hall, Edwin ..... Chicago, Illinois
Halloran, W. J. ..... Salt Lake City, Utah
Hampton, W. H. ..... Grant's Pass, Oregon
Hand, J. H. ..... Yellville, Arkansas
Hanson, Chas. F. ..... Douglas, Arizona

Hanson, Otto ..... Salem, Oregon
Hanson, Rasmus ..... Silverton, Colorado
Hard, F. J. ..... Bohemia, Oregon
Hardy, W. C. ..... Hazel Green, Wisconsin
Harrison, A. W. ..... Silverton, Colorado
Haworth, Erasmus ..... Lawrence, Kansas
Hayes, C. Willard ..... Washington, D. C.
Heigho, E. M. ..... Weiser, Idaho
Heizer, D. N. ..... Colorado Springs, Colorado
Henderson, H. B. ..... Columbus, Kansas
Herr, H. L. ..... Galena, Illinois
Herrick, R. L. ..... Denver, Colorado
Hiller, Albert L. ..... Denver, Colorado
Holman, Austin T. ..... Victor, Colorado
Holmes, Dr. J. A. ..... Washington, D. C.
Holmes, Edwin F. ..... Salt Lake City, Utah
Holman, G. P. ..... Salt Lake City, Utah
Holmes, Susan Emery ..... Salt Lake City, Utah
Hoofer, A. O. ..... Grant's Pass, Oregon
Horse Shoe Mng. Co. ..... Seattle, Washington
House, S. R. ..... Denver, Colorado
Houtz, J. C. ..... Rhyolite, Nevada
Howell, F. D. Jr. ..... Los Angeles, California
Howell, Jos. ..... Wellsville, Utah
Hubbard, M. E. ..... Salt Lake City, Utah
Humphries, C. K. ..... Seattle, Washington
Husted, Jas. D. ..... Denver, Colorado
Hutchinson, Chas. T. ..... San Francisco, California
Hutton, Jas. ..... Waukesha, Wisconsin
Hymer, J. P. ..... Denver, Colorado
Iglehart, Wm. ..... Salt Lake City, Utah
Ingalls, J. Aaron ..... Reno, Nevada
Ingham, E. H. ..... Eugene, Oregon
Irvine, Thos. E. ..... Boulder, Colorado
Ish, Marvin E. ..... Goldfield, Nevada
Ivey, J. W. ..... Seattle, Washington
Jacobs, A. L. ..... Salt Lake City, Utah
Jacobson, Tony ..... Salt Lake City, Utah
Jackling, D. C. ..... 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
Johnson, J. B. ..... Denver, Colorado
Johnston, C. J. ..... Denver, Colorado
Jones, J. I. ..... Cottage Grove, Oregon
Jones, Lloyd Kenyon ..... Denver, Colorado
Jones, W. A. ..... Mineral Point, Wisconsin
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
Kendall, W. L. ..... Cleveland, Ohio
Kendrick, W. F. ..... Denver, Colorado
Kennedy Bros. ..... Salt Lake City, Utah
Kerr, J. E. ..... San Francisco, California
Keyting, Wm. ..... Salt Lake City, Utah
King, Fred B. ..... Bridgeport, Connecticut
Kinkead, Jas. H. ..... Virginia City, Nevada
Kinney, M. J. ..... Portland, Oregon

Kinney, R. C. ..... Portland, Oregon
Kinney, W. Z. ..... Silverton, Colorado
Kirby, John A. (L.) ..... Salt Lake City, Utah
Kirk, Morris P. ..... El Paso, Texas
Klinefelter, P. K. ..... Needles, California
Knight, Jesse (L.) ..... Provo, Utah
Knowles, W. H. ..... Los Angeles, California
Kountz, Louis K. ..... Goldfield, Nevada
Krepps, J. E. ..... Los Angeles, California
Krakauer, Adolph. ..... El Paso, Texas
Kyle, T. D. ..... Leadville, Colorado
Lake, C. F. ..... Cardinal, Colorado
Lamb, Wm. A. ..... Idaho Springs, Colorado
Lamont, E. M. ..... Canon City, Colorado
Lancaster, Henry M. ..... Wallace, Idaho
Lane, Chas. D. (L.) ..... Seattle, Washington
Lane, Martin ..... Philadelphia, Pennsylvania
Largent, J. A. ..... Rhyolite, Nevada
Lawton, M. J. ..... Joplin, Missouri
Leary, Chas C. ..... Thorpe, Nevada
Lee, Chester F. ..... Seattle, Washington
Lee, J. C. ..... Portland, Oregon
Leebrick, W. S. ..... Idaho Springs, Colorado
Leftwich, Thos. J. ..... Fort Collins, Colorado
Lennox, Wm. ..... Colorado Springs, Colorado
Leonard, J. M. ..... Joplin, Missouri
Le Roy, J. L. ..... Portland, Oregon
Leschen & Sons Rope Co., A. ..... Denver, Colorado
Lewandowski, J. A. ..... Douglas, Arizona
Lewis, S. J. ..... Needles, California
Lightcap, R. L. ..... Hazel Green, Wisconsin
Logan, G. W. ..... Denver, Colorado
Lomiester, Frank ..... Leadville, Colorado
Longhenry, Edw. G. ..... Benton, Wisconsin
Loose, C. E. ..... Provo, Utah
Lund, S. ..... Carson City, Nevada
Lundberg, Alex. ..... Bohemia, Oregoon
Lynch, J. H. ..... Butte, Montana
McCaffery, Richard S. ..... Salt Lake City, Utah
McCarthy, E. T. ..... Baxter Springs, Kansas
McCarthy, Jas. F. ..... Wallace, Idaho
McCarthy, P. B. ..... Rapid City, South Dakota
McChrystal, J. H. ..... Salt Lake City, Utah
McClelland, Geo. E. ..... Idaho Springs, Colorado
McCone, Alex. J. ..... Reno, Nevada
McCormick, C. K. ..... Salt Lake City, Utah
McCullough, A. ..... Tacoma, Washington
McDonald, D. C. ..... Ely, Nevada
McDonald, Ed. ..... Carterville, Missouri
McDonald, J. R. ..... Rhyolite, Nevada
McDonald, Sam C. ..... Cripple Creek, Colorado
McDowell, W. W. ..... Butte, Montana
McGraw, John H. ..... Seattle, Washington
McIntire. A. W. ..... Everett, Washington
McKinnie, J. R. ..... Colorado Springs, Colorado
McLean, M. H. ..... Morenci, Arizona
McLeod, D. L. ..... Portland, Oregon
McMullan, John ..... Goldfield, Nevada
McMurray, John H. ..... Denver, Colorado
McNeil, John ..... Denver, Colorado
McQuarrie, W. F. ..... Denver, Colorado
McWeeney, P. J. ..... Albany, New York
MacVichie, Duncan (L.) ..... Salt Lake City, Utah

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
Martin, E. L. ..... Kansas City, Missouri
Martin, R. L. (L.) ..... Denver, Colorado
Mason, L. C. ..... Independence, Kansas
Mattheissen & Hegeler ..... La Salle, Illinois
May, Ernest ..... Lead, South Dakota
Mayham, H. J. ..... New York City
Meese, Geo. C. ..... Joplin, Missouri
Menardi, J. B. ..... Reno, Nevada
Merchant, Jos, ... Walla Walla, Washington
Merchant, Wm. F. ..... Walla Walla, Washington
Middlekauff, E. D. ..... Plainfield, New Jersey
Millar, H. J. ..... Joplin, Missouri
Miller, Cyrus. ..... Denver, Colorado
Miller, David ..... South Bend, Indiana
Miller, Fred A. ..... Laramie, Wyoming
Miller, L. F. ..... Joplin, Missouri
Miller, W. A. ..... Denver, Colorado
Mills, W. F. R. ..... Denver, Colorado
Mine & Smelter Sup. Co. ..... Salt Lake City, Utah
Miracle, G. W. ..... Seattle, Washington
Mitchell, Co., The C. E. ..... Spokane, Washington
Mitchell, McKinley ..... Gervis, Oregon
Mitchell, S. Duffield ..... Carthage, Missouri
Mitchell, W. H. ..... Seneca, Missouri
Moffat, D. H. (L.) ..... Denver, Colorado
Monroe, Edward ..... Boulder, Colorado
Moore, F. Cushing ..... Wallace, Idaho
Moritz, Jacob ..... Salt Lake City, Utah
Morphy, C. W. ..... Granite, Hill, Oregon
Morris, Chas. H. ..... Georgetown, Colorado
Morris, F. D. ..... Montrose, Pennsylvania
Morris, Howard G. ..... Denver, Colorado
Morrison, W. O. ..... Denver, Colorado
Mosier, Frank, ... Carterville, Missouri
Mt. Baker & Shukson Mng. Co. ..... Seattle, Washington
Mueller, Dr. Victor F. ..... Milwaukee, Wisconsin
Mudd, Seeley, W. ..... Los Angeles, California
Muir, Thos. K. ..... Portland, Oregon
Mundy, J. A. ..... Colorado Springs, Colorado
Munroe, H. S. ..... Congress Junction, Arizona
Murray, J. J. ..... Orogrande, New Mexico
Myers, Clarence ..... Chehalis, Washington
National Development Co. ..... Salt Lake City Utah
Nay, Geo. ..... Needles, California
Newcomb, B. M. ..... San Francisco, California
Newell, J. W. ..... Leadville, Colorado
Newmeyer, C. E. ..... Denver, Colorado
Nicholson, H. H. ..... Lincoln, Nebraska
Nicholson, Samuel (L.) ..... Leadville, Colorado
Nix. Geo. M. ..... New York City
Noon, Thos. F. ..... Peru, Illinois
Norcross, C. A. ..... Reno, Nevada
Nordquist, John H. ..... Wallace, Idaho
Northern Exploration Co. ..... Seattle, Washington
Northwest Mining News ..... Spokane, Washington
Norton, E. A. ..... Denver, Colorado
Oberndorfer, J. ..... Salt Lake City, Utah

O'Brien, W. M. ..... Salt Lake City, Utah
Orem, W. C. ..... Salt Lake City, Utah
Packer, H. G. ..... Joplin, Missouri
Page, Alfred ..... Wardner, Idaho
Paige, N. Jr. ..... Joplin, Missouri
Palace Drug Co. ..... Joplin, Missouri
Palmer, Edw. Vose ..... Denver, Colorado
Pape, J. B. ..... Cottage Grove, Oregon
Parker, E. W. ..... Washington, D. C.
Parker, M. B. ..... El Paso, Texas
Patrick, Fred L. ..... Columbus, Ohio
Patrick, Jas. M. ..... Denver, Colorado
Pearl, E. H. ..... Denver, Colorado
Pease, L. A. ..... Slater, Colorado
Peck, I. F. ..... Denver, Colorado
Phelps, Aug. H. ..... Denver, Colorado
Phillips, Wm. B. ..... Birmingham, Alabama
Phinney, Frederick V. ..... Wallace, Idaho
Phipps, S. A. ..... Cripple Creek, Colorado
Piatt & Heath Co. ..... Helena Montana
Playter, C. C. ..... Joplin, Missouri
Playter, Geo. H. ..... Boston, Massachusetts
Playter, Franklin ..... Boston, Massachusetts
Plummer, Frank ..... Washington, D. C.
Pollard, Ira ..... Denver, Colorado
Pollock, Jas. A. ..... Salt Lake City, Utah
Pompeney, Dr. Jos. ..... Frontenac, Kansas
Power-Christy & Co. ..... Goldfield, Nevada
Powers, O. W. ..... Salt Lake City, Utah
Prather, H. R. ..... Joplin, Missouri
Preston, W. J. ..... Silver Cliff, Colorado
Quigley, E. D. ..... Denver, Colorado
Randolph, Epes (L) ..... Tucson, Arizona
Rapp, Abram ..... Cripple Creek, Colorado
Ray, L. O. ..... Rhyolite, Nevada
Read, H. Clay ..... Big Springs, Texas
Read, T. A. ..... Reno, Nevada
Reese, Mrs. Clara Clark (L) ..... Denver, Colorado
Reinert, Lewis A. ..... Denver, Colorado
Reinert, E. G. (L) ..... Denver, Colorado
Reinert, N. A. ..... Denver, Colorado
Reitler, Charles W. ..... Denver, Colorado
Renshaw & Co., Paris H. ..... Wallace, Idaho
Renshaw, W. E. ..... Idaho Springs, Colorado
Reppy, W. E. ..... Carl Junction, Missouri
Reynolds, Chas. A. ..... Sneffels, Colorado
Rice, Wm. V. ..... Salt Lake City, Utah
Richards, A. G. ..... Laramie, Wyoming
Richards, Bartlett (L) ..... Ellsworth, Nebraska
Richards, J. H. (L) ..... Boise, Idaho
Ridge, W. R. ..... Reno, Nevada
Riebe, Ed. ..... Redding, California
Riedel, H. A. ..... Denver, Colorado
Riepe, Richard A. ..... Ely, Nevada
Riordan, D. M. ..... New York City
Risque, J. B. ..... Salt Like City, Utah
Riter, Geo. W. ..... Salt Lake City, Utah
Roberts, Jno. G. ..... Idaho Springs, Colorado
Robinson, W. J. ..... Joplin, Missouri
Rodgers & Rogers ..... Chicago, Illinois
Roeder, A. B. ..... Denver, Colorado
Roller, Arthur H. ..... Idaho Springs, Colorado

Rooklidge, Chas. D. ..... Salt Lake City, Utah
Ross, Beauregard ..... Denver, Colorado
Ross, J. B. ..... Silverton, Colorado
Root, L. V. ..... Needles, California
Royce, W. K. ..... Rich Hill, Missouri
Royse, O. D. ..... Joplin, Missouri
Rummell, A. G. ..... Denver, Colorado
Samuels, H. F. ..... Wallace, Idaho
Sachs, Claude ..... Colorado Springs, Colorado
Sanders, Frank T. ..... Colorado Springs, Colorado
Sapp, W. F. ..... Galena, Kansas
Scaife, H. L. ..... Clinton, South Carolina
Schader, Carl F. (L) ..... Los Angeles, California
Schen, C. H. ..... Salt Lake City, Utah
Schermerhorn, E. B. ..... Galena, Kansas
Schnitzel, Henry ..... Lead, South Dakota
Schwan, Gustave ..... Murray, Utah
Scott, J. B. ..... Fort Jones, California
Seeman, Henry I. ..... Denver, Colorado
Shane, W. H. ..... Bohemia, Oregon
Shannon, C. M. (L) ..... Los Angeles, California
Sherman, M. H. ..... Los Angeles, California
Shinn, Jos. A. ..... Leadville, Colorado
Shomon, J. ..... Galena, Kansas
Shull, W. L. ..... Denver, Colorado
Siegwein, Jno. ..... Weiser, Idaho
Sierra Madre Mng. Co. ..... Kansas City, Missouri
Siegel, F. L. ..... Denver, Colorado
Sigafoos, R. B. ..... Denver, Colorado
Simmons, A. J. ..... Deadwood, South Dakota
Singleton, Jno. ..... Los Angeles, California
Siren Gold Mining Co. ..... Greeley, Colorado
Sessions, E. A. ..... Portland, Oregon
Skeels, Alfred ..... Central City, Colorado
Smedley Steam Pump Co. ..... Dubuque, Iowa
Smith, Claude M. ..... Goldfield, Nevada
Smith, Edmund ..... Valdez, Alaska
Smith, Frank Clemes ..... Sault Ste Marie, Ontario, Canada
Smith, Franklin W. ..... Bisbee, Arizona
Smith, Geo. Otis ..... Washington, D. C.
Smith, Jas. ..... Carterville, Missouri
Smith J. Fewson, Jr. ..... Salt Lake City, Utah
Smith, Jno. H. ..... Denver, Colorado
Smith, Oscar J. ..... Reno, Nevada
Smith, W. H. ..... Burke, Idaho
Snapp, F. T. ..... Joplin, Missouri
Snavely, R. M. ..... Denver, Colorado
Snoqualmie Copper Mng Co. ..... Seattle, Washington
South, Frank M. ..... Grants Pass, Oregon
Speer, Alex (L) ..... Salt Lake City, Utah
Sperry, Edwin A. ..... Denver, Colorado
Spry, Jno. C. (L) ..... Chicago, Illinois
Standard Reduction & Development Co. ..... Seattle, Washington
Star, Sol ..... Deadwood, South Dakota
Stearns-Roger Mfg. Co. ..... Denver, Colorado
Stebbins, A. H. ..... Little Rock, Arkansas
Steele, Jno. A. ..... Lane City, Nevada
Steele, J. L. ..... Landlock, Alaska
Steele, T. J. ..... Deadwood, South Dakota
Steffner, S. W. ..... Portland, Oregon
Stevenson A. M. ..... Denver, Colorado
Stevenson, W. L. ..... Wadsworth, Nevada
Stewart, W. B. ..... Portland, Oregon

Stone, W. B. ..... Galena, Kansas
Storm, Lynn W. ..... Valdez, Alaska
Straub, Frank ..... Denver, Colorado
Sultana-Arizona Copper Co. ..... Chicago, Illinois
Sumner, C. M. ..... Denver, Colorado
Swart, W. A. ..... Denver, Colorado
Sweek, Alex ..... Portland, Oregon
Swift, J. V. ..... Benton, Wisconsin
Swindler, F. P. ..... Salt Lake City, Utah
Talbert, High ..... Carterville, Missouri
Tarbell, W. S. ..... Colorado Springs, Colorado
Taylor, Gibson ..... Los Angeles, California
Taylor, Harrie L. (L) ..... Goldfield, Nevada
Temple, Geo. B. ..... Joplin, Missouri
Temple, W. O. ..... Denver, Colorado
Terry, M. C. ..... Carterville, Missouri
Thatcher, G. W. ..... Rhyolite, Nevada
Thomas, B. ..... Seattle, Washington
Thomas, Gomer ..... Salt Lake City, Utah
Thomas, W. J. ..... Denver, Colorado
Tibbals, Wm. H. ..... Salt Lake City, Utah
Tibbitt, Alton W. ..... Seattle, Washington
Timothy, Thos. ..... Baxter Springs, Kansas
Travers, Richard P. ..... Chicago, Illinois
Traylor, Jno. A. ..... Denver, Colorado
Trenton Iron Co. ..... Denver, Colorado
Triangle Mng. & Dev. Co. ..... Missoula, Montana
Trojanovitch, A. ..... Globe, Arizona
Tulloch, Seymour W. ..... Salt Lake City, Utah
Tumbach, J. H. ..... Ouray, Colorado
Turner, J. H. ..... Salt Lake City, Utah
Tuttle, Sidney ..... Janesville, Wisconsin
Underhill, H. B. Jr. ..... San Francisco, California
Underwood, Pierce ..... Chicago, Illinois
Union Iron Works ..... San Francisco, California
Vaughan. B. L. ..... Needles, California
Vest, T. J. ..... Galena, Kansas
Vincent, Major F. C. ..... Kansas City, Missouri
Voorheis, E. C. ..... Sutter Creek, California
Walden, Chas. ..... Victor, Colorado
Walker, M. H. ..... Salt Lake City, Utah
Wall, E. A. ..... Salt Lake City, Utah
Walsh, Thos. F. (L) ..... Littleton, Colorado
Walters, Wm. J. ..... Portland, Oregon
Ward, W. S. ..... Denver, Colorado
Wampler, W. W. ..... Webb City, Missouri
Walton, Wm. ..... Higbee, Missouri
Ward, Jno. G. ..... Albany, New York
Warwick, A. W. ..... Choix, Sinaloa, Mexico
Watson, J. Frank ..... Portland, Oregon
Watson, J. W. ..... Baxter Springs, Kansas
Watts, L. H. ..... Baxter Springs, Kansas
Weaver, Geo. B. ..... Salt Lake City, Utah
Webb. I. A. ..... Deadwood, South Dakota
Webber, W. H. ..... Fairview, Nevada
Wells, Henry F. ..... Boston, Massachusetts
Welsford, J. V. ..... Cuba City, Wisconsin
West, Jno. H. ..... Needles, California
Westinghouse Mach. Co. ..... Denver, Colorado
White, Arthur L. (L) ..... Lima, Ohio
White, E. L. ..... Denver, Colorado
White, F. Wallace (L) ..... Cleveland, Ohio
Whitman, J. A. ..... Medford, Oregon

Wheeler, H. K. ..... Ely, Nevada
Whitman, A. H. ..... San Pedro, Chihuahua, Mexico
Whitford, O. B. ..... Butte, Montana
White, Robt. H. ..... Idaho Springs, Colorado
White, J. J. ..... Georgetown, Colorado
Wilber, F. A. ..... Joplin, Missouri
Wilcox, E. J. ..... Denver, Colorado
Williams, E. W. ..... Denver, Colorado
Williamson, J. D. ..... Idaho Springs, Colorado
Wilson, Geo. B. ..... Searchlight, Nevada
Wingfield, Geo. (L) ..... Goldfield, Nevada
Wire, Frank E. ..... Libertyville, Illinois
Wolfe, Leon B. ..... Lewisberg, Pennsylvania
Wolff, Jno. R. ..... Boulder, Colorado
Wood, Guilford S. ..... Denver, Colorado
Wood, J. D. (L) ..... Salt Lake City, Utah
Woods, F. M. ..... Victor, Colorado
Woodward, Felix J. ..... Denver, Colorado
Wourms, Jno. H. ..... Wallace, Idaho
Wright, E. M. ..... Union, Oregon
Wright, Jno. M. (L) ..... Oakland, California
Wright, Willis ..... Indianopolis, Indiana
Young, Lewis E. ..... Rolla, Missouri
Zeitfuchs, E ..... Wallace, Idaho
Zimmerman, Ed ..... Harrison, Arkansas

[(L) following name indicates life members.]

RICHARD A. RIEPE of Nevada: I rise on a question privilege. I see it stated by the morning papers here that it is announced that Reno, Nevada, is out of the race for the privilege of having the next session of the Mining Congress and that we have withdrawn in favor of Columbus. That is not the case. When Nevada withdraws it will withdraw in favor of Douglas, Arizona. (Applause.)

CHAIRMAN BUCKLEY: We will now listen to the reading of the report of the committee on smelter rates by Senator Josephs of Utah.

H. L. JOSEPH: I want to state first how this committee came to be appointed and how the report was made up. A year ago Senator De La Vergne of Colorado, in a paper read by him at the session in Denver, called the attention of the Congress to grievances that the ore producers of Cripple Creek had against the so-called smelter trust. At that session, the matter was thoroughly discussed and it was there found that the grievances were not local. They seemed to spring up from all over the country. Hence a resolution was introduced in the Congress to this effect: "Resolved that the President appoint at his convenience, a committee of five to consider the relations between the ore producers and the smelter interests and report on the same at the next session of the Congress, and also reports at intervals to the President and Board of Directors of the Congress if this committee so desires. This resolution was passed after discussion and the following named members or delegates were appointed on that committee: E. A. Colburn of Denver, Chairman; Senator De La Vergne of Colorado Springs, George W. Riter of Salt Lake City, Dr. L. D. Godshall of Needles, California, and H. S. Joseph of Salt Lake City, Utah, This committee met in Denver. It had daily sessions for four days. It interviewed a great many ore producers. It received letters and other communications, both locally in Colorado and as far north as Alaska. The committee than authorized the Secretary to formulate a request to be sent out to each and every ore producer which had come to the knowledge of the Secretary throughout the United States, and we regret to say that responses to this communication were not as plentiful as they should have been when you come to consider the importance of this question. However, we received some 100 responses. The committee meetings were fully attended, and within the last two weeks part of the committee held another meeting in Denver and the report was agreed upon in part, to be

approved of by the entire committee on the assemblage of this Congress here during this week. Judge Colburn who was to present this report as chairman of the committee, was unavoidable detained on account of sickness in his family and hence could not be here. The duty of presenting this report then devolved upon me and I am here to read it to you. There is a lot in the report that ought to be digested by every party interested. We had intended to have this report printed for distribution, but owing to the fact that we did not have it prepared before coming here, we could not do so.

The report of the committee was as follows:

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

To the President and Members of the American Mining Congress:

Introductory—In submitting this report, the committee desires to state at the outset that the subject assigned to us is rather large, complicated and difficult of treatment for reasons which are very obvious to us and may become plain to all before the report is finished.

The work of this committee has been considered almost entirely from the standpoint of the ore producers in the West, where the problems of mining are more complex than in the Mississippi valley. Mining ventures in the West involve difficulties and hazards, the only compensation for which lies in the richness of such ore deposits as may eventually be found. Deep shafts, long tunnels and drifts, expensive hoisting and pumping plants, costly supplies, difficult transportation—all of these things impose heavy burdens on the mine operator which he cannot afford to assume unless he has a regular market for his output of ores. To him, therefore, the smelting question is a most vital one.

The complaints that have been made to the committee have come, in the main, from the western ore producers, who are obliged to sell their product in markets where there is little or no competition. These complaints have been directed, most of them, against the American Smelting and Refining Company and its allies, popularly known as "the Smelting Trust" by whom nearly all of the important custom smelting plants in the United States are controlled. The mine owner who wishes to sell his product must accept the best offer he can get, and in order to insure a market for his ores, he must enter into a contract under which his output for a long period in advance goes to the purchasing smelter and is paid for in accordance with terms specified in the contract. Under such conditions there is nothing to prevent the ore buyer from exacting as much tribute as the traffic will bear.

In considering the complaints that have been filed with the committee, we have tried to bear in mind that custom smelting is a legitimate industry and is entitled to recognition as such. We must remember that the owner of a smelting plant cannot afford to buy ores unless they are of such nature that he can utilize them and get the metals from them within a reasonable length of time. He is entitled to a fair return for the money invested in the business, including, of course, the money represented by ores awaiting treatment, product tied up in process of reduction, and metals awaiting sale. Perhaps he is entitled to an allowance for possible fall in metal prices while he is getting the product in shape for the market, although in the long run prices are as apt to rise as to fall. His problem is to roast off the volatile elements, to flux off the worthless earthy dross, to save the metals as a base bullion which can then be put through a refining process for the purpose of separating the valuable metals from one another and finally to sell the refined product to consumers.

It should be noted that in lead smelting, as practiced in the West, the lead, silver and gold are saved as bullion and that a by-product is made from which the copper can be recovered. In copper smelting, the copper, silver and gold are saved, but no recovery is made of any lead

that may be present. In neither of these processes is there any attempt to save other elements in the ore such as zinc, antimony, arsenic, etc.; on the contrary, these elements are looked upon as objectionable, either because extra expense is entailed in getting rid of them, or because in disappearing they carry off precious metals to an alarming extent. In practice, complete recovery of the valuable metals is not made. Therefore, in buying ores, the smelter does not expect to pay the ore producer for greater percentages of the metals than he can recover; he cannot pay the full market price for the metals without first deducting sums sufficient to transport his product to the refinery, to pay the cost of refining, the cost of transporting refined metal to the market, and the additional costs of brokerage, interest, insurance, etc. He is entitled to charge for roasting off the volatile elements in the ore and for slagging off the earthy dross. If, in order to make the slag, he is compelled to buy barren limestone, iron, etc., he in entitled to charge for the cost of these materials and for the cost of handling this additional stuff in the furnace. If, after all this, he exacts a fair profit and does it without subterfuge, the ore producer should not complain.

Tenor of Complaints.

But the objection is made that the methods of ore buyers are not always fair. Summarizing the complaints that have been made to the committee, we find them to embrace:

1. Excessive deductions for smelting losses and for refining and selling costs.
2. Unsatisfactory settlements on account of arbitrary valuations placed by the smelters upon different metals.
3. Exorbitant smelting charges.
4. Arbitrary and unfair rules governing the sampling and assaying of ores.
5. Questionable tactics to stifle and forestall competition.

Relief Through Competition.

If any or all of these things are true, what can the ore producer do about it? Turning to the Salt Lake valley of Utah, where there seems to be least cause for complaint, we find a number of independent smelting plants which were built by private concerns for the purpose of treating the ores from their own mines and which were afterwards enlarged in order to handle custom business. These plants are now formidable rivals of "the trust." Under the stimulus of competition the smelting industry in the Salt Lake valley has advanced commercially and technically to such an extent that this is now the most important smelting center in the West. Moreover, this competition has brought substantial relief to the ore producer who has no smelting plant of his own.

Ore producers in other parts of the West will therefore be glad to learn on what basis ores are bought and sold in the Salt Lake valley. By permission of certain producers, we recite below the terms of existing contracts for the sale of their output or ores. In individual instances, and for exceptional ores, even better terms than these have been obtained. All transactions it might be well to explain, are based on the net ton of 2,000 pounds avoirdupois, taking the net weight of the ore after deducting for moisture. The term "unit" means one per cent, or twenty pounds to each ton; the term "ore" means the product shipped to the smelter, whether it be crude ore or mill concentrates.

Gold contained in the ores in question is paid for at the rate of $19.50 per troy ounce. No gold is paid for when the assay shows less than 0.03 ounce per ton.

Silver—ninety-five per cent. of the silver obtained in the ore, as shown by fire assay, is paid for at the New York "official" price on the date of the first assay.

Copper—All copper contained in the ore, in excess of 0.5 unit (ten pounds per ton of ore) is paid for at the ruling wholesale price of electrolytic copper in the New York market for the previous week, deducting therefrom 2⅞ cents per pound. If, however, the ore happens to contain

lead in excess of three units, such ores are treated in a lead furnace, making a more round-about process for the recovery of the copper contents and the sum of 4½ cents per pound is deducted from the New York price of electrolytic copper.

Lead—ninety per cent of the lead contained in the ore, as shown by wet assay on fire button, is paid for at the ruling wholesale price of common desilverized lead in the New York market, deducting therefrom the sum of one cent per pound. No lead is paid for when the assay shows less than three units.

Smelting Charges Closely Associated With Buyers' Schedule of Deduction on Metals.

While all metallurgical losses, and all expenses attaching to bullion after it leaves the smelting works, are amply covered by the foregoing deductions, the schedules in use in other localities call for deductions far in excess of these. No two smelting companies have exactly the same schedule of deductions, neither does any concern apply the same schedule in dealing with all patrons. When brought to the point, the ore buyer does not maintain that his schedule of deductions represents actual metallurgical losses and the costs of freighting, refining and selling bullion. The average ore producer, if paid for 100 per cent of the metals in his ore, at full market prices, would object most strenuously to a treatment charge which would cover metallurgical losses, freight on bullion, refining costs, selling costs, interest, depreciation, profit, etc. It is plain that this entire outlay must be borne by the ore in some way, but by the subterfuge of deductions, a little on one metal here, and a little there, and a little somewhere else, the ore buyer is able to bring the treatment charge, which first attracts the attention of the producer, to a low point. Although not in fact singled out as victims the producers of gold ores have been the most bitter in their complaints against the ore buyers; one reason being that with no valuable metals in the ore, except gold, there is little chance for round-about figuring, and the treatment charge stands out in its cold reality.

Reasons for Varying Treatment Rates.

Rates of treatment vary within wide limits, according to the locality, the nature of the ore, and the needs of the smelter. The ore buyer aims to assemble at his plant, ores containing silica, ores containing iron, and ores containing lime, so that from these a mixture can be made which will yield a fluid slag in the smelting furnace. Under such ideal conditions, the smelter does not have to buy barren rock for flux, and his furnaces are burdened with nothing except pay ore. Too much of one kind of ore is a bugbear in the absence of enough of the other kind. In the smelting centers nearest the Pacific coast, there is frequently such a shortage of silicious ores that the smelters handle them for almost nothing; from such regions, no complaints of exorbitant treatment charges have come to your committee. But in most smelting centers, as in the Salt Lake valley, there is a large surplus of silicious ores, and in order to flux them the smelter is compelled to buy more or less barren iron ore and barren limestone, which not only cost money to get, but also cost money to smelt, to say nothing about metallurgical losses through increased volume of slag. In the Salt Lake valley, one producer of silicious ores is paid for the metals in his ores on the terms already quoted, and pays treatment charges as follows: On ores going to the lead furnaces, a base or initial charge of $1.00 per ton; on ores going to the copper furnaces, no base or initial charge. To the base or initial charge is added: 10 cents for each unit of insoluble matter; 30 cents for each unit of zinc in excess of ten per cent; 25 cents for each unit of sulphur in excess of two per cent, the maximum penalty for sulphur being $1.00 per ton of ore; 25 cents for each unit of speiss in excess of five per cent. On iron, a credit of 10 cents per unit is allowed. All of this means that on highly silicious ore carrying twenty per cent. to twenty-five per cent. of lead, this mine owner pays a treatment charge of some $5.50 per ton, and up to this time the buyer has made no complaint.

A private smelting plant, handling sulphide copper ores and having no flux to buy, reports a working cost for roasting, smelting and converting, of less than $3.00 per ton. But as to sulphide ores in general and ores containing other objectional elements, it is impossible to lay down any hard and flat rules, because the ore from any mine is peculiar to itself.

The actual cost of conducting smelting operations, and the results obtained, have been looked upon by concerns doing custom smelting and by many concerns operating private plants, as secrets to be carefully guarded. Notwithstanding such efforts, much information has leaked out through litigation between rival concerns and much data has been given out from time to time by retired owners and officials. To the professional men who have given the subject much study, such details are now fairly well known; the producers who scorn professional advice are the ones that suffer the most.

Sampling and Assaying.

As to rules for sampling and assaying, we call attention to the fact that in regions where competition is active, shovel sampling is being done away with and mechanical sampling is becoming general. The theoretical and practical problems involved in obtaining an accurate sample by mechanical means have been met so thoroughly by the men engaged in the custom sampling business, that the weights, moistures and samples of these custom sampling works are being accepted by the ore buyers. Mechanical sampling is being adopted by the smelting companies themselves, and much of the ore coming into the market is sampled at the smelting works without being handled by custom samplers at all. In any event, both buyers and sellers are permitted to watch the sampling and to satisfy themselves at any and all reasonable times that the work is being done right. The seller gets his own assays on the control sample as a check on the assays of the smelter. In some cases the assays of the seller are averaged with those of the buyer as a basis of settlement. If the two assays do not agree within reasonable limits, an umpire may be called for.

Wholesale Metal Market Quotations.

Where contracts do not specifically state what authority shall be accepted on the ruling prices of the metals, much dissatisfaction is caused by discrepancies between the prices quoted by the smelting companies and those quoted by the daily press and by trade journals. Up to this time, it has not been possible to account satisfactorily for these discrepancies or to locate the actual source of all quotations.

Silver—The so-called "official" prices, published daily is the prices at which silver will be bought by the firm issuing the quotation. The firm does not undertake to fill orders from consumers at these figures. A statement made by the Treasury Department of silver purchased for the mint, shows that the average price paid by the government is some four-tenths of a cent per ounce higher than the average New York prices for the same dates, out of which difference, however, the cost of delivering the silver to the mint was paid.

Copper—Nearly all the copper produced in the United States is sold by some half-dozen firms. The copper turned out by the "smelting trust" is sold by the United Metals Selling Company, a firm that handles more than one-half of the copper output of the country. The selling company persistently refuses to furnish any quotations for publication. Such prices as are given out to the public from day to day are only approximations, made by journalists who go through the market and endeavor to get an accurate opinion from the parties interested. These figures really mean nothing as to the size of lot, time and place of delivery or terms of payment. As to the quotations sent out by the New York Metal Exchange, the "American Metal Market and Daily Iron and Steel Report," a trade journal published in New York City, said editorially in its issue of December 5, 1906:

"We are called upon to day and almost every day, to explain our copper quotations in the light of the official figures for copper issued by the New York Metal Exchange, and which today, and also for several days have been:

Lake	22½ to 22¾
Electrolytic	22⅛ to 22⅜
Casting	22 to 22¼

"These prices are taken by the public press and copied and reproduced daily all over the country as correct, on account of being, as they say, "official."

"While it is true, very few firms in the metal trade take any interest in this exchange or their prices, or even grace its precincts with their presence, there should be sufficient who use the exchange, to take steps to stop this deliberate under-quoting of the market.

"As regards our readers who are constantly at us for the difference between our prices and the New York Metal Exchange official price, we refer them to our heading, which states 'Based on actual transactions.' What the other figures are based on we do not know, certainly not on transactions, as no copper transactions are made on the New York Metal Exchange."

Lead—Transactions in this metal in the wholesale market are on the basis of so much per pound, the size of lots, terms of delivery, and terms of payment being published regularly in the various technical and trade journals. But in dealings with producers the ore buyers in some regions continue to buy on a so-called "unit" basis, so aranged that there is seldom any close or tangible relation between the buyer's price per unit and the ruling price of the metal in the wholesale market.

No Appeal From Rules of Ore Buyers.

It is claimed by many small producers of ore, that the large producers are given a very unfair advantage over them in the matter of treatment charges. It is also claimed that the custom inaugurated by at least one of the great smelting companies of distributing additional compensation to its employes for faithful service during the preceding year is actuated by ulterior motive, which operates to the disadvantage of the producer. Your committee is not in the possession of data from any of the great smelting companies against whom these complaints and charges are made to show that such smelting company or companies are at all dissatisfied with present existing conditions. When we take into consideration the fact that one of the great smelting companies in its report for the year ending April 30, 1906, showed that the profits upon an original expenditure of some $30,000,000 or $40,000,000 were over $10,000,000 and that this was but a slight increase in percentage of gain over the former year, the inquiry naturally arises in the minds of your committee as to how this great accumulation of profit has been accomplished? And it seems to us that the conclusion would naturally arise in the minds of unprejudiced persons that the smelting business is wonderfully profitable, or is conducted along lines of advantage which are not to be shared by ore producers.

In other words, the whole matter, as to treatment charges, weights, moisture, assays and value of different kinds of metals of which the ore is composed, and time of settlement, is absolutely in the hands of the smelters, and from their arbitrament and dictation there is no appeal.

Impediments to Organized Competition.

No ore producer can build his own smelting works and operate it to advantage, without making provision for such ores as will combine with his own to make a good smelting mixture. The producer who attempts to set such an enterprise on foot usually finds that other producers, whose ores he needs, and who would ordinarily be willing to co-operate in the enterprise, are not free to do so because they have been allured

into long term contracts with "the trust." Because of these long term contracts, the producer who finds himself free can seldom get any co-operation; and as all such contracts have been timed so carefully that not many important ones terminate during the same year, the producers, however much they may sigh for relief, seldom succeed in getting together. In this respect, "the trust" must be given credit for its shrewd and adroit efforts to forestall further competition.

It is complained further that railroad rates from many of the mining districts of the West are dictated by the traffic officials of the "smelting trusts" and that the rates are fixed so as to stifle competition from the outside. The matter of railroad freight rates, however, is already receiving the attention of congress and of various state legislatures and we withhold further comment on the subject, other than to advise the formation of local and state mine operators' associations for the purpose of fighting all such evils.

Remedies Against Monopoly.

The three most prominent remedies suggested are:

First.—Intervention on the part of the United States government.

Second.—Intervention by way of state legislation.

Third.—Intervention by organization of mine owners and operators throughout the country for the purpose of building, operating and maintaining their own mills and smelters.

Under the first remedy suggested, "Intervention on the part of the United States government," your committee does not feel like making any recommendation other than that the American Mining Congress uses every effort in its power to convince the United States government of what we believe to be the absolute necessity of better recognition and protection of the mining interests of this country through a Bureau or Department of Mines and Mining.

Under the second remedy, "Intervention by way of state legislation," on account of the difficulty of securing efficient state legislative action in some of the states we think that recommendation along this line would not be advisable at this time.

The third remedy suggested, "Intervention by organization of mine owners and operators, etc.," however, seems to us to be entirely practicable and if wisely organized and judiciously managed will be eminently satisfactory and we would respectfully recommend it to the consideration of this Congress. About the legality of this remedy there can be no question. About its desirability, it seems to us, there can be no question, for the reputed dividends earned by the great smelting companies place their enterprises beyond the question of doubt as successful business and financial propositions. And with this idea in mind your committee is disposed to discourage mine owners from contracting their output to any concern for such long periods in advance that they will be unable to join with their friends in enterprises of this kind whenever the time seems ripe.

We feel that any objection which can logically be urged against the ownership of smelters and mills by mine owners and operators as a business proposition, are practically the same objections which could be urged against any such smelting companies as The American Smelting and Refining Company and the United States Smelting Company as business propositions.

By way of illustration, permit us to state that not a great many years ago the mine owners and operators of the Cripple Creek mining district became aware of the fact that the railroad charges for transportation were exorbitant, and they were entirely at the mercy of certain railroads. This led to an idea on their part of building an independent road from Colorado Springs into the town of Cripple Creek, traversing the entire Cripple Creek district, as a means of outlet for their ores and transportation of their fuel and other mining supplies. The road was built and paid for by the mine owners and operators, and then began a bitter rate war which continued for a period of seven months. It was inaugurated by a competing line to drive the new line out of business. However, the new line sur-

vived and subsequently sold its holding to another railroad company, reserving for its stockholders contracts with the different mine owners and operators which put them beyond the possibility of paying exorbitant rate in the future. The road paid its owners a good interest and profit on their investment, very materially reduced their transportation rates and was satisfactory in every particular.

Conclusion.

We desire to call attention to the fact that it is the purpose of the American Mining Congress to assist the mining and metallurgical industries in all their branches, not only in the United States, but in all contiguous territory where these industries desire to be benefited by our efforts. And while we have been assisted in securing data for use in preparing this report by the earnest and hearty support of quite a large number of mining men and operators throughout the country, for which and to whom we extend our hearty thanks, yet we deplore the fact that so many who could have co-operated with us have failed to do so. The reasons for this partial lack of co-operation are very evident to your committee; one of the principal ones being that should it become known by the smelting companies that their business is being criticized by their patrons they might be discriminated against or perhaps refused treatment of their ore entirely. Still another is that producers who are wise to the situation sometimes obtain better concessions and better treatment and consequently have not so great cause for complaint as those who have not given the subject so much attention. Another is the general apathy which is very human and which exists to a greater or less extent among mining men as well as other people.

Your committee would respectfully suggest that when we shall have been discharged from our duties in the premises, another and stronger committee be apopinted to take up and carry forward this work of investigation and recommendation until such policy shall have been inaugurated and acted upon among mining men and operators as will insure for all fair, just, equable and satisfactory treatment in the reduction of their ore products.

All of which is respectfully submitted.

(Signed) GEORGE W. RITER.
H. S. JOSEPH.

MR. JOSEPH: I want to say at this time, gentlemen, that the committee invites discussion upon the different points. You will readily see that we have not gone into details, or given statistical information because that is all on file with the Secretary. The statistics are on file, but our general findings are contained in the report as read.

COLONEL EWING: May I ask a question. Is that the report of the entire committee?

MR. JOSEPH: I stated at the outset Colonel, that a report had been partially made up in Denver and sent in by Judge Colburn and I have that report, but in making up our report we incorporated the vital points of Judge Colburn's report. His report is only signed by himself. After arriving here Mr. Riter and myself asked Judge Colburn by telegraph as to whether we could make modifications in the report which was sent here by him. He answered that he did not desire any changes made and probably out of justice to Judge Colburn his report ought to be read. I will read it if the Congress desires. I expected to file it with the Secretary.

COLONEL EWING: I think we ought to hear the minority report.

MR. JOSEPH: I will read this report of Judge Colburn, but I want to say that Mr. Rider and myself do not agree with this report.

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

Your committee on Mutual Relations and Grievances of Ore Producers and custom smelters reports as follows:

We desire to state in the outset that the subject assigned to us in rather large, complicated and difficult of treatment, for many reasons which are very obvious to us, and which possibly may become somewhat plain to you before the report is finished.

Without going too minutely into details, we wish to state that among the matters complained of by the producers are the following:

I. Exorbitant smelter charges.

II. Unsatisfactory method of determining basis of settlement.

III. Unsatisfactory settlements on account of arbitrary valuation placed upon different metals by the smelters; and refusal to pay for the ore under forty-five days to two months after treatment of same.

I. Exorbitant Charges.

The claims are made:

That charges vary depending upon the value of the ore. Most producers are unable to understand that while a treatment charge of say $3.00 per ton is made on ores not to exceed $10.00 in value, $12.00 or $15.00 is charged on ores valued at $200.00 and upwards; any more than they can understand why it costs a railroad company only 40 cents a ton to haul ores of low grade and from $4.00 to $6.00 a ton for ores above a certain grade.

That, in localities where there is no competition among smelters, they are obliged to pay much higher rates for treatment of ore where competition exists. We are credibly informed that in one instance of contract where competition existed between smelters there was a difference in treatment charges of $34.00 on lead ore of the value of $100.00 and less per ton. That in an extensive mining district where competition was started the smelters lowered treatment charges from one to three dollars per ton.

That the tax for insoluble matter and for elemens seems to the producer to be altogether too great.

II. Unsatisfactory Method of Determining Basis of Settlement.

The claims are made:

That the smelter assays are almost invariably low, and this is purposely done in many instances to secure splits on assays to reduce the basis of settlement.

That methods of umpiring are so arranged by the smelters that the producer almost invariably pays the umpire fees.

That the methods of assaying used are those which favor the smelter and prevent the producer from receiving full value for his ores.

That the full assay value of metals is not settled for.

That a certain percentage of the value in some cases is subtracted from assay value; and in some instances, where full value is allowed, a certain percentage is deducted on settlement; both amounting to the same thing.

III. Unsatisfactory Settlements on Account of Arbitrary Valuation Placed Upon Different Metals by the Smelters; and a Refusal to Pay for the Ore Under Forty-five Days to Two Months After Treatment of Same.

The claims are made:

That quotations from the Engineering and Mining Journal are taken by some smelters as a basis of settlement; and by many it is believed that this journal is owned and operated in the interests of a smelter or smelters and that its quotations are not always correct. Some settlements are based upon prices quoted by brokerage firms in New York City, who always quote prices lower than the regular New York quotations.

That while some smelters agree in their contracts with producers to settle upon quotations given in the Engineering and Mining Journal, they sometimes settle at less price than such quotations.

That the smelters in a measure control the quotations upon which their settlements are made and that while under contract to settle on certain quotations they do not always do so.

And one of the latest, and to our minds, one of the most vital complaints is that in certain mining sections the smelters now refuse to settle for ore until the lapse of forty-five days to two months after the treatment of the same. This, to your committee, seems to be a matter of very grave importance so far as present circumstances are to be considered, and also to be very far-reaching in its results so far as the future is concerned. We are credibly informed that in some mining sections it would not only be possible, but highly probable that the smelters would be owing the producers from $1,000,000 to $2,000,000 within the two months specified. This rule of the smelters is very serious at this particular time when it is hard to provide currency as a circulating medium. And we fail to see the justice of furnishing the smelting companies with what would probably, in certain localities, amount to the continuous use of the interest on from $1,000,000 to $2,000,000.

It is claimed by many small producers of ore, that the large producers are given a very unfair advantage over them in the matter of treatment charges. It is also claimed that the custom inaugurated by at least one of the great smelting companies of distributing additional compensation to its employes for faithful service during the preceding year is actuated by an ulterior motive, which operates to the disadvantage of the producer. Your committee is not in the possession of data from any of the great smelting companies against whom these complaints and charges are made to show that such smelting company or companies are at all dissatisfied with present existing conditions. When we take into consideration the fact that one of the great smelting companies, in its report for the year ending April 30, 1906, showed that the profits upon an original expenditure of some $30,000,000 or $40,000,000 were over $10,000,000 and that this was but a slight increase in percentage over the former year, the inquiry naturally arises in the minds of your committee as to how this great accumulation of profit has been accomplished? And it seems to us that the conclusion would arise in the minds of unprejudiced persons that the smelting business is wonderfully profitable, or it is conducted along lines of advantage which are not to be shared by ore producers.

In other words, the whole matter, as to treatment charges, weights, moisture, assays and value of different kinds of metals of which the ore is composed and time of settlement, is absolutely in the hands of the smelters, and from their arbitrament and dictation there is no appeal.

Remedies.

The three most prominent remedies suggested are:

First.—Intervention on the part of the United States government.

Second.—Intervention by way of state legislation.

Third.—Intervention by organization of mine owners and operators throughout the country for the purpose of building, operating and maintaining their own mills and smelters along lines similar to those now employed in the operation of the great smelting companies which now control the treatment of ores in this country.

Under the first remedy suggested, "Intervention on the part of the United States government," your committee does not feel like making any recommendations other than that the American Mining Congress uses every effort in its power to convince the United States government of what we believe to be the absolute necessity of better recognition and protection of the mining interests of this country through a Bureau or Department of Mines and Mining.

Under the second remedy, "Intervention by way of state legislation," on account of the difficulty of securing efficient state legislative action in some of the states we think that recommendation along this line would not be advisable at this time.

The third remedy suggested, "Intervention by organization of mine owners and operators, etc.," however, seems to us to be entirely practicable and if wisely organized and judiciously managed will be eminently satisfactory and we would respectfully recommend it to the consideration of this Congress. About the legality of this remedy there can be no question. About its desirability it seems to us there can be no question, for the reputed dividends earned by the great smelting companies place their enterprises beyond the question of doubt as successful business and financial propositions.

Other remedies, such as competition and independent smelters, have been suggested and considered by your committee. Neither of these do we think would be of any permanent value for the reason that competition might cease to be competition, and independent smelters, as in the past, might cease to be independent smelters and then the mining industry, so far as treatment of ores is concerned, would practically be in the same condition as at the present time.

We feel that any objections which can logically be urged against the ownership of smelters and mills by mine owners and operators as a business proposition, are practically the same objections which could be urged against any such smelting companies as The American Smelting and Refining Company and the United States Smelting Company, as business propositions.

By way of illustration permit us to state that not a great many years ago the mine owners and operators of the Cripple Creek mining district became aware of the fact that the railroad charges for transportation were exorbitant, and they were entirely at the mercy of certain railroads. This leads to the conception of an idea on their part of the building of an independent road from Colorado Springs into the town of Cripple Creek, traversing the entire Cripple Creek district as a means of outlet for their ores and transportation for their fuel and other mining supplies. The road was built and paid for by the mine owners and operators and then began a bitter rate war which continued for a period of seven months. It was inaugurated by a competing line to drive the new line out of business. However, the new line survived and subsequently sold its holdings to another railroad company, reserving for its stockholders contracts with the different mine owners and operators which put them beyond the possibility of paying exhorbitant rates in the future. The road paid its owners a good interest and profit on their investment; very materially reduced their transportation rates and was satisfactory in every particular.

We desire to call attention to the fact that it is the purpose of The American Mining Congress to assist the mining and metallurgical industries in all their branches, not only in the United States, but in all contiguous territory where these industries desire to be benefited by our efforts. And while we have been assisted in securing data for use in preparing this report by the earnest and hearty support of quite a large number of mining men and operators throughout the country, for which and to whom we extend our hearty thanks, yet we deplore the fact that so many who could have co-operated with us have failed so to do. The reasons for this partial lack of co-operation are very evident to your committee, one of the principal ones being that should it become known by the smelting companies that their business is being criticized by their patrons they would be discriminated aganst or perhaps refused treatment of their ore entirely. Still another is that the producers who are wise to the situation sometimes obtain better concessions and better treament and consequently have not so great cause for complaint as those who have not given the subject so much attention. Another is the general apathy which is very human and which exists to a greater or less extent among

mining men as well as other people. However, if we are to expect the best results we must be thoroughly united in our efforts.

Your committee would respectfully suggest that when we shall have been discharged from our duties in the premises, another and stronger committee be appointed to take up and carry forward this work of investigation and recommendation until such policy shall have been inaugurated and acted upon among mining men and operators as will insure for all fair, just, equable and satisfactory treatment in the reduction of their ore products.

All of which is respectfully submitted.

(Signed) E. A. COLBURN, Chairman

H. J. CANTWELL, OF MISSOURI: As the majority report seems to embody all contained in the minority report, and as the minority report contains a criticism of the Engineering and Mining Journal, I move that the minority report be laid upon the table, and the majority report be incorporated in the minutes.

COLONEL DORSEY: You speak of a majority report and a minority report. This Congress appointed a committee of five gentlemen to report upon these facts. As stated, the secretary sent out some 1,500 requests for the different mine owners to answer. I went to a dozen of those men and requested that this information be given. Not one responded for the reason given in those reports. They were afraid to do it. I am satisfied they had contracts with the railroads and with the smelters to their advantage so they were afraid to say anything. I submit there is no majority report here. Mr. Joseph and Mr. Riter make a report. Judge Colburn makes a report. I think it is wise to publish the report made by Mr. Joseph and Mr. Riter. Let Judge Colburn's lay on the table for the reason that the other report contains everything except this criticism perhaps. Then if you desire, discharge this committee and appoint another committee to take this matter up and report to the next session of the Congress.

GEORGE W. RITER, OF UTAH: As one of the members of the committee who is responsible for this report which was first read, I think it is fair to state to the Congress that the other members of the committee met with us, traveling long distances, and we were in session for several days at a time. I should like to state that although the other members of the committee are not here with us and have not joined in the report first read, the reason for that is this, the report was not made up until our arrival in Joplin—the report in its final form. Consequently it has been signed by Senator Joseph and myself who are here. It is fair to the other members of the committee, however, to state that in all sessions of the committee the members have been in perfect harmony, and I have no reason to believe that the other members of the committee would be unwilling to add their signatures and give their support to our report.

I think it is fair also to state that those figures which are quoted in the report have been given with the express permission of the operator who furnished it, and that the committee has been guided entirely by its pledge not to divulge information given it in confidence. I may say in conclusion that Senator Joseph and I do not join in Judge Colburn's report because it contained things we cannot agree upon. We who are operating and selling ores in a district where competition has reached a maximum, where one of the smelter managers has given us honest information for this report and has stated that more tons of ore are being smelted today with better results than in any other smelting center in the country, are inclined to recommend competition as a good thing.

W. R. INGALLS, OF NEW YORK: I arise, not to discuss the report just read, but to make a simple statement with reference to the criticism which Judge Colburn has made in his report of the Engineering and Mining Journal.

H. S. JOSEPH: I arise to a point of order. My point of order is this that there is a motion before the house and that prevents a dis-

cussion of the two reports before the convention at this time. Unless the gentleman desires to speak on a question of personal privilege to refute certain statements made by Judge Colburn in his report he is out of order.

MR. INGALLS: That is it.

MR. JOSEPH: Let me say to Mr. Ingalls, that probably he misunderstood. That is not the committee's report.

MR. INGALLS: I understand that and intend simply to make a brief statement of fact.

CHAIRMAN BUCKLEY: If there are no objections Mr. Ingalls will have permission to make his statement.

MR. INGALLS: The Engineering and Mining Journal is owned by the Hall Publishing Company. The entire stock of the Hall Publishing Company is owned by its own officers and employes. I make this statement as a director in chief of the Engineering and Mining Journal and as a director and manager of the Hall Publishing Company.

MR. MALCOLMSON, OF KANSAS CITY: Do I understand, Mr. Chairman, that this matter is now open for discussion?

CHAIRMAN BUCKLEY: The reports are now open for discussion.

MR. MALCOLMSON: For a number of years I held a general power of attorney for the American Smelting and Refining Company, but since 1902 I have been in business of mining on my own account. I would like to make a few remarks regarding this matter.

In the first place I would protest against the assumption that the extra money paid by that company to its employes for increased efficiency is paid to them because of the amount of money that they steal from the miners. Is that the way I understand the report of Mr. Joseph?

MR. JOSEPH: That there was a suspicion—well grounded.

MR. MALCOLMSON: These bonuses are paid to employes for efficiency, resulting in increased profits, and in no organization is it possible for efficiency and dishonesty to go together. Most of the employes to whom the increase in the way of a bonus is paid are metallurgists, superintendents and others, who do not come into contact with ore sellers at all, and are in no way able to influence or affect settlements with the customers of the company. It is good in law, and should be good elsewhere, that definite proof must be obtained before accusations of the kind mentioned by the delegate from Utah be made against a number of reputable men, based merely on suspicion without any proof whatever is ridiculous, and never should have been made.

MR. RITER, OF UTAH: The members of the committee submitting this report recognizes that custom smelting is a legitimate industry, and so long as it is conducted along that line, and so long as the smelters are fair in their methods of dealing with patrons, there is no complaint. We do object, however, to profits being made by subterfuge. Some time ago, there came into my hands a detailed statement, made by the Treasury Department, covering the purchase of several million ounces of silver for the mint. On comparing these prices by dates with the prices that had been sent out from New York for the use of the smelters, it was found that in every instance the price paid by the government was higher than the so called "official" quotation, the discrepancy being almost too large to be explained by such items as expressage, insurance, interest on the money and so on. I finally directed an inquiry to the firm responsible for the New York quotation, stating that our company was selling its ores under a contract which provided that the silver contents should be paid for on the basis of official prices as quoted by the firm from day to day and asking how the quotations were arrived at. There had appeared last spring, in response to inquiries from a number of mining men including myself, a valuable article in the Engineering and Mining Journal on, "How Metals are Sold." Among other things, it recited the basis on which silver is sold, and stated that the price is governed by the London market. According to the article, which I have every reason to

believe correct, at a certain hour each day the silver brokers in London meet and fix upon the price of silver for the day. At that price they agree to buy such quantities of silver as may be offered, within reasonable limits, and also agree to fill such orders from consumers as may be placed at that price, exacting, more than likely, a reasonable commission. This article was cited to the firm that sends out the New York "official" quotation, and the firm was asked whether it followed the rule of the London brokers and undertook to fill orders from consumers at the price quoted. It said: "No. The price we give out from day to day is the price at which we are willing to buy." Now it is to be presumed that the men who are putting out bullion, placing it on the market, are aware of these conditions, and yet all of the contracts that I have ever seen, which the mining men have to sign, recite that the silver contained in ores shall be paid for on the basis of the quotations issued by this firm, which, according to its own statement, does not undertake to sell to consumers at its price, but the price given out is the price it bids for the metal. It might be well to state further that a large portion of the copper produced in the United States is sold by one company, but this company, according to statements made by the editor of the Engineering and Mining Journal,—statements made by him personally,—does not furnish and has persistently refused to furnish for publication any data concerning its transactions and prices. In the absence of definite information from the people who ultimately sell the copper from our mines, we contract in advance to sell to the smelters on the figures quoted in the Engineering and Mining Journal, figures that are made up by journalists who go through the market and endeavor to obtain an accurate opinion from the parties at interest. While not complaining of this journal as now conducted, we remember that it has changed hands more than once, and we should like some legal guarantee that the figures we contract in advance to accept, will represent actual market conditions, transactions with consumers being considered in their bulk. The smelting and refinining companies knowing the real facts at all times and being in position to correct any published errors, could give such a guarantee, but refuse to do so. The parties whose figures we contract to accept are not bound to furnish correct ones. If they give out figures which are not correct we can do nothing but accept them. The point of it all is that the companies who are purchasing and selling metals, who are best posted on the actual conditions of the market, are the ones who refuse to give out accurate information as to what the market is. They compel us to accept the figures of third parties, but refuse to guarantee the correctness of the figures.

MR. JOSEPH, OF UTAH: From Mr. Malcolmson's remarks it would appear that the American Smelting and Refining Company is an angel of charity and justice, never did anything wrong, or dared to do anything wrong, always on the side of right, but the ore producers come to us with their complaints telling us they are not treated fairly and asking the American Mining Congress to help them out. Some have even gone so far as to go to President Roosevelt, the trust-buster, and asked the intervention of the government to regulate this octopus, the American Smelting and Refining Company. Mr. Malcolmson states he believes this bonus which the committee referred to is being paid annually to the employes for efficiency. Well, I don't see that the poor furnace tender that gets $2 a day gets any bonus for his work, but the clerks that do the figuring, they get the bonus.

In reference to another criticism on the part of the gentleman from Missouri with reference to contracts. The committee examined a great many contracts and I would say that it would defy the efforts of a Philadelphia lawyer, much less a Missouri lawyer and I know Missouri has some pretty good things, to unravel these contracts. They read so that the average ore-producer is unable to understand what is in those contracts.

As to quotations, this is what the ore producer is butting up against. We are confronted with two different quotations. The Engineering and Mining Journal has a quotation, and that is the standard the ore producer is willing to take, but the ore producer does criticise these manufacturers quotations given in the Trade Journals and in the Associated Press possibly. We would like to see the quotations on the metal the same in one part of the country as it is in another, and that is what we do not see.

CHAIRMAN BUCKLEY: The motion before the convention is that the minority report be placed on the table and that the majority report be accepted and placed on file, and that the Congress recommends that a new committee be appointed to replace the old. That the old committee be discharged and a new committee be appointed.

Which motion was carried unanimously.

MR. JOHN DERN OF UTAH: I move you, sir, that the present committee or that the committee which has just been discharged be continued or re-appointed for another year.

CHAIRMAN BUCKLEY: I believe that the motion just voted upon provided that a new committee be appointed, so that the appointment of the new committee would be delegated to the President.

MR. JOHN DERN, OF UTAH: I will withdraw my motion and substitute this one: I move that this Congress recommend to the president of the Congress that the members of the committee which has just reported who are present and have served faithfully upon this committee be reappointed on the committee to be appointed for the next year, and that additional members be appointed to complete the committee of five.

MR. MALCOLMSON: I would like to say that I hope you will have a man on that committee who knows something about the smelting industry, in addition to men who know about the mining industry.

MR. JOSEPH, OF UTAH: At this point I would like to state that the American Mining Congress challenges discussion of this important question with the American Smelting and Refining Company, but their representatives are not here today.

CHAIRMAN BUCKLEY: Are you ready for the question

carried.

MR. DORSEY, OF NEBRASKA: The committee on resolutions reports back resolution introduced by Mr. Mills, thanking the city of Joplin for their entertainment. In moving its adoption I ask that a rising vote be taken.

The motion being duly put by the chair was unaanimously carried.

Resolutions of Thanks.

Whereas, The citizens of the city of Joplin have more than fullfilled the promises made by the Missouri delegation when the city of Joplin was selected as the place of holding the session of 1907 of the American Mining Congress, and

Whereas, The officers, members and delegates of the Congress have been received with true Southern hospitality combined with Western enthusiasm,

Resolved, That the members and delegates of the tenth annual session of the American Mining Congress hereby express their hearty appreciation of the courtesies extended by the citizens of Joplin.

Resolved, That the special thanks of the Congress be extended to the warm hearted, generous and apparently tireless ladies of Joplin, who have, by their attendance at the session of the Congress, by their generosity, courtesy, thoughtfulness and untiring zeal, done so much to make this session of the Congress the most enjoyable ever held.

Resolved, That the thanks of this Congress be extended to the Mayor of the city of Joplin and the Joplin Commercial Club for their assistance in making the tenth annual session notable and successful in achievement.

Resolved, That the thanks of the Congress be extended to the press of the city of Joplin, which has, by its uniform courtesies and its equal justice contributed in no small degree to the success of the session.

Resolved, That the thanks of this Congress be extended to the citizens of Galena, Baxter Springs, Webb City, Carterville and Carthage, for their hospitality so generously offered and given by them.

Resolved that the thanks of this Congress be extended to the Mine owners of the Joplin district for the opportunity afforded to members and delegates to examine mines and milling methods so successfully practiced.

Resolved, That it is the intent of these resolutions to convey to each and every officer, citizen and organization in the city of Joplin, an acknowledgement that nowhere has this Congress been received with more liberality or enthusiasim, and

Be It Further Resolved, That a copy of these resolutions be forwarded to the Mayor of Joplin, the Joplin Club and the press.

MR. GREGG OF MISSOURI: On behalf of the people of Joplin I desire to express the thanks of the people of Joplin and all of those referred to in that resolution for the handsome recognition given for any courtesy which we may have rendered. (applause.)

MR. CANTWELL, OF MISSOURI: I have a short resolution which I desire to offer.

The secretary then read the resolution as follows:

Resolution No. 10 Introduced by H. J. Cantwell of Missouri.

Resolved, That it is the sense of this Congress that it is unwise and inexpedient for any official of this Congress to make any report in his official capacity on any individual mine, or other commercial enterprise, and that the work of the information bureau of the Congress be hereafter confined to the circulation of the official printed documents of the Congress, which shall be sent out under such rules and regulations as may be prescribed by the Board of Directors.

VICE PRESIDENT BUCKLEY: I would like to announce that the report of the committee appointed to investigate the laws of the various states with a view to suggesting additional protection for mining investors will be taken up this afternoon. I would suggest that the members be here promptly at 2:30 at which time we will listen to a short address on the International Mining Exposition at Madison Square Garden in New York City, by Mr. W. M. Porter. A motion for adjournment is now in order.

A motion to that effect being made and seconded, upon being put was unanimously carried, and a recess taken until 2 o'clock p. m.

THURSDAY, NOVEMBER 14, 1907.

Afternoon Session.

PRESIDENT RICHARDS: The Congress will be in order.

COLONEL DORSEY, OF NEBRASKA: The committee on resolutions report favorably on resolution No. 3 introduced by Samuel R. House of Denver, which I will ask the secretary to read.

The secretary read resolution as follows:

Resolution No. 3.

(By Samuel R. House.)

Whereas, It is apparent that the free importation of foreign zinc ores into the United States is inimical to the direct interests of the miners of zinc ores in the United States, and

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

Resolved, By the American Mining Congress in convention assembled, that the Congress of the United States be urged to impose such a duty on the importation of zinc ores into the United States as will protect the interests of the miners of zinc ore.

On motion made, duly seconded and put, the resolution was adopted:

Motion was made and seconded that the report of the committee of which Mr. Downey is chairman, be fixed as a special order for four o'clock. Being duly put the motion was unanimously carried.

PRESIDENT RICHARDS: The next order on the program is address entitled "The International Mining Exposition of Madison Square Garden, New York City," by W. M. Porter.

Mr. Porter's address will be found on page 149 of this report.

MR. FRANK E. WIRE of Illinois: I have a resolution I would like to offer and ask the Secretary to read it.

Secretary read the resolution as follows:

Resolution No. 11.

(Introduced by Frank E. Wire of Illinois.)

Resolved, That the American Mining Congress accept this invitation from the International Mining Exposition Company to co-operate with them in holding this exposition at Madison Square Garden, New York, and to that end, as an educational measure for the benefit of the mining industry, the American Mining Congress extends the invitation to the United States government, states and territories, foreign countries, mining associations, manufacturers of mine equipment, and mine owners, to participate in this exposition.

PRESIDENT RICHARDS: The time has now arrived for our subject "Symposium on Mining Engineering. Education," led by Dr. Victor C. Alderson, President of the School of mines of Colorado.

Dr. Alderson's address will be found on page 162 of this report.

COL. DORSEY of Nebraska: There is an important resolution on the desk of the Secretary I would like to have him read.

Secretary then read the resolution as follows:

Resolution No. 12.

(Introduced by Judge J. H. Richards.)

Resolved, That the American Mining Congress urges the establishment under the Department of the Interior at the approaching session of Congress of an independent Bureau of Mines and Engineering Investigation, with ample authority and funds for,

(a). The investigation of, and inquiries into the nature and extent of the mine and quarry industries; the cost, method and processes employed in the mining, handling transporting and treatment of mineral products in the United States, the territories and insular possessions; and the recommending of legislation appropriate thereto; with the view of benefiting these industries, by improving mining conditions, developing more efficient methods, and preventing mine and quarry accidents as well as unnecessary waste, and of securing thereby the wise utilization and conservation of our fuels and other mineral resources.

(b) The investigation in foreign countries concerning mining, handling, treating and using of fuels and other mineral products, with a view to benefiting American industries.

(c) The investigation of, and inquiries into, the engineering problem of the government, the testing of materials belonging to or for the use of the government of the United States; and the making at cost of similar tests and investigations for state or municipal governments and other parties, under such regulations as may be prescribed by the Secretary of the Interior.

(d) The co-operation with the Geological Survey in determining the value of mineral resources in the United States; and with the Survey

as well as the General Land Office and the Forest Service in the disposition and management of the mineral lands belonging to the Federal government.

(e) The publication, in such form as to be readily available, of the information obtained from all these investigations and inquiries; the wide and prompt distribution of these publications among the mining men of the country; and co-operation of impartial government experts in further education work by public addresses in mining camps and at the meetings of men associated with mining and quarrying industries—with a view to prevention of accidents, and of waste, and the adoption of more efficient methods.

Resolved, That realizing the increasing importance of the work of the United States Geological Survey as furnishing an intelligent foundation for the development of the mining, agricultural, forestry, and other great industrial developments in this country, the American Mining Congress respectfully urges the Congress of the United States to grant larger appropriations for the surveys and other investigations of the Geological Survey, so that the results may be reached rapidly enough to more nearly meet the growing needs of the country, especially in relation to:

(a) The classification of the public lands;

(b) The topographic surveying of the United States and the exploration and mapping of the geological formations, ore bodies, mineral deposits, etc.

(c) The investigations concerning the nature, extent and origin of these deposits, and the relation of the rock formations to the character of the soil derived therefrom.

COL. DORSEY: Gentlemen of the Convention: This resolution is offered by our worthy President and has been prepared by him after consultation with your Board of Directors and the Committee on Resolutions. It embodies what the Secretary of the Interior at Washington desires regarding our views as to the establishment of a Bureau of Mining in the city of Washington under the control of the Secretary of the Interior. After consultation of my colleagues on the Committee on Resolutions we have determined to bring the resolutions direct before the convention for action. I therefore move you, Mr. President, that the rule requiring the sending of all resolutions to the Committee on Resolutions be suspended and that this resolution be now considered by the Congress.

PRESIDENT RICHARDS: It has been moved and seconded that the rule be suspended which requires the submission of all resolutions to the Committee on Resolutions. The question now is as to the suspension of the rule.

Motion was unanimously carried.

COL. DORSEY of Nebraska: I move the adoption of the resolution as read.

The motion being duly seconded, was put and unanimously carried.

PRESIDENT RICHARDS: The next topic on the program is "What the Profession can reasonably Expect from the Mining School Graduate," by Dr. Milnor Roberts.

R. H. KEMP of Minnesota: Mr. President, I was requested to read the paper by Dr. Roberts, but at this time I would like to suggest, owing to the lateness of the hour and the fact that there are many papers which will be presented by the authors who are present, that we dispense with the reading of this paper, but have it published without reading.

PRESIDENT RICHARDS: If there is no objection it will be so ordered and the paper will be filed for record.

Dr. Roberts' paper will be found on page 172 of this report.

The next on the program is the "Relation of the Mining School to the the Mining Industry," by Prof. Robert H. Richards of Boston, Massachusetts.

DR. HENRY M. PAYNE: Mr. President, I understand that Prof. Richards' paper is of extreme interest, and would suggest that it be handed over to the Secretary and published in the usual course where members may have an opportunity to read it.

Prof. Richards' paper will be found on page 185 of this report.

PRESIDENT RICHARDS: If there is no objection we will take that order. The next topic is "Secondary Technical Education Applied to Mining," by Mr. Lewis Young, Director of the School of Mines of Missouri.

Prof. Young's paper will be found on page 178 of this report.

PRESIDENT RICHARDS: The next topic is "The Value of Correspondence Instruction to the Mining Man," by Mr. H. H. Stoek, Editor of Mines and Minerals of Scranton, Pennsylvania.

Mr. Stoek's paper will be found on page 199 of this report.

PRESIDENT RICHARDS: The time has arrived for the special order. We will now hear from Mr. C. J. Downey of Colorado, Chairman of the committee appointed to investigate corporation laws of various states with a view to suggesting additional protection for mining investors.

Mr. Downey presented the report of the committee as follows :

Members and Delegates of the American Mining Congress:

This committee respectfully begs leave to report that it is easier to devise than to demonstrate methods of preventing fraudulent mining schemes. By the very nature of the case, the demonstration of methods must be expected to follow the approval and action of this Congress, with respect to the proceedings of this committee. The committee, therefore, has limited itself to the task of devising methods.

This committee begs leave, first to congratulate the Congress upon the passage by several state legislatures of the so-called Pardee measure, concerning fraudulent stock representations, recommended by the Congress at its ninth annual session, and to urge that the effort be continued to procure its adoption in other states.

The report of this committee falls under five topical heads, representing the five recommendations which it presents to this Congress:

First. Concerning a proposed legislative enactment to compel the organizers, directors or promoters of corporations founded upon indefinite or prospective property values, to justify the issuance of full paid stock for such property by filing a complete schedule of facts concerning the same with the secretary of state.

Second. Concerning a campaign of education, in behalf of probable mining stock buyers, through the media of the city and country press, this campaign to be conducted in the name of the American Mining Congress.

Third. Concerning a proposal to secure the cumulative voting privilege for minority stockholders in all states where this privilege has not already been secured by statute.

Fourth. Concerning a set of resolutions respectfully urging upon the secretaries of states and attorneys-general of the various mining states and territories the importance of seeing to the enforcement of all local requirements affecting foreign corporations; that is, corporations organized under the laws of other states or territories.

Fifth. Concerning the proposed establishment of a standing committee of five, the majority of whom shall be practicing attorneys, for the purpose of initiating or considering proper changes in, or additions to, the corporation laws of our states, insofar as they affect or may be made to affect the interests of stock investors.

First.

Owing to the variations in the corporation laws of our various states, especially as illustrated by local court decisions bearing upon the same, this committee has found it impossible to recommend to this Congress any general or uniform measure for presentation to the legislatures of those states where the organizers, directors or promoters of mining cor-

porations should be required to fully certify the facts concerning their financial operations. It, therefore, presents to this Congress a TYPE of such a measure, one which the committee is satisfied is sustained by the decision of at least one Western state (Colorado), and it recommends that this Congress adopt the said measure as a TYPE of a publicity law to which this Congress gives its hearty sanction, the enactment of proper statutes in the several states to be urged in accordance with the principles thereby approved. The following type of publicity measure is accordingly recommended to the favorable consideration of this Congress:

AN ACT ENTITLED AN ACT TO CONTROL THE ISSUANCE OF THE FULL PAID CAPITAL STOCK OF CORPORATIONS FOR PROPERTY, TO PROVIDE FOR THE CERTIFICATION OF INFORMATION CONCERINING SAID PROPERTY AND THE STOCKS SO ISSUED TO THE STATE, TO REQUIRE AN ANNUAL REPORT TO THE STATE BY CERTAIN CORPORATIONS, TO FIX PENALTIES FOR THE VIOLATION OF THIS ACT, AND TO IMPOSE CERTAIN DUTIES UPON THE SECRETARY OF STATE.

Be It Enacted by the General Assembly of the State of Colorado:

Section 1. Whenever the board of directors of any corporation, existing under and by virtue of the laws of the state of Colorado, shall cause to be issued any portion of the capital stock of said corporation in exchange for property, the said capital stock being issued as full paid, it shall be the duty of the said directors, within thirty days immediately succeeding the issuance of said full paid capital stock and the acceptance of the said property as full consideration therefor, to file with the secretary of state of Colorado a signed and sworn certificate of the transaction aforesaid, which shall contain also a declaration of the value of said property, as a reasonable equivalent of the full paid stock issued in exchange for said property; provided only that the said declaration may be subject to the following described specifications, to-wit:

First. That the declared value of the said property, in whole or in part, is representative of a true market appraisement of the value of said property, in whole or in part, and to this extent, as described or defined, immediately available for productive use or valuable service to the possessor thereof.

Second. That the declared value of said property, in whole or in part, is representative of an implied future or prospective value inherent in said property, in the judgment of the directors; the said implied future value being dependent upon undetermined factors of experiment, exploration, equipment or other means of exploitation, without which the said implied future value must forever remain undisclosed.

Sec. 2. In case the said directors of any corporation shall certify to the value of the property issued in exchange for the full paid stock of the said corporation, subject to the two specifications of value, as provided in section 1 of this act, it shall be the duty of said directors to clearly define the proportions in which the market or appraised value of said property and the implied future value of said property are represented by the said declaration. Failure to specify the implied future or prospective value of any property, accepted in exchange for the full paid stock of the corporation, when the said implied future value is manifestly an increment of the total valuable consideration for said full paid stock, or any evasion or false representation as to the actual present value, or implied future value, of said property, shall be a misdemeanor, punishable by fine or imprisonment, as hereinafter provided.

Sec. 3. Whenever the directors of a corporation shall certify to the secretary of state the implied future or prospective value of any property, transferred to the said corporation in exchange for the full paid

stock of the said corporation, it shall be the duty of the said directors to comprise within or attach to their said declaration, as a part thereof, a description of the said property with respect to the following particulars, to-wit: (1) Its location within a given state, county, township and section; (2) the nature of the legal title thereto; (3) the industrial or commercial character of the same, and (4) a description of its physical extent or amount; except in the case of leaseholds, contracts of purchase or other written instrument signifying possession of real property, in which case the real property itself shall be described with respect to the particulars set forth in this section; also the said directors shall accompany their declaration with, or attach thereto, a signed and sworn report of an expert authority, fully describing (1) the limitations of the said property, or the property represented by leasehold, contract of purchase or other written instrument of possession, with respect to its immediate productive use or valuable service, and the element of uncertainty existing in the value of said property, together with (2) the nature of the experiment, exploration, equipment or other means of exploitation, which, in his judgment, are necessary in determining the actual value of said property, and (3) the probable expenditure of cash or labor or both in completing said experiment, exploration, equipment or other means of exploitation.

In case the property transferred to the said corporation, in exchange for its full paid stock, is unproductive or prospective mining property, in whole or in part, or a leasehold, contract of purchase, or other written instrument signifying possession of unproductive or prospective mining property, in whole or in part, wherein the ores or valuable minerals exposed to the knowledge of its owners are not sufficient to warrant a valuation equal to the full payment of the capital stock so issued, the expert authority mentioned in this section shall be a practical mining engineer, who shall, in furtherance of the provisions of this act, certify to the secretary of state (1) the amount of underground development done upon the said property; (2) a description of the surface and underground equipment appurtenant thereto; (3) the approximate amount of ores or valuable mineral exposed, if any, (4) his estimate of the gross value of the ores or valuable minerals so exposed; (5) the nature of the titles under which said property is held, as revealed by the public records, and (6) the limitations, the uncertainty, the necessary forms of exploitation and the necessary expenditures with respect to said property, as hereinbefore provided.

Failure of directors to comply with the provisions of this section shall be deemed a misdemeanor, punishable by fine or imprisonment, as hereinafter provided.

Sec. 4. Whenever the directors of any corporation shall cause to be issued any portion of the capital stock of said corporation in equivalent exchange for property having an implied future or prospective value, in whole or in part, and shall certify to the said transaction, as provided in section 1 of this act, it shall be the duty of the said directors to file instanter with the secretary of state a certificate containing the following rescribed particulars, to-wit:

First. The name and address of the last previous owner of said property, and a statement with respect to any contract, agreement or understanding which he may have with any or all of the said directors or with any organizer or organizers, affecting the subsequent use of the stock of said corporation for and in behalf of the said corporation and its stockholders.

Second. The amount of full paid capital stock of the said corporation of original or subsequent issue, if any, accepted or designed to be accepted by the said directors as trustees for and in behalf of the said corporation and its stockholders, or of any cash proceeds from the sale of any of the company's full paid stock, accepted or designed to be accepted for the use and benefit of the said corporation and its stockholders.

Third. The name and address of any officer, director, stockholder, trustee or agent into whose hands the company's full paid stock of original or subsequent issue has passed by virtue of expected cash consideration from the sale thereof for the use and benefit of the said corporation.

Fourth. The nature of any contract, agreement or understanding by and between the said officer, director, stockholder, trustee or agent with respect to the subsequent cash or market price of any of the said corporation's full paid capital stock, by virtue of any expected cash consideration to the said corporation from the sale thereof, or with respect to any commissions, bonuses, funding expenses or other outlays incident to the said sale of the said full paid capital stock; also a statement whether or not there exists any contract, escrow agreement or understanding by and between the parties herein mentioned to assure to the said corporation any proportional benefits from the sale of any of the capital stock of the said corporation, made under and by virtue of the public market for said stock created through the said contract, agreement or understanding.

Failure of directors to comply with the provisions of this section shall be deemed a misdeameanor, punishable by fine or imprisonment, as hereafter provided.

Sec. 5. Whenever, by virtue of any contract, agreement or understanding by and between the directors, organizers or incorporators of any corporation or any of said directors, organizers or incorporators, and any officer, director, stockholder, trustee or agent of the said corporation, the said officer, director, stockholder, trustee or agent shall issue or cause to be issued, a printed prospectus, book or pamphlet for general public circulation, in furtherance of the advertising and marketing of any of the capital stock of said corporation, the said capital stock being full paid in exchange by the said corporation for property having an implied future or prospective value, in whole or in part, in accordance with the specifications set forth in section 1 of this act; it shall be the duty of the said officer, director, stockholder, trustee or agent furthering the sale of said full paid capital stock to duly print in said prospectus, book or pamphlet a transcript of all declarations and certifications filed with the secretary of state under the provisions of this act, as hereinbefore recited; provided that the said officer, director, stockholder, trustee or agent may print or cause to be printed, in prominent typographical characters within the first three successive pages of the said prospectus, book or pamphlet, the words "Official Prospectus, Published in Compliance with the Statute of the State of Colorado;" provided that the said officer, director, stockholder, trustee or agent shall, by so publishing the said imprint in the said prospectus, book or pamphlet, be acquitted of any further requirement to print said declarations certifications in other printed advertising, circulars or letters. Failure of any officer, director, stockholder, trustee or agent, to comply with the provisions of this section shall be deemed a misdemeanor, punishable by fine or imprisonment, as hereinafter provided.

Sec. 6. Any corporation whose board of directors shall certify to the secretary of state the issuance of any portion of its capital stock as full paid in exchange for property having an implied future or prospective value, as provided in section 1 of this act, may, at any time, file with the secretary of state a declaration, signed by the then existing board of directors, setting forth that the said property has, by experiment, exploration, equipment or other means of exploitation, proven to be of actual value, by virtue of productive use of valuable service to the possessor, equivalent to the face value of the full paid stock issued in exchange for the said property; but any false representation upon the part of the said directors as to the proven equivalent value of the said property, under the provisions of this section, shall be a misdemeanor, punishable by fine or imprisonment, as hereinafter provided. Any corporation subject to the provisions of this section, as hereinbefore recited, which has not filed the said declaration of proven equivalent value, shall, by its board of directors, annually file with the secretary of state, between the first day of

January and the first day of April, a statement showing (1) the amount of cash received into the treasury of the said corporation during the year ending December 31st last past, together with the amount separately stated, of any cash balance remaining in the treasury from any previous fiscal period; (2) the nature of the source or sources from which said new cash was received; (3) the amount of any expenditures or disbursements made from the treasury of the said corporation during the year ending December 31st last past; (4) the nature and destination of said expenditures or disbursements; (5) the nature and amount of any liens or encumbrances that may rest upon any of the company's property, and (6) the nature and amount of any experiment, exploration, equipment or other means of exploitation, whereby it was proposed to transfer the implied future or prospective value of any property assets of the said corporation into the category of proven equivalent value, as defined in this act. Failure to file said annual statement shall constitute a forfeiture of the charter of the said corporation, but the said charter may be revived by the payment to the secretary of state of the sum of $100 and the filing of the last delinquent annual statement as aforesaid.

Sec. 7. Wherever in this act the failure of directors or of any officer, director, stockholder, trustee or agent to comply with the provisions of any section hereof is proclaimed as a misdemeanor the penalty for such failure shall be a fine of not to exceed $500 or imprisonment in the county jail for the term of not to exceed three months; provided that, in the case of the duties of directors, as prescribed in sections 1, 2, 3 and 4 of this act, any director may urge as his defense the records of any meeting of directors showing that he has, by resolution or otherwise, sought to set in motion the functions of the board of directors in compliance with this act, or that he has voted in favor of compliance with this act, or that he has dissented from any agreement or understanding to the contrary.

Any false certification or declaration filed with the secretary of state in pretended compliance with the terms of this act shall be deemed a felony, and any director consenting to such felonious certification or declaration shall, upon conviction, be subject to imprisonment in the state penitentiary for a term of not to exceed two years; except that any signed and sworn report filed by the directors of a corporation in compliance with the provision of section 3 of this act, requiring the filing of a report from an expert authority or mining engineer, shall be deemed the work of the said expert authority or mining engineer and not chargeable to the said directors; provided that this exception shall not be construed to inhibit the charge of a conspiracy, as between the said directors and the said expert authority or mining engineer. In the case of a false report by an expert authority or mining engineer, the said expert authority or mining engineer shall be subject to the usual penalties for perjury.

Sec. 8. It shall be the duty of the secretary of state to accept for filing all certifications, declarations, and reports provided for under this act; and he may exact fees for the filing of the same provided that the fee for any single certification, declaration or report shall in no case exceed the sum of one dollar. In the event that the directors of any corporation shall fail to comply with the provisions of this act, as prescribed in sections 1, 2, 3 and 4, it shall be the duty of the secretary of state to promptly notify the attorney general of the circumstance and supply him with the state documents bearing upon such breach of the law, to the end that the attorney general may proceed against the offenders.

Sec. 9. In the event of any request for a certified copy of any document or report, filed under the provisions of this act, the secretary of state may cause the same to be made and delivered upon the receipt of the usual transcript fees.

The Abolition of Par Value.

As a supplement to the foregoing recommendations, this committee makes the further recommendation that this Congress place itself upon record as favoring a dual classification of corporation based upon the manner of the original issuance of stock, in accordance with a suggestion re-

cently outlined before the Illinois State Bar Association at Galesburg, Illinois. The idea, while not altogether a new one, was brilliantly set forth and advocated by Mr. Edward M. Shepard of New York City, and it calls for the organization of corporations without any fixed par value of shares —in simple terms for the elimination of the dollar sign from stock certificates. Inasmuch as the function of legal par value is to determine the liability of the stockholder, and this function has been practically abolished by the system of issuing full-paid stock for property, its function of determining the liabability of the stockholder can much better be fulfilled by requiring adequate and honest certifications to the state of the assets upon which corporation shares are uttered.

This committee is of the opinion and so recommends, that this Congress should approve the organization of corporations either with or without a legal par value for their shares, provided that those which are organized with a legal par value be required to issue these shares for cash or an actual cash equivalent; and provided also that those corporations which attach no par value to their shares shall be required to certify, in extenso, to the location, nature and status of all assets for which such shares are paid. It will be apparent that this dual classification of corporations can be appropriately attached to the TYPE of publicity measure already set forth, but the enactment of this idea must, of course, go to the very roots of our corporation laws, and the committee recommends the idea rather for future enactment. While this committee is of the opinion that the corporation laws of our states and territories, insofar as they should be devoted to the protection of general stock buyers are often wrong and in general far from adequate, it does not now feel warranted in recommending more than the continued agitation for a fundamental revision thereof, in the light of the needs of stock investors. The work which should be done in this direction is gigantic in its proportions, and the education of public opinion may, in some respects, be necessary.

SECOND.

As a means of instructing and protecting the widely distributed mining stock buyers of the United States, this committee recommends that the American Mining Congress, under the direction of its Secretary, shall pursue a permanent campaign of education through the city and country press, insofar as the financial resources of the Congress will permit; it being the design of this recommendation to present to such purchasers of stocks a clearer knowledge of mining as a business, its risks, needs and responsibilities, together with suggestions as to how they may defend themselves against false representations by detecting the earmarks of fraud.

As a suggestion appropriate to this purpose, the committee recommends that the following notice be sent to the city and country newspapers of the United States with the request that it be published as coming from this committee of the American Mining Congress.

Authoritative Advice to Mining Investors.

The American Mining Congress, numbering among its members thousands of the representative mining men of the West, at its Denver meeting in 1906 and its meeting at Joplin, Missouri, in November, committed itself to a policy of suppressing fraudulent mining promotions.

In pursuance of that policy it appointed a Fraud Investigating Committee, which has issued to the press of the county the following information, intended as a safeguard to the mining investor:

In the interests of those who wish to invest, not speculate, in mining stocks, the committee urges that each prospective investor arm himself with information in answer to the questions below.

Let there be no evasion of the promoter, accept from him no glittering generalities, but insist on clear, concise, accurate information. The honest promoter, who has a business-like proposition to present to busi-

ness men is afraid of shocking their intelligence by explaining the business chances which his enterprise entails.

The "Separator Promoter," however,—that is, one whose chief interest is in dishonestly separating cash from the investor, rather than in separating metal from the ground—is either afraid to reveal the thousand to one chances against his gamble, or reluctant to disclose his method of pocketing the lion's share in case of success.

Presuming that the prospective investor is anxious to acquire definite information regarding a mining company and its property, the committee urges that, as a preliminary step, he secure precise statements from the promoter in answer to the following questions. Inasmuch as the misuse of the mails is a felony, be sure to preserve all replies, together with the stamped envelopes containing them:

1. Company organization, when and where incorporated?
2. Capital stock, how issued and apportioned?
3. What steps have been, or will be, taken to raise funds for the development or equipment of the property?
4. Is any of the stock pooled?
5. How was the property acquired by this company?
6. Are there any debts against the company?
7. Are there any incumbrances against the property?
8. Location of the property and total acreage? Nature of titles?
9. Nature and extent of developments and equipment, and how much has been expended in this work?
10. How much treasury stock has been sold and at what price?
11. How much cash is in the treasury?
12. Has the property ever produced, and if so, how much has it produced under the present ownership?
13. Has the property ever been examined by a competent and honest mining engineer? Give his name and address, and send copy of his report.
14. Is the property working at the present time? If so, how many men does it employ, exclusive of stock solicitors?
15. Has a comprehensive financial report of the operations to date been issued? If so, send a copy. If not, count the writer out.

These questions are modeled after a few of the most important contained in a blank form issued by the American Mining Congress, James F. Callbreath, Secretary, Denver, Colorado. This blank will be mailed to any address upon application.

It will be noted that question No. 13 calls for the name and address of the engineer who has examined and reported upon the property in question. To those innocent of the fact that scores of parasites upon the legitimate mining industry masquerade under the title of Professor or Doctor, or have appropriated the degrees of E. M. or M. E., a word of advice may not come amiss.

Investigate the standing of this engineer, by writing some one in a position to know, and whose integrity is beyond question. If you are not a good judge of these things, exhibit his report to some one who is.

Below is given a list of the various state officials whose duties concern the mining industry:

Arizona—William P. Blake, State Geologist, Tucson.
California—Lewis E. Aubrey, State Mineralogist, San Francisco.
Colorado—T. J. Dalzell, Commissioner of Mines, Denver.
Idaho—Robert N. Bell, State Inspector of Mines, Boise.
Kansas—Erasmus Haworth, State Geologist, Lawrence.
Michigan—Alfred C. Lane, State Geologist, Lansing.
North Carolina—Jos. Hyde Pratt, State Geologist, Chapel Hill.
Missouri—E. R. Buckley, State Geologist, Rolla.
South Dakota—E. C. Perisho, State Geologist, Vermillion.
Washington—Henry Landes, State Geologist, Seattle.
Wisconsin—E. A. Birge, State Geologist, Madison.
Wyoming—H. C. Beeler, State Geologist, Cheyenne.

In some of these state offices the regulations require the receipt of one dolar, acompanying all inquiries, to guarantee answer. In all of them such a small fee is only a proper recompense for a conscientious reply on inquiries.

A quick method of getting in touch with a reputable engineer, familiar with the region in which the mining property is located, is that of corresponding direct with the editors of the reputable technical mining press. Avoid what are known as promotion organs.

These suggestions to the public are made by a special committee of the American Mining Congress, composed of Hon. Albert McIntyre, Everett, Washington, former governor of Colorado; Hon. Henry C. Beeler, state geologist, Cheyenne, Wyoming; Judge William F. Clark, Glover, Vermont; R. L. Herrick, associate editor of Mines and Minerals, Scranton, Pennsylvania, and Charles J. Downey, managing editor of The Daily Mining Record, Denver, Colorado.

THIRD.

The purpose of what is known as the cumulative voting privilege in the selection of corporation directors is to enable minority stockholder to procure representation in boards of directors. Instead of casting one vote per share for each of a given number of directors, such a law will permit any stockholder to cumulate his vote; that is, by casting all his votes for a single director, or for any limited number which he desires. This committee, therefore, recommends that a measure be framed, after the models already existing, carrying out the idea of the cumulative voting privilege, and that the same be presented to the legislatures of the states not already possessing such a law.

FOURTH.

This committee recommends the adoption of the following self-explanatory set of resolutions:

In view of the frequent complaint that is heard against the business methods of mining corporations and their attitude toward the remote purchasers of their shares in the interest of development, and being convinced from investigation that many evils arise from the practice of incorporating mining companies under the laws of one state or territory for the purpose of doing a mining business in another state or territory, as well as from the frequent failure of such corporations to properly comply with the corporation laws of the states or territories wherein their principal business is carried on; therefore,

Be it resolved, By the tenth annual session of the American Mining Congress, assembled at Joplin, Missouri, that the nature of such evils and the efforts which the Congress has put forth to suggest remedies therefor, fully justify it in respectfully expressing itself upon this point to the secretaries of state and attorneys general of all the states of the United States where mining is done, and especially where public mining corporations the more frequently operate; and,

Be it further resolved, That, without any specific instance in mind and wholly to the general advantage of the mining industry and those who trust their money in the development and equipment of mining enterprises, legitimate or spurious, the American Mining Congress shall urge upon the state and territorial officers herein mentioned the vital importance of enforcing the local laws governing foreign corporations, to the end that no mining company, by any method of organization, may evade or continue to evade its just duties toward the purchasers of such corporation shares; and,

Be it finally resolved, That the Secretary of the American Mining Congress be hereby instructed to send a copy of these resolutions to the Secretary of State and the Attorney General of every state or territory where, according to his knowledge, the purposes of these resolutions apply, together with any suitable letter of explanation which he may see fit to draw.

FIFTH.

This committee recommends that a standing committee of five be established by the American Mining Congress, called the Committee on Investment Legislation, the purposes of which shall be to initiate or consider suggestions for improvements in the corporation laws of the various states with respect to their bearing upon the needs and privileges of stock investors; the majority of the members thereof to be practicing attorneys and the tenure of service upon this committee to run from one annual session of this Congress to the next succeeding session, the President of the Congress being authorized to appoint the members thereof annually. Nothing in this recommendation shall be construed to mean that a committeeman may not succeed himself. This committee shall be empowered to consider and report upon matters initiated by itself or proposed at any session of this Congress, as well as to take in hand any incompleted business of the present committee.

Respectfully submitted by the committee:

A. W. McINTIRE,
R. L. HERRICK,
WILLIAM F. CLARK,
HENRY C. BEELER,
CHARLES J. DOWNEY,
Chairman.

THURSDAY, NOVEMBER 14, 1907.

Evening Session.

PRESIDENT RICHARDS: The Congress will be in order.

We will now listen to an address entitled "The Relations of the United States Geological Survey to the Mining Industry," by Dr. George Otis Smith of Washington, D. C., Director of the United States Geological Survey.

Dr. Smith's paper will be found on page 138 of this report.

COL. DORSEY of Nebraska: I am directed by the Committee on Resolutions to report back Resolution No. 6, introduced by Mr. Sidelle, and offer as a substitute therefor that which I will ask the Secretary to read.

The Secretary then read the resolution as follows:

Substitute for Resolution No. 6.

(Introduced by Wm. T. Sidell of Oklahoma.)

Whereas, There is expressed dissatisfaction among the oil producers of Oklahoma respecting the conditions governing the development and operation of oil and gas lands in that state; and

Whereas, It is recognized by the American Mining Congress that these unsatisfactory conditions arise from the peculiar relations existing under acts of Congress, whereby the Department of Interior is constituted as guardian for the Indian land owners; therefore, be it

Resolved, That the Congress of the United States be urged to enact such legislation as will, so far as possible, correct the unsatisfactory conditions at present existing, and be to the mutual advantage of the Indian land owner and those who are desirous of developing the oil and gas resources of their lands.

Moved and seconded that the substitute resolution be adopted in place of the one formerly offered. The motions being duly put was unanimously carried.

COL. DORSEY of Nebraska: I am instructed to report back Resolutions No. 10, offered by Mr. Cantrell of Missouri, and offer this substitute therefor.

The Secretary than read the resolution as follows:

Substitute for Resolution No. 10.

(Introduced by H. J. Cantwell of Missouri.

Resolved that it is the sense of this Congress that it is unwise and inexpedient for any official of this Congress to make any report in his official capacity on any individual mine or other commercial enterprise whatever, and that the work of the Information Bureau of the Congress be hereafter confined to the circulation of the official printed documents of the Congress, which shall be sent out under such rules and regulations as may be presribed by the Board of Directors.

It being moved and seconded that the substitute resolution be adopted and the resolution offered by Mr. Cantrell laid upon the table, the motion was put and unanimously carried.

COL. DORSEY of Nebraska: I report back Resolution No. 9, offered by Mr. Vincent of Missouri. This matter is covered largely by the report of the committee of which Mr. Downey is chairman and it is now under consideration by this Congress.

PRESIDENT RICHARDS: That is the one which was to have been considered with the report?

COL. DORSEY: Yes. If this report is adopted by this Congress I will ask that the resolution offered by Mr. Vincent be tabled, for everything, in my judgment, that he seeks to enact or reccommend is covered by that report. Still, some gentlemen of the committee take a different view and think that this resolution of Mr. Vincent should be considered, so I ask now that the two be considered together, the resolution of Mr. Vincent and the report of the committee of five referred to, to investigate laws for the prevention of mining frauds.

PRESIDENT RICHARDS: I believe it was understood that at the proper time the motion would be made to make these two resolutions a special order. They will remain in the Secretary's hands until that order is made.

PRESIDENT RICHARDS: The next on the program is an address on the subject "The Importance of the Mining Industry to the Industrial and Commercial Life of the Nation," by H. J. Cantwell of St. Louis.

Mr. Cantwell's address will be found on page 115 of this report.

There being no further business the meeting adjourned until Friday morning at 9:30 o'clock.

FRIDAY, NOVEMBER 15, 1907.

Morning Session.

PRESIDENT RICHARDS: The Congress will be in order.

The Secretary was requested to read the paper entitled, "The Great Southwest," which paper is as follows:

THE GREAT SOUTHWEST.

Mr. President and Gentlemen of the American Mining Congress:

With a profound appreciation of of the honor of appearing before this excellent body as duly accredited delegates thereof, and as representatives from Arizona and the Great Southwest, we extend to you the hand of royal fellowship from that magnificent field. We are incapable of underestimating the importance to ourselves, our country and to civilization which this splendid convention carries. In it we see the brain and brawn, the integrity, the industrial worth and the crystallized patriotism of the very best element from many nations the world over.

As comrades we extend to you the right hand of the Great Southwest as together we take up the march in this grand crusade of industrial progress.

In a spirit of what we consider legitimate pride, we lay the list of our resources before you, and ask recognition in the eyes of the mining world, in a measure commensurate with these resources, in a field of enterprise, which means, advantage for all. In this beneficent work, the advancement of one does not involve the downfall of another, and a mul-

titude of golden congratulations, fresh moulded in the heart, follow fast on the success of the lowliest and most obscure, as well as upon the achievements of the mightiest captains.

In this convention, which can be said of no other, from The Hague down to the partisan primary, selfishness and personal advancement is entirely eliminated. No other but what the imp of intrigue, the Mephisto of revenge or the heartless demon of ambition enters its ranks, either bodily or in disguise, to corrupt its rectitude, steal away its sense of justice or lead its high promoters in forbidden ways, but here, the noble impulse of mutual and honorable emulation, that splendid ambition to climb to triumph, not upon the ruins of other men's hopes, but by the ladder provided by generous Mother Nature, is in the saddle and calls for the best effort of the noblest sons of this and every other civilized nation on the globe.

We feel that the earnest benediction of all mankind rests upon our deliberations, and may our course be crowned with such results as will vindicate the happiest predictions of our most enthusiastic well wishers.

With every species of respect for every section of the august mining field, from Alaska to Patagonia, from Australia to Africa, from Europe to the antipodes, we are asking ourselves, if, after due investigation and reflection, we may be pardoned by the rank and file of this splendid body for cherishing a PECULIAR pride in our beloved Arizona and the Great Southwest.

We will not burden this august body by lengthy quotations of figures and statistics, which, since they are public property, we have a right to assume have come under the observation of every delegate present. In the light of this statement we hope we may be pardoned for dealing in generalities and off-hand results.

When we reflect that our older sisters, Colorado, California, Montana and Michigan employed a score of men in their copper fields, while among the sunny foot-hills of Arizona, a single miner chlorided in the superficial style for the red metal, with his Winchester at his elbow, in momentary expectation of ambuscade at the hands of the lurking Apache, when we reflect that one level was added to another, as the tardy railway grew closer and closer, and as capital angled cautiously for years about the golden prize, when we stop to consider that, despite all of these difficulties, and with one man at work to-day, where our older sisters have perhaps ten, with their unlimited capital and mighty machinery, California, Colorado and Michigan have successively yielded the palm to Arizona as a copper producer and Montana will also yield by the end of 1907—are we not compelled to attach most profound importance to these significant FACTS ?

Do not these eloquent truths speak volumes for the ore bodies in Arizona, their extent, their richness and the facilities which must surround the meagre mining operations in the territory?

In the light of these happy conditions, are we not compelled to admit that Arizona is an industrial entity entitled to the highest recognition and consideration at the hands of this splendid body of just and considerate men?

Now this remarkable result has been brought about by the output of the copper mines of Arizona, conspicuously Bisbee, Jerome, Clifton, Morenci, Globe and many others surrounding Douglas. Thus Cochise county, Arizona, is the head and front of the mighty impulse, and extraordinary resources, which give Arizona first place as a copper producer in this country despite the disadvantages under which it has labored.

Now, the city from which we have the honor of being accredited is in Cochise county, Arizona. It is the smelter center of the Southwest as well as for a field of custom operations of vast extent. The field tributary to it in the Territory of Arizona, great as it is, is hardly more important than that whose wealth flows through it from the wonderful mining area of Sonora, Mexico. Space forbids, and precludes the possibility of granting the wonderful mining field of Sonora just mentioned in this connection. It's incomprehensible to one who has never visited that ex-

traordinary mining belt in person. The open record of La Cananea and the Moctezuma districts, alone with a thousand smaller propositions, which have produced millions by inefficient, if not primitive methods, would fill a volume of large proportions. This virgin field, which, as yet, has barely been touched, as railroads penetrate the mountains year by year, is unfolding in point of mineral resources in a manner that challenges the astonishment of the mining world.

Then the multitude of undeveloped propositions, with exceptionally fine surface showings, constitutes the principal attraction of capitalist from all over the world, and the recent avalanche of capital and enterprise, moving in that direction, has taken form in a manner to command the attention of the profession universally, before our next Congress shall have been called to order.

The Delegates from Douglas, Arizona, submit this manuscript with a request that the same be filed with and made a part of the records of the American Mining Congress, here assembled.

S. S. BADGER,
Secretary.

COL. DORSEY of Nebraska: I am requested to report back Resolution No. 8 and have substituted therefor the resolution which the Secretary will read.

The Secretary then read the following resolution:

Substitute for Resolution No. 8.

(By John Dern of Utah.)

Whereas, the University of Utah, through a resolution, (No. 8), introduced by Mr. John Dern, has tendered to this Congress the privilege of using the mining and metallurgical laboratories it its school of mines, agreeing to make no charges therefor except to cover actual expenditures in conducting tests; and

Whereas, It is recited in said resolution that the laboratories at said school of mines are amply equipped for necessary and practical tests in connection with concentrating, leaching, furnace work, and other methods of treating ores; and

Whereas, It appears that the judicious use of laboratories, so located in the heart of the mining regions, will materially advance the mining industry and the purposes of this congress; therefore be it

Resolved, That this Congress looks with favor upon aid and co-operation so proffered; and be it further

Resolved, That the thanks of this Congress are hereby tendered to the University of Utah for its generous offer, and that the matter of accepting said offer, and of designating said laboratories as an official experiment station of this Congress, is hereby referred to the Directors for such action as in their judgment will be for the best interests of the Congress.

COL. DORSEY of Nebraska: I move the adoption of the Resolution just read.

JOHN R. WOOD of Colorado: This Resolution comes to us this morning somewhat in the nature of a surprise. If this was a church social where prize grab-bags were in order it would be very interesting because then we would pay our money and take our fortune, but this Resolution has been already brought before the subcommittee on Resolutions and it has been known that it was there presented. The Colorado delegation of this Congress had met in caucus upon this resolution and unanimously, in a friendly spirit, and with the very highest desire for co-operation with all the mining interests and delegates represented in this Convention, agreed it to be unwise that this Resolution be passed for reasons that I will give you in connection with others in all probability in a moment, and so they unanimously drew up a set of Resolutions addressed to the Committee upon Resolutions and the subcommittee, in regard to this

Resolution from Utah, asking that this Resolution be not reported. We met with the sub-committee in connection with the representatives from the state of Utah, and were very generously heard, and then were told that the sub-committee upon Resolutions had declined this Resolution, and we supposed that the battle was over. Now to come here this morning and find that the whole matter has once more been brought upon the floor is a surprise to us. Not that we are unwilling to bring this matter to the Convention, but we did feel that the place to have settled it was before the Committee. We are glad we were here in time and knew that this procedure was taken. I don't know just what authority the constitution and by-laws give the directors in this matter, but I suppose if this Convention sees fit to hand over this deliberative function to the executive department of this Congress and allow it to act for them, that then the Board of Directors would have that authority and the question then is the advisability of having this resolution carried out. It is an affirmative proposition for the Board of Directers.

Just a word now in regard to why we think this Resolution or the statement of facts in this Resolution should not be approved. In the first place we believe that it is not advisable for this Congress to name any specific school of mining as its representative for any division of mining country. To say that the laboratory of the Utah school or the Colorado school that the Missouri school, or the Kansas school or the Oklahoma school or any other of these schools should be the official representative of this Congress seems to us would be a great mistake. Just what it would be if we were to designate one particular engineer as the official engineer of this Mining Congress. As our friends—and they are our friends, we love our friends, we are one with them, we would not do anything in this world to lay a straw in the way of the development of their interests, but they themselves have said before the subcommitte that this action would give their school prestige. Can you or I afford to select in invidious distinction any one of our splendid mining schools of which we are so justly proud—can we afford, gentlemen, under any circumstances, by our action, to specifically say that this one shall have prestige over the other one? I take it that we cannot. That that would be an invidious distinction.

COL. DORSEY of Nebraska: Yield to me a moment so that I may read this resolution. I am sure you do not understand it.

JOHN R. WOOD of Colorado: If I am out of order I should be glad to hear it.

COL. DORSEY: (Reads Resolution.) Now you have got it before you. I do not see how you can charge bad faith on our part.

JOHN R. WOOD of Colorado: Thank you. Mr. Chairman, Gentlemen of this Congress: I had not thought for an instant—be it far from me, to attack the committee for bad faith. I beg your pardon, sir, if there is anything in the thought that has come to you. I never dreamed that the committee was acting in bad faith.

And furthermore, it seems to me that this resolution that is brought before us this morning is simply going home around Robin Hood's barn. It is another way of getting to Carthage than going by way of Webb City.

In regard to the equipment of the Colorado School of Mines, I will pass that up to men more competent to speak of that. I do not know how many schools of mines there are, possibly you know.

COL. DORSEY: Five.

MR. JOSEPH of Utah: One—only one.

MR. WOOD of Colorado: Possibly five. Our brother here says only one. Do I need to say any more? The delegate from Utah has boasted, there is but one school of mines. Gentlemen, when you and I are in Congress assembled, it seems to me the time has come to sink our individual interests in the interest of the entire mining region of this great United States of our. (Applause.) Instead of boasting of one school, let us boast of five. Therefore, I ask you that you will under no circumstances what-

ever pass up your privilege of deciding these questions by even our Board of Directors, but settle it on the floor of this Congress this morning.

MR. JOHN DERN of Utah: Mr. President, Delegates and Members of the Convention: I am not going to enlarge on this subject very extensively but I think it my duty as the originator of the Resolution to give you the plain facts and the purposes for which this Resolution of mine was introduced. Indeed, I am very much surprised at the attitude of the gentleman from Colorado. He cannot confine himself to the facts, but is simply trying to attack and misconstrue our Resolution to be one for the advancement of the school of Utah. This Congress was organized for the purpose of accomplishing things. When our advance sheets were sent out by the Executive Committee, or the Committee on Program, this fall, which only reached the members and delegates a few weeks ago, one of the items specified was the purpose of this Congress to establish experimental stations in the West where ores could be tested and by which the poor prospector would be able to have his ores tested without going to the expense of having these ores tested by an expert elsewhere. Being a bright young man myself, and closely connected with the Congress, I thought we might have an opportunity here to do something for the benefit of the Congress and for the mining industry. Realizing that three years have elapsed since we voted the establishment of a permanent home at Denver in which home it is intended to establish not only laboratories, but other information on geology and mining, equip it with the most modern and up-to-date testing plant to test ores of the miners—for all those who desire them to be tested. I figured that so little progress had been made it would probably be years before such equipment should be established or the building erected. I thought after talking with the professors of our university and with a number of our members, it might be a good thing to have the University of Utah offer the service of our State School of Mines. Other schools have the same opportunity to offer their services to advance the cause of the mining interests of the country. This offer was made in the best of faith and I believe it is a step in the right direction. I trust you will vote in support of the Resolution as it is introduced, as it is plainly stated in there that it is proposed to make the Utah school AN experimental station, not THE experimental station.

DR. V. C. ALDERSON of Colorado: In speaking on this matter I should like to refer to what Mr. Dern has said because it applies to every school of the United States, that it is located in a mining locality. However, I thing the gist of this question is just here: Is it within the province of the American Congress to have any official School of Mines, any official testing plant, any official jig, any official concentrating table. If this resolution passes gentlemen, it will open the door for people to come in here and ask for the official recognition of everything that is used in mines and you, gentlemen, will have to approve or disapprove of it. I don't want to get into an argument with regard to the relative advantages of the different schools. If necessary, I could give many reasons why the Colorado School of Mines should be recognized officially. But I would not ask that my school be designated or our testing plant designated as the official testing plant for the American Mining Congress because in the bottom of my heart I belive it would be a bad thing for the American Mining Congress. As our President has said so well from this platform, the idea with us should be co-operation. I tell you, gentlemen, it is a dangerous thing to begin on. I think the thanks of this Congress ought to be extended to the Utah School of Mines and to the Utah delegation for their sincerity and their kindness in making this offer, but I believe it would be utterly dangerous to accept it because it would open the door for many other and greater errors that might be performed by this Congress. I tell you, gentlemen, this Congress cannot afford to give its official sanction to any such plan. It will come back to us in years to come and we will regret it. The American Mining Congress must be too big for that. I think the Utah school can do its work in helping miners just as well without our official recognition as with it. We in Colorado will do

our work along that line in the same old regulation way. We should not pass this resolution because, for the one reason, if no other, it is outside of the province of this Congress to put this official stamp on any such thing. I therefore move you, Mr. President, that as an addition to this or as a substitute for the Resolution, that it is the sense of this Congress that the thanks of the Congress be tendered to the Utah delegation for calling our attention to this matter and for their courtesy and kindly suggesion, but that it is beyond the province of this Congress to accept it.

PRESIDENT RICHARDS: It has been moved and seconded that it is the sense of this Congress that the thanks of the Congress be tendered the Utah delegation for calling our attention to this matter, but it is the sense of this Congress that we are not authorized to endorse the proposition.

COL. DORSEY of Nebraska: This proposition does not designate the Utah school. The resolution refers the entire matter to the Board of Directors. If you do not have any confidence in your Board of Directors, then vote for the motion made by my friend from Colorado.

DR. ALDERSON of Colorado: Don't put it that way, because we have have the utmost confidence in the Board of Directors.

COL. DORSEY of Nebraska: Let me read it. I repeat what I said, if you vote down this resolution and sustain Dr. Alderson's motion, you display a lack of confidence in your Board of Directors. Under this Resolution the entire matter goes to your Board of Directors for action.

MR. JOSEPH of Utah: Mr. Chairman, Ladies and Gentlemen: Utah came here in all sincerity and made this proffer. The proffer in the original manner in which it was presented was turned down by the sub- committee of the Committee on Resolutions. It was then referred back to the Committee on Resolutions and the report of the sub-committee was adopted, and they offered a substitute to the effect that Utah should be thanked by this Congress for the kindly proffer, but they did not think it expedient to take up any school as the official experimental station of the Congress. This morning I went before the Committee on Resolutions, of which I have the honor to be a member, and offered this Resolution as it was here presented by the Chairman of the Committee on Resolutions. Not one voice of protest was raised against the unanimous adoption of that Resolution at that time. The man who made the motion to adopt the Resolution was a delegate from Colorado. I appeal to the gentleman from Colorado.

MR. WOOD of Colorado: I rise to a point of information. If the Colorado representative on the committee moved the adoption of the Resolution, we knew nothing about it and had no hearing.

MR. MILLS of Colorado: The Colorado delegation had a meeting last night and at that meeting, I as a member from Colorado, explained to them what the sub-committee had passed upon and the substitute which they proposed to offer to the committee this morning . That was entirely satisfactory to the Colorado delegation. This morning the general Committee on Resolutions accepted and ordered reported the Resolution suggested by the sub-committee. This morning a motion to re-consider was made and Mr. Joseph at that time offered as a substitute this Resolution which we have here this morning. As the Resolution or substitute offered by Mr. Joseph did not designate any school as the official experimental station, but left it open for the Board of Directors to act upon the application of any school to be so named, I did not consider that the Colorado delegation would object at all. In fact, I had no opportunity to consult with the Colorado delegation and ascertain their views and I acted simply on my own initiative and am perfectly willing to stand by that.

MR. JOSEPH of Utah: In justice to Mr. Mills, I want to state that I substantiate the statement he has made, but there was no intention on the part of the Utah delegation to take any snap judgment. I have seen these fights between schools and I know what they mean, but this is not the place nor the time for the Colorado School of Mines or the Utah School of Mines to fight or to bring before the Congress their respective

merits. We are here for the general good of the people—of all the people. This is an American institution, not a local institution. Now Mr. Chairman, in order to show Colorado that we are sincere and we desire to extend the olive branch of peace, because peace is what we want, and we are going to have peace if we have to fight for it, I desire to offer this as an amendment. As I understand there is a motion, Mr. Chairman, and I offer as an amendment to the motion that the last clause of the resolution be made to read as follows: "Be it further resolved that the thanks of this Congress are hereby tendered to the University of Utah for its generous offer and that the matter of accepting said offers and any other offers which may be made to this Congress and of designating said laboratories or any other laboratories which may be offered as official experimental stations of this Congress is hereby referred to the Board of Directors for such action as in their judgment will be for the best interests of this Congress."

MR. HOWELL of Colorado: When reference was first made to this matter this morning it was stated that the whole matter was settled. We were so informed. It is unquestionably true that Utah is represented here by one of the most active delegations that ever represented any commonwealth in any convention. It is true and it was admitted by the chairman of their delegation that they wanted the matter referred to the Board of Directors without giving anybody a chance to act upon it. We don't want to wash any dirty linen and yet I say our position is not that we want you to endorse the Golden School of Mines or any other. We take the position that it is not for the benefit of this Congress that we should endorse any specific school. Now, gentlemen, I want to say to you, we have a right to contest this matter. It was introduced by one of our directors. He says so himself. It is being advocated by another one of our directors. He says himself he wants to see this resolution passed. I say it should not be left to the Board of Directors. You charge us with insincerity. Your own argument has given us the right to charge it for trying to shove something down us. The proposition is one that we should not handle at all—we should either endorse it or let it alone. Let us not put the responsibility on some one else. We don't want you to endorse the School at Golden as Golden can stand on her own merits and so can any other mining school. I say the whole matter ought to be settled here and now, and we ought to decide to either endorse this school or we ought to take it entirely out of the hands of the directors.

GEO. H. BRIMHALL of Utah: Mr. President, Ladies and Gentlemen: It appears to me that there is nothing novel in accepting the offer made by Utah, at least to the extent of turning it over to the Board of Directors as to the wisdom of acceptance or rejection.

MR. CANTWELL of Missouri: In the Kilkenny-cat fight between Colorado and Utah it is perhaps unwise for any member of the Missouri delegation to inject himself, because he is liable to get scratched. There is a distinction, however, between the endorsement of an educational institution or a state official school of mines and the endorsement of a man's mining scheme or any man's concentrator. There is no parallel between the two propositions. There is no more impropriety in this Congress or its Board of Directors endorsing the state school of mines officially or accepting the offer of a state school of mines to treat ores at cost, than there would be in a Farmers' Institute endorsing state agricultural schools. Therefore, that objection to this endorsement is certainly not well taken.

The objection that thereby one school of mines may be given added prestige is perhaps well taken, but Utah, it appears, is the only school of mines that has yet made this generous offer. I only call attention to these two points. So far as Colorado is concerned, if the gentlemen would accept the suggestion, add to the original resolution that whenever Colorado should duplicate the generous offer of Utah, then the directors might and should so order to make an endorsement of the State School of Mines of Colorado as one of the official experimental stations.

MR. HOWELL of Colorado: Will the gentleman kindly refrain from the position that we are opposing Utah. We do not ask it for Colorado. We are not in that position at all. We are not proposing that the Congress endorse Colorado or any other school. We do not want endorsement for Colorado.

MR. CANTWELL of Missouri: The reason why the question of the endorsement of Utah's offer alone is not properly before this Congress is because it is the only offer and because the Congress will not remain in continuous session. Yet I take it, whenever a similar public institution makes a similar offer, then the Board of Directors can act upon that also.

MR. RITER of Utah: I want to say a word, not from the standpoint of a member of the Utah delegation, but from the standpoint of a mining engineer, who has business which takes him out of the state of Utah.

I have often been placed in a position where the opportunity to use some of the laboratories of our state would be a great boon. I have interests in another state which has no school of mines and where no private individual has established laboratories such as it is proposed to give us the use of by the offer of the Utah School of Mines. I should have some hesitancy in sending my ores from outside the state into the laboratories of the School of Mines of Utah. However, if the resolution passed, and in this way the American Mining Congress endorsed this school, it would put me in a different position. I feel that the Congress should take such action.

COL. DORSEY of Nebraska: I ask the chair to state what is the motion now pending.

PRESIDENT RICHARDS: The first question is as to the amendment. All in favor of the amendment signify the same by saying "aye." Contrary by the same sign. The chair is in doubt.

All in favor of the amendment will signify the same by standing until counted by the Secretary.

A rising vote was taken and the Secretary announced forty-four votes in favor and sixty-three against.

MR. JOSEPH of Utah: Mr. Chairman, we are entitled to a roll call on this point.

PRESIDENT RICHARDS: Mr. Joseph under the rules is entitled to a roll call.

MR. HOWELL of Colorado: I move that the entire matter be laid upon the table.

PRESIDENT RICHARDS: The question now arises on the motion to lay this whole matter on the table. All in favor of the motion say "aye." Those opposed signify the same by saying "no." The ayes seem to have it. The matter is therefore laid on the table.

COL. DORSEY of Nebraska: I report back Resolution No. 14, which I ask the Secretary to read.

The Secretary then read the resolution as follows:

Resolution No. 14.

(Introduced by James F. Callbreath, Jr., of Colorado.)

Whereas, The laws and regulations governing and controlling mining operations in the territory of Alaska, being largely designed for the regulation of mining under conditions substantially different from those existing in that territory, and

Whereas, The American Mining Congress has been frequently called upon by those interested in the Alaskan mining operations, for assistance in the creation of remedies for unnecessary burdens and restrictions now resting upon the development of the mining industry of that section, and

Whereas, This organization has not been sufficiently well advised as to the conditions there existing to render intelligent assistance in those matters which have been called to its attention; therefore, be it

Resolved, That the President of this Congress be authorized to appoint a committee of three members to investigate into the conditions existing in Alaska, and the laws and regulations controlling its mining operations; to render such assistance to the mining men of Alaska as may

seem proper and advisable under the advice and control of the Board of Directors of the American Mining Congress, and to report at its Eleventh Annual Session such recommendations as may seem desirable.

It was moved and seconded that the resolution be adopted. On being put was unanimously carried.

COL. DORSEY of Nebraska: I have another resolution I am directed to report—Resolution No. 13, by J. H. Richards, I will ask the Secretary to read it.

Secretary reads as follows:

Resolution No. 13.

(Introduced by J. H. Richards of Idaho.)

The American Mining Congress in its Tenth Annual Session again commends the efforts of the President of the United States in behalf of a wise and just disposition of the remaining public lands in the interest of the actual settler and the bona fide miner.

It also joins the President in asking the Federal Congress to pass such legislation relative to the coal and other fuel resources still owned by the government, as, while continuing this ownership by the government.

(1) Will encourage their development by providing conditions favorable for modern mining operations.

(2) Will prevent all unnecessary waste of these resources.

(3) Will make certain the use of these resources in the best interests of the whole people of the West; and

(4) Will separate the surface development of these coal and oil lands for agriculture, forests or grazing from the development of the underground or fuel resources.

It was moved and seconded the resolution be adopted, which motion was unanimously adopted.

PRESIDENT RICHARDS: I have here an official telegram from the Trans-Mississippi Congress, inviting this Congress to send delegates to its session to be held in Muskogee next week. We are anxious to have the Trans-Mississippi Congress adopt the resolution which you adopted yesterday. Mr. Bailey, just coming from there, will make a very brief statement, which I think you ought to hear before any action is taken on that matter.

MR. BAILEY, OF OKLAHOMA: Mr. President, Gentlemen of the Congress: We do not only sent you this telegram officially from the Trans-Mississippi Congress, but we come here personally to invite you to attend that meeting and participate in the deliberations. Bring to Muskogee those questions which remain unsettled in your splendid meeting here. The new state of Oklahoma comes to you the fledgling in the sisterhood of the American commonwealths. The State of Oklahoma can entertain you practical hard-headed mining business men. The new state of Oklahoma has, I venture, the vastest fields of virgin untouched coal in the United States. We have the finest oil field of the United States—the biggest production, I think that has ever been known in the country—gas in unlimited quantities. We have the same, perhaps not as large, a field as Joplin, Webb City and southwestern Missouri, but we have lead and zinc undeveloped. We are interested in establishing a Department or Bureau of Mines and Mining. (Applause.) We have this early, even before the first meeting of our Legislature, a plan on foot to establish a splendid School of Mines. At the next meeting of the American Mining Congress we will be here bidding with Utah for a spot-light position, and I warn you right now, we will get what Utah fell down on. (Applause.) When you come to Muskogee you will see that on the register of delegates that have been sent to Secretary Francis there are 2,500 delegates. Gentlemen, if we have a 50 per cent. of that attendance we will have the most magnificent of all the Congresses for sixteen years. Ninety per cent. of its recommendations have ben adopted by the National Congress. There will be governors from every state west of the Mississippi river. Come. We will welcome you, give you the glad hand,

and entertain you right. To-morrow we will become a state and then we can entertain you. Come to Muskogee Tuesday. (Applause.)

A motion was made to accept the invitation and that a committee be appointed to attend in accordance with the telegram.

Which motion being duly seconded and put was unanimously carried.

In accordance with resolution the following communication was sent:

COL. DORSEY, OF NEBRASKA: The special order is the consideration of the report of the committee, made by Mr.. Downey as Chairman, in reference to the appointment of the committee of five for the purpose of devising methods of preventing fraudulent mining schemes. I will yield now to Major Vincent, as he has a resolution on the table of the Secretary on this same question.

Joplin, Missouri, Nov. 15, 1907.

To the Trans-Mississippi Commercial Congress,
Muskogee, Oklahoma.

Gentlemen: The American Mining Congress sends greetings to the Trans-Mississippi Commercial Congress, and begs to express the hope that its great work will be fostered and augmented through its present session.

Responding to your telegram, I beg to appoint as delegates the following persons: Dr. J. A. Holmes, Mr. H. L. Scaife, Mr. F. A. Brown, Major F. C. Vincent, and Col. W. R. Calkins.

This organization expresses its sincere appreciation of assistance rendered to it by the Trans-Mississippi Congress in its work looking to greater co-operation between the government and the mniing industry.

I have requested Mr. Jas. F. Callbreath, Jr., to present to your session some matters which we deem of particular importance at this time and for which we ask your continued support and co-operation.

Respectfully,

THE AMERICAN MINING CONGRESS,
By J. H. RICHARDS,
President.

MAJ. F. C. VINCENT, OF MISSOURI: Mr. President, Members and Delegates of the American Mining Congress: Ladies and Gentlemen:

One of the resolutions presented to your Committee on Resolutions, the one referring to the prevention of fraudulent mining schemes, was presented before I was advised of the action taken at your last session, when a committee of five was appointed to devise means of putting an end to such illegitimate transactions. That committee has presented this printed report, which has been scattered broadcast amongst the members of this convention. The report shows a vast amount of individual work on the part of the committee on this particular proposition. While they were at work on behalf of this Congress, it is safe to say that in other states of this Union many other people were at work on identically this same proposition. Speaking for the legitimate mining men of Kansas City, I can say we also considered this proposition in all its phases. Almost every one of the recommendations made by the committee of which Mr. Downey is Chairman was considered by us.

After examining the laws of the various states we finally arrived at the conclusion that the entire matter could be accomplished by urging the attorneys general of the various states and the departments of justice of the United States to thoroughly enforce the laws now on their statute books. I say to you gentlemen that ninety per cent. of these swindling operations have been made possible by the non-enforcement of the law, and that if the laws had been properly applied if the attorneys general of the various states would enforce the law, these men could not have placed upon the name of mining the blot that now rests there. Inasmuch as this report recommends that a committee be appointed, the majority of whom shall be lawyers, who shall endeavor to frame and shall be instrumental in placing on the statute books of the various states laws that will cover adequately the questions, off-hand, I am in favor of refer-

ring this whole matter back to that committee and let them frame a law that will be absolutely feasible.

I am not going to talk further on this resolution. I am going to make a motion that inasmuch as part of this resolution refers to the appointment of a committee composed mostly of attorneys, to frame a law or to have placed upon the statute books a law that will hold water and that will be the best possible proposition for this Congress, that this entire matter be referred to this committee and that no further action be taken on it by this Congress at this time.

COL. DORSEY, OF NEBRASKA: That is the report of the special committee of five that has not been before the Committee on Resolutions?

MAJ. VINCENT: I understand that.

PRESIDENT RICHARDS: You have heard the motion that the matter be referred to the special committee of five, the majority of whom shall be lawyers, who after further action shall report to the next session. What shall we do with the motion? Do I hear a second?

MR. DOWNEY, OF COLORADO: If no one else wants to discuss this question I am willing they should do so, but if no one else intends to, I want to do so.

PRESIDENT RICHARDS: Mr. Downey has the floor.

MR. DOWNEY: In the first place, I don't understand the resolution that Mr. Vincent has himself introduced. As I understand it, that resolution was to be added on the report.

MAJ. VINCENT: Mr. Downey, for your information and for the information of the Congress I will say that not knowing that a committee had been appointed to consider this question I had previously introduced a resolution somewhat similar. I am not going to urge the passage of that resolution, in deference to Mr. Downey's report, but I am willing to have that resolution and the report of the committee referred back to the committee of five.

MR. DOWNEY: It will be clearly understood that the committee making this report proposed a standing committee on investment legislation and that we have distinctly stated in here that that committee shall take charge of any uncompleted business which might pass over from the committee that is now retiring. There are certain portions of this report that it seems to me this Congress ought to pass on. The committee that has been serving you during the past year has made this report unanimously. I have just this morning received a letter from Ex-Governor McIntire of Colorado on this point. He has not been with us, but has kept in touch with this matter by correspondence. Now it seems to me that the feelings of the five members of this committee who have devoted a year to this matter should have a little consideration. We have talked this matter over and come to the conclusion that the whole trouble with this entire question is that the fakir does not have to put himself on record. This argument about retarding development I don't think holds water. You speak of the prospector as though he were constantly organizing corporations. That is not the case. It is only when the prospector, by the aid of some promoter in some city somewhere, seeks to organize a corporation in such a way as to deceive those at a distance, that we demand of him that he place himself on record. That does not retard development in the slightest. If it retards development it had better do it. That is my position on the matter. If the prospector of the West has to unload his property on Eastern investors at a price far in excess of what it is worth and what he paid for it, then I say let him fail. That is the point. I don't believe there are many prospectors who are deceitful. This Congress certainly should place itself on record with respect to this matter. I want to say that the master-spirit in favor of publicity in cases of this kind is our President, Theodore Roosevelt, to whom we are now going for a Bureau of Mines and Mining, and if you want to please him on the side without any sentiment thrown

in, you might consider this would please him in that respect. This committee's report states very distinctly that the legislation offered here is a type. I don't want to argue with the gentleman from Kansas City on the question of constitutionality of any measure—I am not an attorney and don't profess to be,—at the same time, if I wanted take the time and do so, I could show him, I believe, that there was two sides to the question. I have here one decision. I took a copy of it because it is typical of the position which the courts of the mining states seem to take on this subject of prospective value. This is a case before the Colorado Court of Appeals, afterwards decided by the Supreme Court:

"In the case of corporations organized under the laws of this state for the development of mining property, the capitalization may be, and usually is, fixed with reference to 'prospective' value; that is, to value, which, in the judgment of the parties, the property actually has, but which development is necessary to disclose ; and if such value is estimated in good faith, we think the stock issued in consideration of a transfer of the property should be so regarded as full paid, notwithstanding the parties' judgment should afterwards prove to be erroneous." Buck v. Jones, 18 Colo. App. 250, 70 Pac. 951.

Strange to say that decision was rendered in a case in which the very opposite result was arrived at so far as the decision was concerned. In other words, the case involved the transfer of property to a corporation upon which mineral in place had not been discovered. I believe that is in some way the effect of your resolution. As that is contrary to the United States statutes, the court declared that such property was of no value because mineral in place was not discovered. Therefore the property was of no value and could not be given in exchange for stock of a corporation.

This shows that the court of that state has given its sanction to the idea that full-paid stock may issue for property of value. In fact, that is being done every day in the year. It is the prevailing method of organizing such corporations, and as I said it was the object of this committee not particularly to sanction that thing, but to meet the situation as it stands and to sanction it with regulation. Regulation is what is demanded. This committee has offered what it considers the best method for regulation. I don't think this Congress can afford to turn this question down. You can't afford to adjourn this convention without giving your specific approval of the principles stated in that report, namely, that those who offer their stock in that way, based on prospective values, with a view to deceiving the prospective investor and persuade him that he is getting something of greater value, should be compelled to put himself on record.

I am perfectly willing you should refer this matter back to a committee. There are no Legislatures meeting in the West this winter. Another session of the Congress will be held before any Lgislature in the West can meet. Therefore I have no objection that the special committee that is provided for should take this matter under consideration and take any steps it sees fit, but I don't want the idea to go forth that this Congress is trying to side-track this proposition, and that is the intent, it seems to me, of the motion. That is the reason why I have taken the floor.

COL. DORSEY, OF NEBRASKA: Mr. President, this is a very important question and there are some gentlemen here who wish to be heard on it, but there is a special order for the selection of the place of holding our next Congress.

PRESIDENT RICHARDS: I would suggest that the special order be taken up at the beginning of the afternoon session without anything else intervening. That will enable us to clear up some of the smaller matters.

MR. H. L. SCAIFE, OF SOUTH CAROLINA: There is a disposition on the part of people to make too many laws. If you examine this question you will find that we have a statute of the United States against the fraudulent use of the mails, but sometimes fraudulent promotions

are made without using the mails, and some are unwise enough to do so, but I dare say there is not a state in the Union but has sufficient laws against frauds, getting money under false pretenses, to amply protect the investor if the law was enforced. Now, gentlemen, it would be a wise thing for us to frame a general law on this subject, but as I see it, we have not as yet sufficient information upon which to base such a law, so I think it would be wise for this Congress to appoint a committee to get this additional information and report at the next meeting.

MR. WIRE, OF ILLINOIS: The tendency of the times is toward publicity, toward the clearing away of the mists, to divest this business from the glittering generalities of the promotor or the stock seller, and to compel him to go on record and state what he has and to state it in black and white. So far as the publicity portion of this proposed measure is concerned it rather underreaches than overreaches. I believe we ought to go on record in favor of some publicity measure, or some statement of the Congress in favor of publicity. I am of the opinion that it would be a mistake for this Congress, with its intelligent membership and delegates, to fail to express itself in some way in favor of a publicity measure and along lines that make it easy for an honest man to do business, and almost impossible or really impossible for a fakir, or for a fake promoter, one who uses glittering generalities, to take advantage of the American people. The greatest enemy that the mining business has, the greatest enemy that the investor has, the greatest enemy that the prospector has, is the fake promoter. And I think this American Mining Congress ought to go on record in some way, either extending this committee or appointing a new one, or the same committee (for they have done good work) for it is a step in the right direction. This committee has done good work and we appreciate it. It is the best measure we can get and they ought to be continued for another year. The records ought to show that the Congress is opposed to anything that makes fake or fraud promotion easy and in favor of everything that makes it hard or impossible. It ought to be made impossible.

MR. CANTWELL, OF MISSOURI: It appears that this document submitted by the committee of five is divisible into two parts and it has never been read to the Congress. I take it from the discussion evidently very few of even those who are discussing it, have read it. This document contains 3½ pages which is simply the report of the committee. Then it contains a very short resolution, three or four questions in one column, which evidently contains nearly all the suggestions that have been made here, and I am going to take the liberty, if the Congress will permit me, to read that column.

MR. VINCENT, OF MISSOURI: I would like to ask, just as soon as the discussion on the question of place for holding next session has been finished and the convention has disposed of that proposition, that a re-hearing of this motion be taken up.

PRESIDENT RICHARDS: After the special order. If there is no objection, it will be so ordered.

We will now adjourn until 1:30 o'clock this afternoon.

FRIDAY, NOVEMBER, 15, 1907.

Afternoon Session.

PRESIDENT RICHARDS: The Congress will come to order.

COL. DORSEY, OF NEBRASKA: Mr. President, your Committee on Resolutions refers back this resolution, which I ask the Secretary to read.

Secretary read the resolution as follows:

Substitute for Resolution No. 4, introduced by H. S. Joseph of Utah.

To The American Mining Congress:

Gentlemen:—Your Committee on Resolutions, to which was referred resolution No. 4, introduced by H. S. Joseph, having had same under con-

sideration, do respectfully recommend that the subject matter of said resolution be referred to the Board of Directors and in the event of the failure of this winter's session of the National Congress to establish a Bureau of Mining, that the Board of Directors be and are hereby empowered and instructed to carry out the subject matter of said resolution.

Upon motion duly seconded it was ordered that the recommendation of the Committee be adopted.

PRESIDENT RICHARDS: We will now proceed with the special order. Delegates and members will be given an opportunity to express their desires as to place of holding the session for 1908. The Secretary will call the roll of states alphabetically, and any state desiring to respond as the name is called will have the privilege of doing so.

MR. JOSEPH, OF UTAH: Mr. President, we would like Arizona passed for the present.

PRESIDENT RICHARDS: If there is no objection, it is so ordered.

The Secretary then proceeded to call the roll of states.

Edwin L. Bride, of Nevada, nominated Reno, Nevada.

Frank E. Wire, of Illinois, nominated Chicago, Illinois.

T. M. Howell, of Colorado, made a motion that the matter be left to the determination of the Board of Directors. Motion overruled for the time being.

H. S. Joseph, of Utah, nominated Douglas, Arizona.

Mr. S. S. Badger, of Arizona, seconded the nomination of Douglas.

Mr. John Y. Bassell, of Columbus, Ohio, nominated Columbus, Ohio.

Mr. John J. Lentz, of Ohio, seconded the nomination of Columbus.

Mr. Wire, of Illinois, then withdrew the nomination of Chicago in favor of Columbus.

MR. HOWELL, OF COLORADO: Do I understand the chair ruled my motion out of order?

PRESIDENT RICHARDS: I have not ruled at all. What is your motion?

MR. HOWELL, OF COLORADO: My motion was that the matter be referred to the Board of Directors. I renew that motion, that the whole matter be referred to the Board of Directors for consideration.

A MEMBER: I second the motion.

A MEMBER: I move to amend that motion by moving that we proceed with a direct vote of the house.

PRESIDENT RICHARDS: It has been moved and seconded that the motion made and stated a while ago and which was temporarily suspended, be amended, and that we now proceed to a direct vote upon the question as to the location of the next session of the Congress.

MR. JOSEPH, OF UTAH: I arise to a point of order. My point of order is that the amendment is not germane to the point in issue.

MR. WIRE, OF ILLINOIS: I make a motion to lay the gentleman's motion on the table.

PRESIDENT RICHARDS: The point of order is well taken.

MR. WIRE, OF ILLINOIS: Did you make any ruling on my motion? I moved that the motion of the gentleman from Colorado be laid on the table.

PRESIDENT RICHARDS: It has been moved and seconded that the motion of the gentleman from Colorado be laid on the table.

The ayes seem to have it. It is so ordered.

SECRETARY CALLBREATH: We have a telegraphic communication and two or three letters extending invitations. Inasmuch as the cities named by the letters have been placed in nomination, it may not be necessary to read them. But it would seem fair to hear the telegram from Los Angeles, which I will read:

Los Angeles, Cal., Nov. 12-13.

Jas. F. Callbreath, Jr., Secretary American Mining Congress, Joplin, Mo.:

We extend greetings. Our representative bearing credentials relating to 1908 convention is sick and can not attend. Los Angeles wants

1908 convention and Chamber of Mines guarantees to take care of customary expenses in the event Congress convenes here in 1908. Have arranged special programme entertainment for a gala miners' week. Please notify us if Delegate C. M. Shannon, A. D. Myers, L. V. Root or Wm. Gross present. Answer. Collect.

LOS ANGELES CHAMBER OF MINES,
Per G. W. ARNDT, Sec'y.

MR. VINCENT: I recommend that the telegram be placed on file.

PRESIDENT RICHARDS: If there is no objection, it is so ordered. How do you want to vote on this question? In the order of nomination?

A MEMBER: I move you that we proceed to vote on the question of place of holding next Congress by calling the names in the order of nomination.

PRESIDENT RICHARDS: The question now arises on the invitation of Arizona. Those that are in favor of going to Arizona for 1908 may say aye, and those opposed say no.

MR. JOSEPH, OF UTAH: Mr. Chairman, I think that we should not have a viva voce vote. I think we should have a standing vote. No man need be ashamed to show his colors. We are willing to stand on the record.

PRESIDENT RICHARDS: If there is no objection we will call the vote by standing. We will vote until one point gets a majority, all candidates remaining in. It is a standing vote and the place that wins must have a majority of the votes cast.

COL. DORSEY, OF NEBRASKA: While the Secretary is preparing to call the roll, may I report some resolutions. My committee recommends a vote of thanks to Dr. Buckley for the services rendered in the preparation of our program, etc., which the Secretary will read:

Resolved, That the success of the Tenth Annual Session of the American Mining Congress has been achieved largely through the efforts of Dr. E. R. Buckley, the Chairman of the Programme Committee.

Dr. Buckley has labored unceasingly for several months in preparing the splendid programme which has been presented to the Congress. The papers presented and the discussion thereof will be of the most lasting benefit to not only those in attendance at this session, but to all those interested in the upbuilding of the mining industry; therefore be it

Resolved, That a vote of thanks be extended to Dr. E. R. Buckley, as an acknowledgment of the appreciation of the members and delegates of the Congress for the work he has so faithfully performed.

A motion was made that the resolution be adopted, which being duly seconded and put, was unanimously carried.

COL. DORSEY, OF NEBRASKA: Your Committee on Resolutions recommends that a vote of thanks be extended to the Smelter Rates and Freight Bill Committees, which I will ask the Secretary to read.

Secretary then read the resolution, as follows:

Resolved, That a special vote of thanks be extended to the members of the "Smelter Methods" and "Fraud Bill" Committees. These committees have spent not only their time, but their money, in obtaining information that will be of the greatest benefit to their fellows engaged in every branch of the mining industry; therefore be it

Resolved, That the American Mining Congress hereby records its hearty appreciation of the work so wisely and generously performed by the members of the above named committees.

It was moved and seconded that the resolution be adopted, which motion was duly put and unanimously carried.

MR. JOSEPH, OF UTAH: I move you that each state be allowed to vote the full strength of its delegation present in Joplin.

PRESIDENT RICHARDS: Is there any objection to that. If there is no objection it will be so ordered.

COL. DORSEY, OF NEBRASKA: I make this objection: I do not think it is fair. I think if the men who have been delegates and mem-

bers of this delegation have thought so little of this issue that they have absented themselves, they have no right to a voice in the determination of that matter. It is for those who are here to determine the place of next meeeting, and as I am informed, that has been your ruling and usage heretofore.

MR. JOSEPH, OF UTAH: I desire to state that I know of twenty delegates who are partaking of the hospitality of the people of Joplin. They ought not to be cut out. They are represented on the floor by other delegates. They should express their opinion.

COL. DORSEY, OF NEBRASKA: Under our by-laws no man has a right to give his proxy to another in this Congress.

MR. JOSEPH, OF UTAH: If that is so, I have nothing to say. I do know this was the order of business for ten o'clock this morning. These men were here then, but accepted the hospitality of some of the people of Joplin this afternoon, or they would be here to vote.

PRESIDENT RICHARDS: It has always been the rule that only those present can vote here. If you wish to make an exception it is your privilege to do so.

MR. HOWELL, OF COLORADO: A resolution was passed by our delegation unanimously that the membership present at this convention vote the absentees. That was our organization and I think there should be a ruling on it whether we are allowed to do it that way.

MR. GALIGER, OF MONTANA: I don't see how you can get around your by-laws on this proposition. It states positively that no vote shall be cast by proxy and that no state shall be permitted to cas more votes than the number of members from each state which are present at the annual meeting.

MR. JOSEPH, OF UTAH: The interpretation of that is those delegates who come to the annual session are allowed to vote. It does not refer to the sitting—it refers to the convention—present at the convention.

MR. GALIGER, OF MONTANA: Article IX, section 1, provides:

"The directors shall be elected at the annual meeting of the members. In the election of the directors each state or territory shall be entitled to cast ten votes and one additional vote for each fifty members in good standing, residing within such state or territory; provided, however, that no votes shall be cast by proxy and that no state shall be permitted to cast more votes than the number of members from such state present at such annual session."

MR. JOSEPH, OF UTAH: That clause does not fit the case. This is the selection of the place for the next convention. That clause has reference to the election of directors.

MR. GALIGER, OF MONTANA: I take it that it refers to all elections, as much so for the election of a point of meeting, because of the fact that there is no other clause in these by-laws to govern the election of officers.

PRESIDENT RICHARDS: The by-law has no reference to this character of vote. It relates to an election of directors, but as I stated a while ago, the custom has been to only allow those to vote who are present, on questions of this character, but I stated to you that under that ruling, you would have a right to change it if you saw fit. I have no right to change it.

A MEMBER: I move that this convention proceed to vote, allowing only those to vote who are actually present.

Which motion being duly seconded, was put and carried.

The Secretary then called the roll of places nominated, which resulted as follows:

Douglas, Arizona, 29 votes.

Los Angeles, California, no votes.

Reno, Nevada, 6 votes.

Columbus, Ohio, 63 votes.

MR. JOSEPH, OF UTAH: On behalf of Douglas, I desire to withdraw Douglas, Arizona, and cast our vote with Columbus.

COL. DORSEY, OF NEBRASKA: I move that it is the sense of this Congress that Columbus, Ohio, be unanimously nominated as the place for the holding of the next session of this Congress.

Which motion being duly seconded, was put and unanimously carried.

MR. DOWNEY, OF COLORADO: I move that the report of the committee of five appointed for the purpose of devising methods of preventing fraudulent mining schemes be received and printed. That the recommendations of the committee be adopted, and that the resolutions under clause 4 be also adopted, and that a standing committee of five, as recommended by clause 5, be appointed.

PRESIDENT RICHARDS: If there is no objection it will be so ordered.

MAJ. VINCENT, OF MISSOURI: Mr. Dorsey and Gentlemen: The resolution I presented to the Resolutions Committee was reported back to the Resolution Committee and not acted upon. I wish to read the resolution before this body. It is short, and I believe inasmuch as we ought to put ourselves squarely before the world, I am going to ask that you pass my resolution, which is as follows:

Whereas, The promiscuous exploitation of illegitimate and fraudulent mining schemes throughout the United States, Canada and Europe, especially during the past year, by unscrupulous so-called promoters has resulted in the wholesale defrauding of the general public and especially the small investor; and,

Whereas, The above unlawful acts still obtained and continued unabated; and,

Whereas, No other condition has so tended to discredit the fair name of the American mining industry throughout the world; and,

Whereas, The public press has been the chief instrument used by the said dishonest promoters in their predatory efforts; now, therefore, be it

Resolved, By the American Mining Congress in annual convention assembled, that the attention of the Department of Justice of the United States and the various attorney generals of several states of the Union be favorably called to these flagrant violations of the laws of the states and the United States and that immediate action be taken under the law to prevent further swindling operations as herein outlined; that it is the sense of this body that such unlawful acts are in fact violations of the statutes to prevent "obtaining money by false pretense" and "general swindling," and that the public press of the country are herewith earnestly urged to assist this body by refusing further to lend its aid to this particular kind of wholesale and organized robbery.

That those periodicals and newspapers who have aided this body in its efforts to right this condition be greatly commended, and that the members of this body and all other good citizens support these publications in every way possible in the accomplishment of the aim set forth in this resolution.

COL. DORSEY, OF NEBRASKA: This asks for the appointment of no committee?

MAJ. VINCENT, OF MISSOURI: I simply ask for its adoption, so that it can be scattered broadcast through the country as the sentiment of this Congress. I move the adoption of the resolution.

Which motion being duly seconded, was put and carried.

MR. H. H. STOEK, OF PENNSYLVANIA: I beg to submit the following report:

Report of the committee appointed to investigate the advisability of a commission appointed from the several coal mining states and the United States at large to investigate the conditions effecting safety in coal mining, with a view toward the formation and enforcement of adequate laws favoring this branch of the mining industry.

Your committee reports that the Chairman and one member of the committee appointed at the last meeting of the Mining Congress, found it impossible to serve. It was therefore necessary to appoint other members and a new Chairman. This was not done, however, until shortly

before the meeting of the Congress, and it was therefore impossible for this new committee to assemble before coming to Joplin. Only two members of the committee are in attendance at the Congress, although two others fully expected to attend, but were detained at a late date.

Your committee does not consider it feasible at present to have a commission appointed from the several coal mining states, and believes that such a commission should be national in character, and that such an investigation should preferably be carried on by a Federal Bureau of Mines, such as the Mining Congress is now working to have established. In view of the probability that such a Bureau will be established in the near future, your committee suggests that the same, or a similar, committee be appointed and authorized to consider this matter further and to gather statistics upon the subject, to be reported to the next meeting of the Mining Congress.

(Signed) H. FOSTER BAIN, Chairman.
H. H. STOEK, Secretary.

COL. DORSEY, OF NEBRASKA: Are the members of the committee able to give their services?

MR. STOEK: The new members of the committee were only appointed a short time ago and we had no meeting until we came to Joplin. Two members not here were unavoidably detained.

SECRETARY CALLBREATH: The members of this committee have all consented to serve. I move that the report of the committee be received, that the committee be continued for another year, and that the President be authorized to add to the committee two additional members.

PRESIDENT RICHARDS: There being no objection it will be so ordered.

SECRETARY CALLBREATH: I have a paper submitted by Dr. James Douglas, entitled "The remedy for the Law of the Apex," which I will read, in response to particular request that it shall be presented to the convention:

Dr. Douglas' paper will be found on page 122 of this report.

COL. DORSEY, OF NEBRASKA: There is one thing I wish to speak of, and I hope the members will publish this. We have had quite a number of telegrams and letters asking the Congress of the United States to pass a bill not requiring the work of 1907 to be done on mineral locations. That work in most instances has already been done up to this time, and it would be utterly impossible for such a bill to pass through the Congress of the United States during the month of December, as it is necessary it should be passed during that month to become operative, for the reason that if the work is not done by December 31st the claims are re-opened and open for re-location. We do not refuse to take up that matter and consider it, but it is absolutely useless to do so, for the reasons I have given. And so the Committee on Resolutions did not consider it.

It was moved and seconded that a vote of thanks be tendered to President Richards for his able services in behalf of the American Mining Congress. A rising vote was called for, and the motion was carried unanimously.

It was also moved and seconded that a vote of thanks be tendered to Secretary Callbreath for his able services. A rising vote was also called for, and the motion was carried unanimously.

It was moved and seconded that a vote of thanks be tendered to the members of the Committee on Resolutions for their faithful and able services rendered by that committee. Which motion being duly put was unanimously carried.

MR. DORSEY, OF NEBRASKA: I move that this Congress do now adjourn sine die.

The motion being duly seconded, was put and unanimously carried.

The Importance of the Mining Industry to the Commercial and Industrial Life of a Nation

BY H. J. CANTWELL, ST. LOUIS, MISSOURI.

It seems like painting the lily and gilding refined gold to attempt to demonstrate before an assembly of intelligent people in America the importance of the mining industry to the commercial and industrial life of a nation, for as we understand the words "industrial and commercial life," and the word "nation," there could be neither without the mining industry.

The history of civilization is the history of the progress of mining. When the first cave dweller ceased to tear the raw flesh from the bones of the animals which he had strangled with his hairy claws, or killed with his stone ax, he became a miner, and from that day until now, when so many of the forces of nature have been subjugated by man, there is not an hour of our existence on this planet when we should not be reminded of the contribution which the miner has made to the comfort of our existence.

There is no modern industry which does not have as the base of its existence, the products taken from beneath the surface of the earth. Every art and every science owes its debt to the miner.

Were it not for the mining industry, the art of navigation would be confined to the paddling of the birch bark canoe, or the steering of the galley within sight of continental shores, instead of the accurate direction, from continent to continent and from pole to pole, of floating cities of the seas—like the Lusitania. The clumsy wooden cart, oxen-dragged through knee-deep mire, would be the means of land transportation instead of the locomotive whirling its train of palace cars or the automobile realizing the poetry of motion on the Champs Elysee or the Jasper county roads. The beacon fire upon the hill would be the means of communicating intelligence instead of the telephone, the telegraph and the wireless, which by their wonders give to mortals the qualities heretofore deemed possible to be possessed only by the immortals. Winged mercury! The dream of the poetic pagans, realized in common, prosaic, everyday life; for the individual vibrations of your thought, electric-winged, may now be felt to the remotest corner of the globe.

Instead of the palaces of modern architecture in which the humlest member of society may dwell, man would

still be living in the wigwam of the Indian or the palm-leaf hut of the South Sea Islander. Instead of the electrict light, illuminating the darkness of the witching hour with the brilliant rays of mid-day, we should have the pine torch and the tallow dip. Agriculture would be confined to the wooden flail and a plow of forked stick instead of the four-furrowed cultivator, the thresher and the mower. The picture of the art of milling would be of a haggard crone, grinding between two smooth stones the kernels of corn instead of a colossal giant with a thousand deft fingers—the modern mill. The countless instruments by which the masters of music render to human ears their divine symphonies would not be possible, and man's only attempt at harmony would be such as he could derive from the rude viol, the voudoo drum or the pith extracted pipe. None of the triumphs of modern surgery would be possible without the instruments made from the fruit of the toil of the miner. The art of the painter progressed no farther than the dyeing of his own face, until the miner gave him the materials by which he might reproduce upon a canvas all the glowing colors of the rainbow.

Commerce, other than the most primitive barter, would not be possible, for, imperfect as it may seem today, when the exchange of commodities of the world is made upon a basis of relative values, by bookkeeping, yet man has only reached this stage as an evolution from, by and with a metallic currency which has been produced by the miner. In fact, there is no art, however seemingly far it be removed from the toil and grime of the mine, but depends absolutely upon contributions gotten by the rugged delvers in the subterranean depths.

A great philosopher has said that there is nothing more unreliable than statistics except the deductions often sought to be drawn from statistics. I shall not attempt to burden your minds with the exact figures of the values of the mining products of the world, and shall only deal in round millions in attempting to give a relative idea of the value of the mining products of the United States, as compared with other products of this most productive age.

The production of coal in the United States for the last year was $567,000,000. That coal made possible all the manufactures of the United States.

The production of iron, in ore and pig, amounted to $560,000,000, and from that iron was produced all the machines which went into every industry other than mining.

The production of zinc ore and metal amounted to $45,000,000, making possible all the electrical manufactures and supplying the inside paints of the world.

The production of lead amounted to $39,000,000, making possible all of the underground cables, furnishing the outside paints in the United States and the conduits by which the modern systems of plumbing are possible, thus giving civilized man an abundance of pure water, one of the greatest gifts of God to man. In the ancient days, and even in the early history of our country, water, the finding of the well, was the first care of the settler. Tribes went to war to occupy particular locations in the neighborhood of this necessary of daily life, and yet, by the production of lead, and in the uses of it for carrying and distribution water, the beggar upon the streets is a greater master of this gift than the former monarch upon the throne.

The production of copper in the United States amounted to $180,000,000, the greater part of which is consumed in electrical devices for the transmission of power, light, and heat.

The production of gold in the United States amounted to $96,000,000, furnishing the basis of value of *debts* at least, and preventing the enslavement of a generation of debtors to the foreign creditor.

The production of silver in the United States amounted to $37,000,000.

The production of petroleum amounted to $80,000,000, the use of which has multiplied the capacity of man in every field.

The production of phosphate rock, the use of which has revolutionized agriculture, amounted to $12,000,000.

The production of salt, that necessary of man and beast, amounted to $6,600,000.

The total production including secondary minerals and chemicals, amounted to a magnificent total of $1,868,000,000, excluding all excavation of brick, fire-clay, tiling and all quarry products. This production being twice as much as in 1900.

Think of it! These statistics show a production from beneath the surface of one billion eight hundred and sixty-eight millions of dollars. One's brain reels from a glimpse of the immensity.

It is barely possible that in the table of these statistics there has been some duplication, as when the value of white lead is included as well as the value of pig lead, from which it is made; but excluding all possiblities of duplication, it yet remains absolutely certain that the value, at the mine

pit, or furnace, of the products of the mines in the United States during the year 1906 easily exceeded $1,700,000,000, or a value of more than one hundred dollars for every male adult in the United States, or, assuming that there are approximately six hundred thousand persons engaged in the mining industry proper, a production per capita of men employed in the United States in the mining industry of more than $2,800.00 annually.

Consider how the development of the Western Continent has been brought about. Remember that the first incentive to the early explorations of the Spaniards, and to the later settlements of the French in this magnificent valley, was the search for minerals. Fresh in the memory of many men now living, is the development of the iron industry in Alabama and Tennessee, and the transformation thereby wrought. Consider western Pennsylvania before the oil, gas, coal and iron were developed, and view it today, the *heart of the manufacturing district* of the world.

Picture the the shores of Lake Michigan before the copper and the iron were developed, and know of the wondrous changes in New York and Chicago by the making of a thousand millionaires from the deposits of the Mesabi range. Contemplate the first development of southern Missouri, and remember that the first railroad in that section was built to reach the famous Iron mountain! See what Joplin and the adjacent districts have become under the influence of the zinc mining industry.

Alaska sat, since the glacial period, silent, grim and impenetrable, bound by the icy fetters of the polar seas, her barren peaks swept by the cruel blast of the north wind, until the miner's fiery ardor melted the icy chains and released the golden flood. Alaska, for the purchase of which our government was criticised as being prodigal in paying the sum of seven millions of dollars forty years ago, today producing annually a total of more than $21,000,000 in gold and in other mine products and is producing of forest, fishery and farm, three times as much more.

Africa, which since the loss of King Solomon's mines, was abandoned to the barbarian and the beast by the genius of the miners, Rhodes and Hammond, and the touch of their magic wands on the golden reefs, today is yielding millions of wealth of every conceivable form for the uses of man.

California, which lay across the barren waste of the great American Desert, over which the slow steps of the Forty-niner wearily dragged—under the lure of the mine,

and by reason of the mining industry, has now become the most fertile spot on God's footstool. In truth, war and the *lure of the mine*, by which the best and the bravest of every generation have been drawn from the place of their birth, and their capacities multiplied many fold by a change of environment, have been the two incentives to action, the main factors of progress, the cause of the development of individuality, the means of diffusing intelligence, and the consequent attainment of the brotherhood of man.

In the front ranks of the adventurers of the world have been the miners, and though of the advance guard too often may it be said, "their bones unburied on the naked shore, devouring dogs and hungry vultures tore," yet ceaselessly the column has passed on, and smiling peace and plenty have followed in their train.

There is no part of *this* continent, at least, where the miner has not been the pioneer.

South America, most fertile in resources of all the spots of the earth, will never be redeemed from the jungle until the adventurous miner does the pioneer work. And rough and uncouth as these soldiers of the pick and drill are, yet 'tis the *miner* who has always planted the foundations of law and order.

The only mention of a land of perfect abundance in the Bible is of a land of mines of useful metals. The book of Deuteronomy speaks of a promised land "where without any want thou shalt eat thy bread and shalt know abundance of all things. Where the stones are of iron and out of its hills are digged mines of brass."

Without the product of the mines, the materials of literature would be the quill pen and papyrus sheet, instead of the printing press and cheap paper, diffusing intelligence over the entire world and placing education within the reach of all; making the researches of the sages of all the heritage of all men. This democracy of education, this common diffusion of intelligence, is possible only through the modern printing press, and the printing press is made from the products of the mine. While the mines have created the means by which this literature is popularized, and by which literary men may be sustained, yet the mining industry has received few tributes from Knights of the Quill. Of the dignity of agriculture, literature is full; of the glory of war, minstrels and poets have sung in every age; but of the dignity, glory and heroism of those who beneath the surface of the earth have toiled with more wondrous results than the genii of Aladdin's Lamp, literature, song and story have been absolutely silent.

The Book of Job makes but one reference to a mine—but one sentence—"There is a path which no fowl knoweth and which the vulture's eye hath not seen; the lion's whelps have not trodden it, nor the fierce lion passed by it." No flaming gonfalon floats there, and no stirring music is heard. There is none of the pomp and circumstance of glorious war. But in those dark, dull caverns, which the lion's whelp have not trod, and the vulture's eye hath not seen, are performed more acts of simple heroism and self-sacrificing endeavor than have ever been performed upon the battlefields of the earth.

There have been more hardships endured between the White Pass of Alaska and the sweltering sun of the Equator, in the miner's daily toil, than armies engaged in war have ever suffered.

Gold, and the mysterious call from the depths of the earth have been the attraction by which all the great explorers of the earth have ventured forth, and in their wake, and by reason of their first conquest of the wilderness and the desert, in the search of mines, have come all the great progresses of agriculture, of transportation, of manufacturing, and of art.

These are the direct influences of mining on the industrial and commercial life of a nation. But there is another feature of importance in mining. The indirect effect of mining success cannot be overestimated. The man who has amassed a fortune in mining is rarely content to be a mere idle holder of money thereafter, and every field of endeavor outside of mining has felt the quickening effect of his investment in other fields of the millions made in the mines.

"The patient search and vigil long," the courage and constancy necessary for the development of a mining enterprise, becomes a permanent possession to the successful miner; he carries these same qualities into other fields of endeavor, he re-animates other enterprises, he inspires his associates, his courage and enthusiasm leaven the whole lump.

Consider for a moment the remarkable impetus given to other enterprises in San Francisco and New York by the fortunes made in mining, and that the money of Mackay, Haggin, Fair and Hearst, has caused untold activity in other fields on the eastern shores of the continent, four thousand miles away from where the treasure was uncovered.

Denver owes its commercial and industrial prestige, outside of mining, to the activities of Moffat, Tabor and others in other fields.

St. Louis was called from her long sleep by the fortunes made in the famous Granite Mountain.

Pittsburgers have become the most fearless and persistent workers in manufactures of all kinds, stimulated by the money and encouraged by the success of the iron, coal, gas and oil miners.

Boston was little famed for its trade until the copper fields of Michigan distributed its millions there.

In this, more than in any other age, is the mining industry the very heart and soul of industry and commerce, but looking back throughout the centuries, since the dawn of industry and commerce, there is no age in which the mining industry has not been paramount.

"A cultivated and a populous race heaped with long toil the earth (*Yea, and mined beneath it*), while yet the Greek was hewing the Pentelicus to forms of symmetry, or raising on its rock the glittering Parthenon."

The importance of the mining industry to a nation! Your means of defense would be confined to the arrow or the wooden javelin, or the club with which the baboon kills his prey, instead of the many implements of war, made possible by the mining industry, and by which peace is assured and *nations* are preserved! Tribes and confederations of tribes there might be, but no modern civilized nation could exist without the mining industry.

But why multiply words upon the importance of the mining industry to the commercial and industrial life of a nation? Without it there would be little industry, *less* commerce, and NO NATION.

Therefore, let the miner walk erect, unaffected by the sneer of the supercilious or the criticism of the ignorant. His craft is ancient, and his calling noble. Let him walk erect!

He is the chosen son of the Most High in the industrial development of this age and of all the ages *yet to come.*

A Remedy for the Law of the Apex

BY DR. JAMES DOUGLAS, NEW YORK CITY.

While there may be difference of opinion as to the wisdom of amending the existing law known as the Law of the Apex, by reason of the fact that court decisions have settled so many of its ambiguous features, and that its provisions have been applied, and rights under it secured over so large an area as the United States, few people would be found to defend the law on its own merits. Fewer still, if the law did not stand on the statute books, would frame or vote for the passage of such a law today. It was based on false geological assumptions, and has retarded mining in many districts. Apart from its baneful effects in this respect, it has been the cause of bitter ill-feeling among neighbors, and created a widespread feeling of hostility where there should have been co-operation, self-help and mutual aid and counsel.

Those who so desire have the remedy in their own hands, for neighbors who do not wish to avail themselves of their rights under the apex law, may contract between themselves to apply to their surface the common law rule, and abolish, so far as their adjacent property is concerned, their rights under the law of 1873. In May, 1882, Mr. Wm. E. Church of the Detroit Copper Mining Company, whose operating headquarters were at Morenci, near Clifton, Arizona, made an arrangement with Messrs. Freudenthal and Lesinsky, the owners of the Longfellow Copper Mining Company, and a number of other claims in the Clifton district, to abolish the apex law as applied to their properties, and to confine their operations in depth within the end and side lines of their respective claims carried down vertically. After Messrs. Freudenthal and Lesinsky sold their property to the Arizona Copper Company the arrangement which has worked so well was confirmed by the Arizona Copper Company, and a similar contract was made between that corporation and the Detroit Copper Mining Company. As a result, during the twenty-six years that have intervened between the first contract and today, there has been no litigation in the Clifton district growing out of the law of the apex. A number of other companies have since then begun operations in the district. I am not aware whether or not similar contracts have been made among them, but a spirit of friendliness, instead of distrust, prevades the whole corporate mining community of that district, which

may or may not have been brought about by the action of the two most prominent mining companies.

In the still more productive Warren district of southern Arizona, whose center is the town of Bisbee, the Copper Queen was for many years the only company working actively, or producing much copper; but when the Calumet & Arizona Company acquired property and became an important factor in the copper production of the southwest, the same spirit possessed the companies, and the same method of avoiding litigation, growing out of the direction in which ore bodies extended, was adopted. In the Warren district the profitable ore as yet discovered and developed is confined to beds of carboniferous limestone, whose thickness is about 400 feet, and which have a southerly dip. Probably under the decision in the famous Eureka-Richmond case, the Copper Queen, which has worked continuously from a marvelous outcrop opened up in 1880 along the dip of the ore bearing strata of limestone for a distance of over a mile from it outcrop to a depth of 1,200 feet below the surface, might have fought, with a reasonable expectation of winning, for all ore on the dip. But the result of litigation would have been curtailment, if not stoppage, of work, by injunction, paralysis of the whole district, rabid hatred between neighbors, and the transfer of profits (if under the circumstances any happened to be made) to the legal profession instead of to the shareholders. And therefore the Copper Queen Company, guided by the success of the experiment in the Clifton district, was quite willing to follow the same procedure and make side and end line agreements with the Calumet & Arizona Mining Company and with five other prominent neighboring mining companies.

The wonderful development of mining in the district has unquestionably been brought about through this liberal policy, for not only has litigation and its consequent bitterness of feeling been eliminated, but the underground development of the district has progressed more rapidly than it would have done had not the contracts contained a clause which opened each other's mines to the inspection of the contracting parties. The consequence has been that any discovery made by any one of the companies, instead of being concealed, is published to the others, and the neighbor is thus directed to the point where he should, with most probability of success, search for ore. This benefit has been experienced to the utmost advantage in the Warren district, where the ore bodies appear to be eccentrically distributed within the area of the limestone above referred to.

So loyally do the companies live up to the spirit as well as the letter of the mutual engagements, that when one of the companies works in ore to the side line of his neighbor's claim, and his neighbor's ground travels across the line into his own (an event which not seldom happens in ground so soft and shifting as the ferruginous clays which carry most of the copper of the Warren district) no question has arisen as to the right of the original owner to the travelled ore, nor objection raised to his removing it from the adjacent claim which he does not own, or else claiming its value. From every point of view, therefore, I believe the companies of both districts have benefited; and the population at large of both have prospered. Moreover, to this abolition of the Law of the Apex and the voluntary adoption of the common law rule, may safely be attributed the rapid strides with which the whole of southern Arizona has advanced of late.

Under the old Spanish mining law, as applied to their American colonies, the ownership of the mineral in depth beneath the actual surface of the claim is vested in the possessor of the surface, but if the miners were negligent and tardy, and his neighbor reached the ore in depth below his surface before he did, that neighbor might extract the ore, accounting to the owner for a certain share in the profits. In that way the Spanish government, which depended for revenue on the export duty of minerals, protected itself against the absorption of unused mining property by unproductive owners; but the eagerness with which we push forward towards every indication of ore, and the haste with which we are to extract it, supply sufficient remedy against so remote an evil.

As I have already remarked, except by voluntary contract such as above described, one can see no means of radically amending the mischievous workings of the Law of the Apex in the older mining districts; but this remedy is available to all neighboring mine owners, who wish to act in a neighborly manner and exchange a possible advantage, which may be secured after great loss of money and temper, for an assured benefit.

The following draft of an agreement embodies such provisions as we have found to cover the main points, which, in our experience, have arisen in carrying out the above policy:

This agreement, made and entered into this.....

Witnesseth: That whereas, The parties to this agreement are the owners of certain mines, mining claims, and premises, situate, lying and being in the county of.....

Territory of Arizona, the side lines of many of which adjoin each other, or are closely contiguous to each other.

And whereas, Under existing Statutes of the United States of America in relation to leads, lodes, veins, and deposits of mineral bearing earth or rock, the rights of owners and locators thereof, where the apex exists within the surface boundaries of a claim, to follow such leads, lodes, veins, or deposits upon their dip, outside of and beyond the side lines of mines, mining claims and premises, which are carried downward vertically from the surface indefinitely. have been established,

And whereas, The parties hereto desire to settle and adjust forever their respective rights to the leads, lodes, veins, and deposits existing within the boundaries of the several mines, mining claims, and premises owned by them, respectively, by waiving their rights, privileges and ownership arising under the statutory provisions now existing, or which may hereafter be adopted, in relation to the right to follow said leads, lodes, veins, or deposits outside of and beyond the side lines of said mines, mining claims, and premises, carried downward vertically from the surface indefinitely.

Now, therefore, in consideration of these presents and the covenants, conditions, and provisions herein set forth, and the grants, conveyances, relinquishments, and releases which are hereby made by and between the parties hereto, it is hereby covenanted and agreed by and between the parties hereto, as follows:

First. That in all cases where the lead, lode, vein or deposit of mineral bearing earth or rock situate within the surface boundaries of any mine, mining claim, or premises, herein mentioned and referred to, passes on its dip, or otherwise, outside of and beyond the side line of such mine, mining claim, or premises, carried downward vertically from the surface indefinitely, the right of the owner or locator of said mine, mining claim, or premises, in which said lead, lode, vein, or deposit exists to follow the same and to extract the ore therefrom after it passes on its dip, or otherwise, outside of and beyond said vertical side lines into the mine, mining claim, or premises, owned by the other party or parties hereto, is relinquished and released to, is hereby forever vested in and granted and conveyed to the party to this agreement that is the owner of the mine, mining claim, or premises, into which said lead, lode, vein, or deposit of mineral bearing earth or rock it passes.

Second. That, in relation to the said mines, mining claim, and premises, in every case where the lead, lode, vein,

or deposit of mineral bearing earth or rock shall pass on its dip, or otherwise, from the mines, mining claim, or premises, of one party to this instrument beyond the side lines of such mines, mining claims, or premises, carried downward vertically from the surface indefinitely, into the mines, mining claims, or premises, of the other party, the right to follow such lead, lode, vein, or deposit outside of or beyond said side lines of such mines, mining claims, or premises, carried downward vertically from the surface indefinitely, is, by these presents, waived and forever relinquished and released by the parties hereto, each to the other, its successors and assigns.

Third. That the officers, servants, or agents of either party hereto who may be by either party authorized in writing, by the board of directors of either party, shall at all times have free access into and through all exterior and interior openings and workings of any of the mines, mining claims, and premises, herein mentioned and referred to for the purpose of determining the location and position of said workings and openings and of the ore bodies therein with reference to the side lines and end lines of the said mines, mining claims, and premises, carried downward vertically from the surface indefinitely.

Fourth. That upon the application of either party hereto for a United States patent for any of the claims herein mentioned and referred to, no protest, objection, or adverse claim or suit shall be entered, made, filed, or instituted by either party hereto against the other who shall apply for such patent, on account of the working or mining of leads, lodes, veins, or deposits of mineral bearing earth or rock, or the extraction of ores therefrom, which are found upon the dip of the leads, lodes, veins, or deposits of mines, mining claims, or premises, for which such United States patent is applied.

Fifth. That in all cases in which United States patents may be hereafter granted for the mines, mining claims, or premises of either party, situate in the Copper Mountain mining district in the county of ....., Territory of Arizona, this agreement shall operate as a covenant on the part of each of the parties hereto that upon the acquisition by either party of the outstanding title in the United States of America in unpatented claims, all the covenants herein shall be deemed immediately applicable to, and shall control and determine the rights of the parties hereto in relation to following any leads, lodes, veins or deposits of mineral bearing earth or rock in such patented claims beyond the side lines thereof, carried downward vertically

from the surface indefinitely, notwithstanding the grant and conveyance by the United States of America to either party hereto of said leads, lodes, veins, or deposits of mineral bearing earth or rock, and the exclusive right of possession and enjoyment of all the surface included within the lines of their locations, and of all veins, lodes, and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward, vertically, although such veins, lodes, or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side lines of such locations.

Sixth. That either party hereto, upon the request of the other, and without further or additional consideration, shall and will make, execute and deliver to the other such further or additional instrument or conveyance as shall, subject to the proviso aforesaid, absolutely vest the ownership of any lead, lode, vein, or deposit in any mine, mining claim, or premises therein mentioned or referred to, so passing outside of and beyond the side lines thereof, in the other party who is the owner of any adjoining or closely contiguous mine, mining claim, or premises, herein mentioned and referred to; such ownership, however, shall be restricted and confined within said side lines of the mines, mining claims, or premises of such other party, carried downward vertically from the surface indefinitely.

Seventh. That the party of the first part hereto, and the parties of the second part and of the third part hereto, for the consideration herein expressed and in consideration of the sum of one dollar ($1.00) by each paid to the other, the receipt whereof is hereby acknowledged, have forever released and discharged each other, from any and all debts, dues, claims, demands, damages, and suits at law or in equity, for, or on account of any trespass or injury done or committed in working in or upon and leads, lodes, veins, ledges, or deposits of mineral bearing earth or rock, in any mine, mining claim, or premises, herein mentioned and referred to, or in the extraction of the ores thereof, from the beginning of the world to the date of these present.

Eighth. That this instrument, which is to be executed by the party of the first part and the party of the second part in the Territory of Arizona, in the United States of America, and by the party of the third part in..... shall be construed in accordance with the laws of the Territory of Arizona.

Ninth. That the mines, mining claims, and premises, mentioned and referred to in Schedule A, hereto annexed, constitute the property of the party of the first part hereto,

and the mines, mining claims, and premises, mentioned and referred to in Schedule B, hereto annexed, constitute the property of the party of the second part and of the party of the third part hereto, and Schedules A and B, hereto annexed, are hereby made a part of and are deemed to be incorporated in, this agreement, as a part hereof, and that said party of the third part, for the consideration therein expressed, hereby assents to and confirms this agreement and all the covenants, conditions, and provisions therein contained.

In witness whereof, the parties hereto have caused this instrument to be executed in triplicate in the manner underwritten, and have caused their respective corporate seals to be hereto duly affixed, the day and year first above written.

The History of Gold and Silver

BY JAMES W. MALCOLMSON, KANSAS CITY, MISSOURI.

The history of gold and silver to a large degree is the history of civilization. These metals have been found in all countries of the world and are widely diffused throughout the crust of the earth.

In the earlier ages of the world's history, gold was obtained more readily than silver, as it is not affected by oxidation or decay. On account of its weight, it settles in the metallic state in streams to the bedrock and on account of its resistance to natural leaching processes, it is often found at the outcrops of mineral deposits when all other minerals have disappeared entirely.

Silver, on the other hand, is but seldom found in the metallic state, but is more often mixed with gold, lead, copper or zinc. Pure silver minerals, such as the chloride or sulphide are almost as rare as native silver and silver ores are usually complex mixtures in which other metals predominate.

The processes of treatment of silver ores are therefore more complex than those of gold, and the metal is only obtained by regular underground mining operations, as it is but rarely carried away from the zone of its original deposition.

It is probable that gold was employed long before silver was known and the value of silver in some ancient states appears to have been superior to that of gold. Even in Japan, up to the seventeenth century, the value of gold and silver were almost equal. Soon after the first opening of that country to commerce the Dutch secured nearly all the gold of Japan in exchange for silver, before the Japanese learned the difference in values in Europe.

In ancient Greece in the days of Herodotus, gold was thirteen times more valuable than silver and this ratio appears to have been fairly constant for many centuries. For nearly 1,000 years to the fall of Constantinople, the ratio of value of gold to silver in the Roman Empire was approximately 12 to 1.

In Arabia, in the sixth century, the ratio was 6¼ to 1, while at the same time it was 10 to 1 in France.

In Spain in 1493 it was 10¾ to 1.

In 1500 the ratio of value of gold to silver was 10¾ to 1.

In 1600 it was 12 to 1.

In 1700 it was 15 to 1.

In 1800 it was 15¼ to 1.

In 1900 it was 33½ to 1, probably on account of its demonetization throughout nearly the whole of Europe and America.

It was a remarkable fact that from 1660 to 1860, a period of 200 years, the ratio of the value of gold and silver remained almost stationary at 15½ to 1.

The search for gold has been the first cause of the settlement of much of the earth's surface by civilized races. Del Mar believes that the Argonauts, who sailed from Thessaly with Jason to obtain the golden fleece of Colchis, were probably leaders in a rush to a new gold field or placer deposit along one of the rivers flowing into the Black Sea. The allusion to the golden fleece perhaps indicates the use of sheep skins in sluice boxes in the way that we still use woolen blankets for the same purpose.

The settlement of Egypt by the Semitic races of Asia has been thought to be contemporaneous with the first discovery of the gold mines of the Peninsula of Sinai, more than 2,500 years before Christ, and the Phoenicians and Jews, the kinsmen of these hardy pioneers, went out and searched the whole world for minerals.

In the Book of Job, supposed, I believe, to have been written 1,500 years before Christ, a notable reference to gold and silver occurs, as follows: "Surely there is a vein for the silver and a place for gold where they fine it, as for the earth, the stones of it are the place of sapphires and it hath dust of gold."

Of Solomon, who lived 1,000 years before Christ, it was said that "All his drinking vessels and all the vessels of his house were of gold, none were of silver, it was nothing accounted in the days of Solomon." Solomon was perhaps our first Bonanza Mining King. It is a curious fact in the history of mining the precious metals, that no matter how intelligent or economical a man may be, if he be unsuccessful in finding ore, his industry and talent count for nothing; and no matter how imprudent or unintelligent he may really be, if he finds rich ore and makes a huge profit, he is hailed everywhere as Wisdom personified. It was probable that something of this sort happened to Solomon and since then, his mines have been the theme of the novelist and the poet. He was closely allied with both the Egyptians and the Phoenicians; he married Pharaoh's daughter and was a close friend and ally of Hiram of Tyre, King of Phoenicia. On account of his successes in gold mining in Africa, in Egypt and elsewhere, it is probable that every wise saying

for centuries was attributed to him. Even his matrimonial adventures are more or less characteristic of many successful mining operations of our own time. In southeastern Africa, over an area of 600 miles square, the ruins of fortified cities and great mining camps are found, about which almost nothing is known today, except that the occupation of the ancient inhabitants was gold mining. It is estimated that over four hundred million dollars worth of gold was extracted from these mines.

Andrew Lang says of them:

> "Into the darkness whence they came, they passed,
> Their country knoweth none;
> They and their gods without a name
> Partake the same oblivion.
> Their work they did, their work is done
> Whose gold it may be shone like fire,
> About the brows of Solomon
> And in the house of God's desire.
> We know but that men fought and fell
> Like us, like us, for love of gold!"

The silver mines of Laurium, 30 miles west of Athens were worked for centuries by the Greeks and are referred to by Tacitus, Aristotle and many other writers. They seem to have been worked originally by the Phoenicians, 1,200 years before Christ. Demetrius, a Greek writer, who lived 300 years before Christ, boasted that the Greeks worked these properties with such energy that they threatened to dig up the devil himself. Shortly after this period, mining operations were shut down. The mines of Laurium were re-opened very successfully by the French in 1860 and are paying dividends at the present time.

In the search for gold, the Phoenicians, and afterwards the Romans, who were more skillful miners than the Greeks were led to Spain, which was to the ancient world what Mexico is to us today, but during the most critical period of the Punic wars, Rome debased its silver money and demonetized its copper coinage, because the silver and copper supplies of the world at that time came from Spain, then in possession of the Carthaginian army. Hannibal, however, had other resources and this became, probably, the first great war in history where the troops of both armies were paid in gold coin.

In the fourth century the Romans worked gold mines in every province of Europe and practically all the gold known at that time was in their possession.

Humboldt is authority for the statement that America was discovered because Columbus sought a nearer way to the gold mines of Japan, while Cortez and Pizarro pene-

trated the unknown forests of the New World in the search for the precious metals.

The conquest of India and South Africa, the settlement of California, Australia and Alaska, all originated in the desire to obtain golden treasure, and the search for gold has carried the torch of civilization throughout the world. It is a curious fact, however, that the English speaking people alone produce today nearly seven-eighths of the world's production of gold.

Asia possesses a remarkable capacity for the absorption of gold and silver and much of the precious metals sent there seems to be permanently withdrawn from our stocks available for money. It may be that much of this is hoarded or buried in the ground and lost, becoming practically non-existent. Asia has been called the sink of gold and silver and its ability to absorb or lose these metals has been a subject of remark ever since the time of Alexander the Great.

Among all civilized peoples, gold and silver have derived their chief importance from their use as money. In the earlier period, the first money known and even still in use among undeveloped or isolated communities consists of skins, salt, shells, soap, slaves, cattle, sheep, olive oil, tobacco, iron, tin, lead, copper, nickel and platinum. In such communities transportation facilities were rudimentary, commercial operations were limited to small areas and carried forward slowly, on a small scale. Money has been defined as that which passes from hand to hand throughout the community in final discharge of debts and as full payment for commodities or service, being accepted without reference to the character or credit of the person who offers it.

For many reasons, the metals finally superseded all other forms of money and gold is gradually displacing all other metals and driving them from the field. Cattle die, iron rusts, slaves grow old, but gold and silver, and more especially gold, fulfills all the requirements of money better than anything else we know of. Gold is of small volume compared with its weight and value, it is of uniform goodness and quality, easy of transport, easily guarded, readily divided and reunited without loss. Its identity is perfect, it is easily recognized and is beautiful, brilliant and durable almost to eternity. It is probable that gold which was in use at the time of Solomon is in active service still. Gold does not deteriorate with storage or time and its firm and compact texture, makes it difficult to wear away.

Until within the last generation, the value of gold bore practically no relation to its cost of production, but depended only on the total quantity in the hands of mankind. For ages, its values changed only by slow degrees. In ancient times, strong nations plundered weaker races of their hoards of the precious metals and more modern powers have followed their example, using it without regard to its cost of production.

It is probable that gold and silver were used as money long before the metals were stamped and coined and this was ultimately done in order to save the trouble of weighing and assaying for each transaction. The talent, shekel, etc., in the Hebrew records all refer to the use of money by weight, while the English pound and the Spanish peso and onza all indicate weight. The word coin itself, meaning a wedge, indicates a primitive method of using money. Our word pecuniary, now applied to metallic money, originally meant cattle, and from the custom of counting cattle, comes our present designation of money as capital, meaning heads.

The coinage of gold and silver was adopted at first by private individuals and cities to guarantee originally the fineness and afterwards both the weight and purity of the metals. In Rome, under the empire, however, coinage became the exclusive privilege of the Emperor. Herodotus attributes the first use of coined gold and silver to the Lydians, but it is probable that the real date was much earlier.

As civilization advanced, the use of gold and silver as money became a modification and an improvement on the earlier methods of simple barter and gold presented us with a desirable standard of comparison with which all other values, even including future obligations are compared and measured.

Gold, however, is not an absolute standard, such as the pound weight or the metre length, but is simply a relative measure of value as steady as anything we know of. In other words it is possible for gold itself to change in value. The control of weights and measures has always been one of the great functions of governments and is one of the necessary prerogatives of national life and honor, and every honest government since the dawn of history has protected the use of gold and silver with the best guarantees it could devise, both as regards its weight and its purity. The reputation of any government can be more readily and more seriously injured by the debasement or the defects of its currency than in any other way. Changes in the value of gold

are reflected immediately in the price of some commodities and very slowly in the price of others, particularly in wages and returns from investments bearing a fixed rate of interest. In any change in the value of gold, the majority of the poorer portion of the community suffers most; employers and merchants are quick to discount any change and they adjust themselves to new conditions more readily than the wage earning classes. Those living on the interest paid on bonds or mortgages, cannot adjust themselves to the change at all, and are paid a fixed amount of gold, irrespective of its value. The wealth stored up by all communities in interest bearing bonds, using gold as a fixed standard for future payments, is affected enormously by changes in the value of gold and the result of such changes on the business and commerce of the world is hard to realize.

Although gold is mentioned in the earlier literature of every race, it is difficult to learn its ancient value as measured in terms of food and wages. It is certain, however, that its value in early times was a thousand times greater than it is today and that this value had been decreasing slowly until the discovery of America. In the thirteenth century, it was estimated that the total stock of gold and silver in Europe was approximately six dollars per capita, the population at that time being thirty millions. Only one-half of this gold and silver was coined; no banks or negotiable paper existed. Good roads were few and there was little peace and no credit. From the fifteenth to the eighteenth centuries, enormous quantities of silver were obtained by Europe from the New World and the gold supplies of Japan and India were gradually transferred to Europe until by the end of the eighteenth century there was estimated to be ten times as much of the precious metals in Europe as in the thirteenth century. As before mentioned, previous to the eighteenth century, the value of gold bore practically no relation to its cost of production, but depended primarily on its peculiar fitness for money as a basis of value and on the total amount in use. Before 1840 the annual production of gold bore such a small relation to the total quantity existing, that its cost of production from year to year never materially affected the value of the whole quantity in use and Von Humboldt, in a remarkable article on the production of gold, written in the early part of the nineteenth century, predicted that these conditions would exist for all time.

In 1845 the annual production of gold in Russia increased very largely and all Europe was alarmed. In Holland the desirability of a single silver standard was widely

discussed. In the Netherlands, gold was demonetized in 1847 and the silver florin declared to be the sole legal tender. Belgium soon followed suit. In 1847 a run occurred on the Bank of England. In 1848 the Bank of Austria stopped payment and when in 1849 California began to give its golden treasury to the world, the golden panic reached its height. In 1857 Russia suspended payments in specie and the German states, including Austria, adopted a single silver standard. Chevalier advised the government of France to demonetize gold and Cobden, in England, seriously recommended a return to simple barter. After this increased production of gold, however, the actual course of events reversed all predictions, prices rose everywhere, and the world entered upon a period of unexampled progress and prosperity, and in 1871 the German empire finally adopted the gold standard and discontinued the mintage of silver, being followed in 1873 by the United States and France and by the Latin Union, Holland and Belgium in 1875.

It is, however, owing to the utilization of the power of steam, during the past 50 years, a cause which has wrought so many changes in human affairs, that the use of gold as money has been almost completely revolutionized. The amount of gold in the world, which, before 1850 had increased slowly and had barely kept up with the increase in population, suddenly increased by leaps and bounds. It became twice as great, ten times as great, and by the year 1900, the annual production of gold became approximately 400 tons, or 22 times as great as in 1800. Since then, the production has increased with equal rapidity, until now, it has reached 680 tons per year, and it is estimated by competent authorities, that in the next 16 or 17 years the amount of gold in the world will be doubled. In other words, the amount of gold which has taken the whole civilized world thousands of years to accumulate, will be doubled in our own lifetime. In addition to this, the spread of knowledge, the development of railroad and ocean transportation, the use of the telegraph and the growth of modern banking methods, have all increased the efficiency of gold as money. This has also been aided by the greater confidence which races and individuals now have in each other, which is one of the great underlying features of our modern civilization and a golden dollar can now be made to do more than a hundred dollars did a century ago. These rapid changes are being accompanied by others equally remarkable; money can now be transported throughout the world at a speed undreamt of by our fathers, cheaply and

with almost perfect safety. Its use has been still further facilitated by international and other clearing houses, where transactions involving the use of the measuring power of gold are affected to an enormous extent by telegraphic communication without actually moving or handling the gold itself at all. All this has tended to make gold cheaper. On the other hand, the enormous scale on which commercial enterprise is now being carried forward, the improved mode of living of whole races, the demands of industry for money along so many different lines, the money needed in the building up of new countries and the funds required for war purposes, all tend to keep up the price of gold.

Underlying all these activities, however, remains the commodity gold, upon which all our calculations are based and the fact must always be remembered that gold as money is only a measure of value by virtue of its relation to the value of other commodities. In all countries, apprehension is felt when gold is exported and this perhaps is an unconscious admission that the quantity of gold in any community exercises an important influence on its industries and its commerce.

The use of gold as money is primarily a modification of the system of barter or exchange and is to a lesser degree than any other material human standard, a creation of law. At the same time it must always be the effort of government to limit and define its use with precision.

In spite of the present efficiency of mining operations and the improvements and economies in metallurgical processes, it is probable that the demands of industry and commerce which are increasing so enormously, will ultimately increase the value of gold, or at least prevent its depreciation to any serious extent below its present level. Whether the value of gold will change materially in the future or not, is a subject that deserves the earnest consideration of every statesman. Although this subject has received the attention of thinkers in all ages, the issues have usually been hidden by the personal interests of rulers, or of those controlling the supplies of the precious metals, or by the desire of governments to secure the greatest benefits for their own coinage. It is seldom that the people of any community have had the opportunity to investigate the relation of this question to their own welfare and it is not improbable that some of the inequalities of our social system may be traced directly to this cause. The growth of organized society depends largely upon the development of ex-

change and exchange is impossible without money. If we must continue to use gold, it is of prime importance that our government should be able to form an accurate judgment regarding its present and future value because this, the basis of our monetary system, fixes the value of much of the property in our own country over long periods of time.

The Possibilities and Limitations of Geological Survey Work as Applied to the Mining Industry

BY GEORGE OTIS SMITH, DIRECTOR UNITED STATES GEOLOGICAL SURVEY, WASHINGTON, D. C.

Gentlemen of the American Mining Congress:

The year 1907 promises to mark an epoch in the mining industry of the United States. I refer to the probability that the value of the mineral output for this year will pass the $2,000,000,000 mark. Last year was a record breaker with its mineral product valued at $1,902,000,000, an increase of 17 per cent. over the previous year. Therefore, before I discuss the relation of the Geological Survey to the mineral industry allow me to call your attention to the fact that in the first year of the Survey's history the value of the mineral product of the country, so far as known, was only about one-ninth of the present figure, and further, that now the value of the annual product of our coal mines alone exceeds one-half billion dollars, or, in other words, is more than twice the total value of all the mineral products of 1880. At this time we do well to consider whether this federal organization has had any part in the national progress and whether it intends to keep pace with the development of your industry, a development it has carefully recorded during these twenty-eight years.

In any review of the development of American mining, the man behind the pick and the drill must be given his due, but motive power counts for little without knowledge to guide it. And I take it, Mr. President, that the American Mining Congress stands for the intelligent guidance of the mining industry, and in this the United States Geological Survey heartily joins.

Your President, in his inspiring address the other evening, remarked on the discoveries you had recently made in Washington, and he was kind enough to mention his discovery of the Director of the Geological Survey, but he neglected what was far more important, the Geological Survey itself. If I may be allowed to speak in technical language he spoke to you regarding a small surface showing and neglected to mention the big high-grade ore deposit beneath.

The Geological Survey is a federal bureau, the chief work of which has been and is devoted to the industry you represent. Reference has been made by your President to the Department of Agriculture and its many bureaus and its important work. Our Geological Survey is expending annually over $1,500,000, in other words, measured in terms of comparison with the Department of Agriculture, it exceeds the expenditures of several bureaus of that department by several thousands of dollars and I repeat that our work is largely addressed to the needs of the mining industry. Our division of Alaskan mineral sources is larger than any one of several bureaus of the Department of Agriculture. Every cent of the $80,000 of that appropriation is expended in the interest of mining in Alaska.

I might mention to you our publications. Your President spoke of the Agricultural Department, that it was issuing publications for the information of the farmer, by the million. We can say, too, that we issue publications by the million. The last year, our total distribution of public documents was within a few thousand of one million copies.

There is another channel through which our Survey keeps in touch with the mining industry and with the miners, and that is, in the compilation of mineral statistics, the divisions of mineral resources, carrying on correspondence regularly with no less than fifty thousand men interested in the mining industry of the country. Nine thousand of these correspondents, for instance, are gold and silver miners, and five thousand are coal operators. It is this kind of thoroughness in this work that leads our friends in the Department of Agriculture to frequently express their admiration for our force and our work. I regret, therefore, that President Richards did not have time to be shown both, but I imagine that he saw more than what he told you, for I understand it was at his instance that the Congress today passed a resolution asking for larger appropriations for the work of the Geological Survey.

In speaking to the subpect assigned me, I ask for the Survey a fair recognition for its part in the past of American mining, and I promise for the Survey even greater endeavor to increase its usefulness to your industry in the future. In making this promise of future service I am conscious of the two fundamental limitations of a government organization; the United States Geological Survey is the servant of the people along lines defined by the law of Congress, and both the direction of our progress and the dis-

tance covered are determined and limited by the appropriation act.

Limitation is but another name for boundary. What, then, are the boundaries of our field of endeavor? Or, if you please, the end lines of our claim? Interested as I am in the future development of the organization I represent, I believe we should not be asked to surrender extra-lateral rights, but only to show the persistence of the lead to justify further extension and expansion of the work.

Congress has expressed the scope and purpose of this branch of the public service in its name. The words "United States" define its national character. In no branch of industry, probably, are state lines of so little moment as in the mining industry. A mineral product of fifty years ago might have been credited to a single state; but today, by reason of development of transportation, with its influence upon financial operation and commercial interchange, the output of our mines and quarries not only reaches the markets of the world, but in many cases the marketed product is of interstate origin. Years ago a shipment of pig iron could be set down as the product of a Marquette county furnace, using Michigan iron ore from the mines close at hand and Michigan limestone as well as charcoal from the neighboring hills; yet today, the blast furnace in eastern Pennsylvania may use Minnesota ore, West Virginia coke and New Jersey limestone, and ship its product to California. Nor need I go far afield for an illustration: You men at Joplin, for the operation of your mines and mills, get your power from a sister state, from the coal mines, from the gas wells and from the water power of Kansas. Nor is the case at all different in the smelting of ores of the precious or other metals. Our smelters, whether located in the East or the West, levy tribute upon the mineral wealth of many states and rarely can the best mixture of ores be obtained from a single state. Again, in the study of ore deposits the mining geologist who, for instance, can continue his investigations year by year through a series of copper camps, has a great advantage over an investigator whose observations must be confined to the mines of a single state. This increase in opportunity means increase in value of results secured and published for the information of the public.

The collection of mineral statistics and the study of mineral deposits then must of necessity be made by an organization whose field is the whole country. As regards authority, the first Director of the Survey, Clarence King,

well remarked that the constitutional right of the federal government "to regulate internal commerce could hardly fail to carry with it the correlative right to gain a knowledge of those commodities and products which are the very material and basis of commerce." In its relation to the mining industry, therefore, I discover no limitations set upon the work of our Survey by reason of its federal character; but rather see in this one of its greatest sources of strength and efficiency.

The second part of the name is "Geological." In the wording of the law creating the Geological Survey, "mineral resources" and "geologic structure" are linked together in a closeness of union that is well justified by the results of investigations showing the absolute dependence of the one upon the other in so many mining districts. There is then a fitness in the use of this adjective "geological" in the title of the organization. It expresses a recognition of the real basis of the mining industry, and upon this foundation the Geological Survey has built well.

Between the lines of every appropriation bill for work under the auspices of our Survey we may read the words "practical" and "utilitarian"; yet even this evident purpose of the appropriation is not to be considered as a limitation upon the nature of the work. The very name of the organization to which these funds are entrusted speaks for its scientific character and in science, progress is not attained by the separation of the practical from the theoretical, but by their union and co-ordination. The fruitage of theory is practice and we cannot gather the harvest without carefully tending the tree of knowledge. Most important is it not to limit our concept of the useful as did the Englishman who is quoted by Huxley as understanding utility to mean "that by which we get pudding or praise, or both." Better to count every investigation useful which our faith tells us may some time win pudding and praise for the other fellow. On this account you practical men must not under-rate the contribution of the worker in pure science, but rather realize that his work is fundamental. For these reasons, again, Mr. President, we count it not a limitation, but the greatest advantage, that this federal organization of which I am speaking bears the title "geological" and that we therefore approach your most important industry from the scientific side.

In the third place, I can discover no embarrassing property line in the word "Survey." To most of us, does not the term carry with it the flavor of the West, and the inspira-

tion of discovery and exploration? It expresses the idea of getting at the truth at first hand, while such a word as "bureau" serves only to emphasize the administrative and clerical side. "Survey," then, stands for work in the field, the winning of truth, not from books, but from rocks; not in the office, but in the stope; and as you men well know, it is upon thorough field investigation alone that you can rely. On this account, I rejoice that twenty-eight years ago Congress in its wisdom retained the use of this one word which links the present organization with its predecessors whose records in the winning of the West are a valued heritage.

Our title to the claim is well established, for our patent rests upon no nominal compliance with the requirements as to assessment work. The field in which you are interested is a broad one and you are justified in the statement that too little attention has been given to your industry by the federal government. Yet thus far all the development work is to be credited to the United States Geological Survey and its predecessors, and many witnesses could be cited to prove the value of its output. The subject of mining geology was put foremost in the plan of the organization of the Survey and the impetus then given to the investigation of ore deposits continues to the present day. Dr. Raymond, the Secretary of the American Institute of Mining Engineers, has said that the leadership which American observers have taken in the science of ore deposits must be attributed not only to the rich field here afforded and its active development by mining, as well as to the liberal appropriations made by state and federal governments for its study, but also to what is most important—the presence of men competent to take advantage of these favorable conditions and "the wise provision made for such investigations by the first Director of the United States Geological Survey."

May I now speak of the possiblities of the United States Geological Survey?

At other sessions of this Congress, representatives of the Survey have explained to you the contributions it has made and is making to your industry, and already I have incidentally touched on some of these. I propose, therefore, to confine myself to only a brief mention of the present work, and that merely as a basis for the statements of further possibilities of development in your behalf.

Our topographic maps in accuracy of detail and in excellence of mechanical execution are of the highest grade.

Every three days our office is publishing one of these maps, based on actual survey, and much oftener is printing a new edition of some earlier sheet; yet we appreciate the fact that one class of men, to whom many of these maps would be of greatest assistance—the prospectors—rarely know that such a map is extant. Of even greater value is this map to the mine operator, who follows the prospector and plans the development of the property, and therefore should have before him all the data bearing upon the important questions of water supply and transportation. The endeavor of the Geological Survey must be, not alone to make better topographic maps and more of them, but to get these maps into the hands of the people for whom they are made.

Much the same statement can be presented regarding our geologic maps. Every month, on the average, a folio is issued which presents graphically all that is known regarding the geologic structure and the distribution of the mineral wealth within a district embracing an area of from 200 to 1,000 square miles. A large proportion of these geologic folios cover mining districts and are especially addressed to the mining fraternity. However, it again appears that the Survey's geologic folios do not reach all who might profit by the facts they set forth. The price asked for these publications is only nominal; the real difficulty is that of advertising our output. Recognizing the possibility of increasing our usefulness by wider publicity, I pledge myself to a special effort to reach the mining man, however distant from the great centers he may be.

Perhaps the Survey has nowhere better improved its opportunity to aid the mining industry than in Alaska. The literature on Alaska of value to the mining man is almost wholly composed of Survey publications; yet the exploration work represented by these reports and maps has involved an expenditure of less than half a million dollars, or only one-half of one per cent. of the gold output for the same period. Few taxes are so light as this, especially when we consider also that the work done by the government geologist covers also the coal, copper and other resources of that district, and that the benefits will continue through a term of years.

Reference has already been made to the importance of reliable statistics regarding the mining industry. At the time of the organization of the Geological Survey the country possessed no adequate knowledge of the status of mining, although this is one of the great primary industries based upon natural resources. Advantage was at once

taken of the new organization, and the systematic statistical study of the mining industry under the tenth census was entrusted to Director King. I refer to this because in the successful issue of the work under these auspices can be discerned the correct policy for this important work. Mr. King's plan of utilizing for statistical work the services of those most closely in touch with the mines deserves continuance, and in view of our recent progress along this same line I assure you that there is within our reach the possibility of much greater usefulness to your industry.

The scope of the Survey's statistical work, like that of all other of its investigations, has been limited by the appropriation available; increase that, and more and more can be done in the matter of keeping the country informed as to the phenomenal development in the technology of the mining industry, as well as the no less marked increase in production. I need only to suggest to you the inherent connection existing between an adequate and exact knowldege of any industry and its future development. It is only by observing, recording, and publishing each advance in the utilization of these mineral resources that true progress will be insured; and here, again, it is to be noted that to secure the best results there must be the closest relations between geologist and statistician; best of all is it when the investigator can justly claim both titles. Without full information regarding the latest development in mining, metallurgical, or milling practice, the geologist-explorer cannot intelligently conduct the work entrusted to him; and on the other hand, without a quantitative knowledge of the varied contents of Nature's mineral storehouse the student of statistics cannot appreciate the bearing of the data he collects.

The record of the Geological Survey in mining geology warrants the hope of greater development in the field it has occupied during these years. Let me again cite the disinterested testimony of those unconnected with the organization. A leading mining journal has within a few years stated that in no other country "has economic geology been applied to the development of industry with such beneficent results as in the United States, and no (other) geological survey has contributed so much to the practical application of the science of geology to mining operations."

Not only in this country, but abroad, the United States Geological Survey is regarded as in reality performing the work of a mining bureau by reason of its activity in fostering the development of the mineral resources of the country.

Indeed, foreign engineers are apt to hold up our survey as a model for the organization of a mining bureau. Only last night I was reading such a comment from one, prominent in the mining development of India.

Last year the Canadian Mining Review, in an editorial, pointed to the successful contributions to the mining industry made by our Federal Survey as the strongest argument against the continuance of the independent existence in Canada of a Geological Survey and a Mines Branch, with the resultant duplication of endeavor involving greater expense and less efficiency. The effort should be, not only to expand the work, but also to seek a logical correlation of all the various branches of industry and of research that will benefit your industry, for logical correlation means economy.

I must not leave the subject of mining geology without a reference to one of the greater possibilities for increasing the efficiency of the Geological Survey. Legislative authority should be secured for a certain amount of investigation in foreign countries of ore deposits, together with mining conditions and methods. Several of the Survey's mining geologists, from time to time, while on leave of absence, have been engaged by foreign corporations to report upon properties in South Africa, Australia and South America, and the extent to which the Survey has benefited by reason of their foreign service is keenly appreciated.

The statement of official publications planned by the first Director of the Geological Survey, twenty-eight years ago, indicates the value which he attached to investigations into the technology of the mineral industry, even to the matter of testing the relative cost and efficiency of different types of mining and milling machinery. Little, however, was done along these lines until, under Director Walcott, the Survey took up the fuel-testing work, which has reached so successful a development under the recently organized Technologic branch of the Survey. The chief of that branch yesterday spoke to you on the need of conserving our mineral resources, and I need add little to his argument for increasing our work for the better utilization of the country's fuels and the prevention of waste. The statistician in charge of the collection of our mineral statistics placed before you the facts bearing upon the life of our fuel supply. Our fathers were fond of referring to "the all but exhaustless beds of anthracite," and even now it already appears that our children may speak of "the all but exhausted beds of anthracite."

Again, I wish to call your attention to the complexity of the mineral industry of today. The interdependence of the one mineral product upon many others makes the miner of all men dependent upon many factors outside his own mine. Waste of our supply of wood, water, and mineral fuels will hasten the day when certain ore deposits can no longer be mined at a profit. Hence, we count upon your mine owners for hearty support in the work that the Forest Service and the Geological Survey are doing in the conservation of the natural resources of the nation.

At the El Paso session of your congress the chief geologist of the Survey enumerated certain apparent needs of the mining industry for meeting, which insufficient provision had been made by the federal government. The arguments clearly set forth at that time I will not repeat, yet it is worthy of note that a full compliance with the demand for free assays and for free advice, both as regards mineral properties and mining technology, would be of the nature of an expansion of work already undertaken by the Survey.

One distinction, however, must be made between what may be asked and what can be granted by the Federal Geological Survey. I refer to the legal restrictions whereby "the Director and members of the Geological Survey shall have no personal or private interests in the lands or mineral wealth of the region under survey, and shall execute no surveys or examinations for private parties or corporations." This law may be thought to restrict somewhat our activity, yet it surely adds to the value of our results. Increased appropriations would enable us to meet these specific needs, although the assays and other examinations made by the Geological Survey should be only for new finds, or for new methods, and the results should be promptly published for the information and benefit of the public, rather than of the individual. In a word, the work of the Survey, geologist, engineer, statistician and chemist is planned not to encroach upon that of the mining engineer or the assayer in private practice, but it is to be basal in character, and of a nature to assist these professional men as well as the prospector and the mine owner. I am not unmindful of what your industry has suffered at the hands of the unscrupulous, who masquerade under the title of expert, and against these the Federal Survey is ready to join with your Mining Congress in the protection of both prospector and investor. More and more is our organization taking upon itself work of this kind, which is always delicate and often thankless.

It may be well to note that the Geological Survey is not charged with the enforcement of the law, but is rather a bureau of information; yet as such, it is no less our duty to assist in law enforcement, especially in all that relates to the classification of the public lands. At the time of the inauguration of the work of the Geological Survey, the classification intended by Congress was believed to be general in character, and such as would be expressed upon maps issued for the general information of the people. The present interpretation is that the classification should be more definite, and, therefore, during the past season the Survey has been actively engaged in the classification and valuation of the coal land of the public domain. Increased demands are also being made upon our mining geologists for assistance in the determination of the mineral or non-mineral character of land of which title from the government is sought. In all this work our sole purpose is to determine the truth of the issue and thus to protect the interests of the public. Our purpose is to assist the legitimate miner by opposing his worst enemies, the land grabber and the unscrupulous promoter of wildcat schemes, and in this we know that we have the support of the men who really represent the mining industry. At this time I might mention such instances as that of the Survey report on Tonopah. The first report of Tonopah it furnished was rather a knock-out blow to wildcat schemes, and yet we believe has worked for good to the benefit of the industry of that particular section.

President Richards has outlined definite recommendations for the further extension of federal work in aid of the industry you represent. With full faith in the trained men who constitute its working corps, I promise, in behalf of the Geological Survey, that our possibilities in your service will be limited only by the appropriations which your representatives in Congress may entrust to us. In the Survey's effort to serve the mining industry, I recognize, then, no limitation beyond those set down by congressional enactment, and I will gladly join with you in the effort to make such enactment more truly fit your real needs. Under what federal auspices the mining work should be conducted is not so important a consideration, to my mind, as that the work should be done and done well. All that has been accomplished thus far has been under the auspices of the United States Geological Survey, and its predecessors, and I mention this fact as a token of how we have administered our trust. Enlarge our appropriations and we will continue to

make good along every line of investigation that is entrusted to us. If changes in organization or in name become necessary, there will be no hesitation in making such changes, nor with co-operating with any other agency that may share with us the work. I repeat, it is the work itself that is of prime importance.

In conclusion, the lines along which I propose to have the United States Geological Survey advance to a position of greater usefulness, in behalf of the mining industry of the country, are these:

First—The fuller recognition of its duty in the matter of the classification of the mineral lands of the public domain.

Second—The rapid extension of systematic field study of all mineral resources, so that geological exploration may keep in advance of economic development.

Third—The further development of the Survey as a source of authoritative and disinterested information for the benefit of the prospector or the land owner.

Fourth—The broadening and improvement of the methods of collecting mineral statistics, with the purpose of securing more accurate returns and of expediting their compilation and publication.

Fifth—The investigation of processes relating to the mining and later treatment of fuels, ores, and other mineral products, but only in so far as such investigation may be fundamental to the best utilization of the nation's mineral wealth.

Sixth—The preparation of reports that will better meet the needs of the mining industry and the distribution of these publications more promptly and effectually.

These are not radical departures, as the Survey is at present making progress along each of these lines of public service, and we mean to continue that progress; yet the rate of our advance, and that is what you are most interested in, will be largely governed by the size of the appropriations, and it can be greatly accelerated by the more generous support which you are able to ask for us.

International Mining Exposition, Madison Square Garden, New York

BY WILLIAM M. PORTER, NEW YORK.

The idea of holding a large mining exposition as an educational measure for the benefit of the industry, in Madison Square Garden, New York, on international lines, in which there will be hearty co-operation of all mining interests, has, it is safe to say, the approval of every member of this Congress, and mining men generally.

In contemplation of the high aim to be attained we therefore respectfully invite the Government of the United States, all foreign governments, the mining states and territories, the American Mining Congress, all miners' associations, the manufacturers and mine owners to assemble and demonstrate their respective mineral and manufactured products at this, the first International Mining Exposition in America.

We realized from the beginning that in order to secure public confidence and achieve success, an undertaking of this nature and magnitude should be conducted on a broad scope and to the entire exclusion of all spurious properties, as well as the exclusion of the sale of mining stocks.

In the effort to educate the public in this regard it is apparent that it is impossible to take all who may be interested to where there are mines in operation, but it is most feasible to demonstrate the mining business in that city where there is the greatest concentration of population and capital, which, of course, is New York City.

Experience has taught us that the eastern public will become enthusiastic and liberally patronize an exposition if made attractive and instructive by planning it upon an elaborate scale and by presenting something new; therefore, as the possibilities are unlimited in this industry their every desire can be highly gratified. To this end we wish to illustrate in a practical manner every phase of mining, mine construction, mine operation—both lode and placer—in the latter the use of the pan, cradle, dredge, giants and sluices; also reduction of ores, metal extraction by various processes—in short, mining methods throughout. This, we wish to accomplish by the operation of machinery as far as possible. There is no mechanical exhibit so attractive to the public as an active one. A silent machine does not teach anything, and

is, therefore, most uninteresting. We have decided to make all exhibits throughout this exposition active where possible.

In mineral exhibits a similar idea will prevail. There is not a more unattractive display to the novice than mineral with its technical title on printed label, but when the same is placed under a magnifying glass and its component parts clearly explained, then information is imparted which makes a lasting impression. A mineral exhibit without demonstration does not appeal to the public. Many states that will have exhibits have mining schools that should be willing to send some of their advanced pupils to instruct the public pertaining to the mineral.

Mine owners in showing the product of their property will naturally be expected to have an engineer to answer all inquiries. Their object will be to interest investors, which they can more easily accomplish by displaying a certificate from the State Geologist or other officer, setting forth that the property as exhibited is bona fide; also give assay value of the ore of the same. This will prove to be a very important part of their exhibit, and will be necessary in procuring space, as it is due this industry and the public that we insist on compliance with this measure, and we expect a most hearty co-operation from all sources. We have classified the exhibits in seven different departments to establish system and avoid confusion, and they must be assigned to their proper departments only, which are as follows:

No. 1.—Department of Machinery.

No. 2.—Department of United States Government and Foreign Countries.

No. 3.—Department of State Exhibits.

No. 4.—Department of Metal Mining.

No. 5.—Department of Miscellaneous Mineral.

No. 6.—Department of Mining Camps of Different Nations.

No. 7.—Department of Precious Stones, Mineral Jewelry, Lapidary Work, Etc.

The last named will be very interesting, as it embodies the cutting and polishing of diamonds and other gems.

The mining camps of different nations, showing the extraction of metal in their crude ways, also their novel mode of transporting ore, can be made a feature of the exposition. This could include a prospector's camp, burro and grubstake outfit. We are asking each foreign country to include a mining camp as a part of its exhibit. A commodious hall will be utilized for the accommodation of this department.

Plans are well formulated for securing a United States Government exhibit, which, if successful, will influence many foreign countries to participate, as well as western states and territories.

A great deal of attention is being given to the miners' rock drilling contest, as it accords with our idea of practical demonstration. We believe it will be successful to that end, and novel and attractive in the extreme to eastern people. Liberal cash prizes will be offered to the best teams having records to induce them to enter these contests, and we desire to get in communication with such.

We are very desirous of securing an assayer's laboratory. This could be supplied by a school of mines of some state, and would make a good exhibit.

It is our earnest endeavor to have a representation of a complete mine installed, the same to be in operation. The facilities in the Garden can be easily adapted to this purpose by constructing a wooden shaft from the top gallery to the main floor, a distance of about seventy feet, and a tunnel leading from the bottom of the shaft down the incline to the basement, where a drill could be in operation. Several different levels could be shown in this shaft, and a cage could be operated by an electric motor. Such a demonstration, it is apparent to all mining men, would be of the utmost importance to this industry, and one of the strongest educational features that could be presented to the public.

We would consider it a very great favor to have donations of rock for the drilling contests, also of ore for demonstrating the machinery. We have accommodations for handling large quantities of it, which will be necessary, considering the four weeks' duration of the exposition. We, of course, will pay freight.

There is a great deal of wall space in the Garden, which could be utilized to good advantage to show scenic paintings of different mining sections throughout the West. We will donate the space, but the district using it must stand the expense of procuring the painting.

While we have the largest and most complete facilities for holding this exposition to be obtained in America, it should be understood that we are striving to place the mining industry of the world in one building, and that necessarily there are many applicants for each space. This exposition will cost thousands of dollars. We are not seeking assistance in bearing this expense, other than general cooperation with us. There is not a mining state which can-

not afford an exhibit here, for it would be most inexpensive, greatly beneficial and well worth the effort.

Now, good people of this wonderfully promising industry, the time and tide have turned; the opportunity is at hand. Let us take advantage of it and unite in this great effort and clearly and practically demonstrate that mining is a business by business men and not a gamble by gamblers.

The Protection of Mineral Lands From Agricultural, Timber Entry, or Other Patent

BY LEWIS E. AUBURY, SAN FRANCISCO, CALIFORNIA.

As our Western country develops, it is a source of considerable comment among mining men that our supposed mineral area is noticeably decreasing, principally within the past few years. The prospector of today often finds his way barred by a barbed wire fence, and he frequently observes that the latter encloses undoubted mineral territory, and which, it may be found, is being held without regard for the present laws, or the rights of the miner.

The rush for land among all classes has placed the pioneer miner in such a position that it is imperative on his part to at once place himself on the defensive, as against the agricultural entrymen, the timber grabber, the homesteader and the stockmen and scripper.

The land laws of our country are either a farce or the enforcement of them so feeble that the miner always receives the worst end of the deal. The cards are stacked against him, and unless he bestirs himself, and seeks other enactments than our present land laws in the near future, it will be too late for him to secure recognition of his rights. I believe it was the original intention of our law makers that in order to develop our western country, which at that time was supposedly rich in mineral, to so frame the laws that every encouragement would be extended to the miner. How well these laws have been carried out is evidenced by the millions of acres of mineral land which have found their way into the hands of a comparatively few individuals and corporations, who now hold the land for other uses. This fraudulent acquirement has been participated in by some of the most prominent men in the country, and some of whom are honored by seats in Congress. The story of the rottenness and corruption in the means of acquiring these lands is too lengthy for submission. Like Hamlet, I might "a tale unfold," but in the telling of it, the entire time of this convention and more would be consumed. You have all been informed many times, I suppose, of the methods which have prevailed in the theft of our mineral lands, and I will not burden you with the repetition of the story. To many, however, the methods employed by the timber thieves would not be more wonderful than was Kelly's impression at his first sight of Niagara.

He was looking at the Horseshoe Falls when his friend O'Hara said: "Ain't that wondherful, Kelly?"

"What's wondherful?" says Kelly.

"Why man, to see all that wather come thunderin' over thim rocks," said O'Hara.

"I don't see as it's wondherful," says Kelly. "What the hell is there to hindher it from coming over?"

Now what is there to hinder the land grabber from acquiring numberless thousands of acres of our mineral lands which have as yet been left untouched. Shall we attempt to assert ourselves, and ask Congress to protect us? I believe that we should, and I further believe that a solution of the difficulty will be found in the enactment of laws which have been in force for many years in our sister Republic of Mexico, and which have proven effective in the protection of mineral lands.

The substance of the proposed law is that on all United States land patents which may be issued by the President on lands classified as other than mineral, that the Government shall reserve the mineral rights, and after complying with the necessary requirements, a separate patent for the mineral rights shall be issued to the miner.

From much personal observation, I believe that such a law would be just to all parties concerned, and would not only meet with general approval, but would settle a vexed question.

The Who Man Stakes Claims Everywhere: Does He Assist or Retard the Development of the Mining Industry?

BY RANDALL H. KEMP, SPOKANE, WASHINGTON.

This is a question that can be viewed from two standpoints. Put in different language, does the man who gobbles up an entire district and endeavors to appropriate the whole country benefit that section or is he a detriment? In my experience of a little over one-third of a century, covering a great portion of the country from Colorado to Alaska, and always being identified with the industry of mining, it could not be otherwise than that I would take some note of the matters which come under this head. In this connection I wish to state that the wholesale patenting of both quartz and placer claims in many instances is also a detriment to the mining industry, and if I am allowed, I shall dwell on this evil before I have finished.

By way of preface, permit me to pay a slight tribute to our American prospector. It is to this optomistic personage that we owe our greatest debt today. The prospector, with the radiant eyes of faith ventured into the unknown wilds of the boundless west and while undergoing the greatest of privations and braving all the dangers that could beset an individual or class of persons, proved to the world that metals, both precious and base, were in evidence in paying quantities. Following the prospector came the husbandman, the merchant, manufacturer, artizan and the hundreds of others who live and thrive in new sections of our country, and I may add, ladies and gentlemen, that were it not for the prospector we would not be here at this time.

Only in rare instances, as far as my knowledge goes, did the pioneer prospector become so greedy that he endeavored to corral everything that was in sight to the detriment of those who came later and wished for a share in nature's gifts. The exception, the man who staked everywhere, was a detriment to the country and a drawback to progress.

Several instances I can cite that have come under my observation. When the placer fields of the Coeur d'Alene were found in the fall of 1873, a horde of agricultural people from a nearby section swarmed into the country and planted their stakes all over the country. Hundreds of claims were located by virtue of power of attorney. These claims were twenty acres in extent, and when it came to

voting at miners' meetings, these farmer-miners were in the majority, and to this day the full merits of the placers of the North side of the Coeur d'Alene are practically unknown. This would not be the case were the ownership more evenly divided and the claims had been smaller, which would have caused them to be more easily developed, as every experienced person knows.

During my sojourn in British Columbia, the evil of one man acquiring so much mineral land became such a nuisance that the associated Boards of Trade took the matter up and memorialized the Provincial Parliament to enact laws to overcome this drawback to the country's advancement. One of the members of this organization informed me that he knew of one man who had sixty claims staked in one district and practically kept out every one else.

In Alaska, also, I have seen the disadvantages of this system. I knew of one prospector who covered two huge mountains with locations and when another prospector would wander into that district he would be shown a map of the first party's holdings and be warned to keep away.

In Idaho, I understand, that the entire Seven Devils country was located and patented by a Helena, Montana, association at least a quarter of a century ago, and it is well known that that region so prolific in copper values has been dormant ever since.

Doubtless there is no one within sound of my voice, who has had experience in the field, but knows of numerous similar instances of where the mining industry has been retarded and the country held back as outlined above.

As a rule the prospector is of a generous nature; when he dives into the wilderness and makes a notable find, he is willing to share with those who come later. In fact he welcomes the crowd as he is aware that in numbers there is strength, and the more that become located around him the sooner his holdings will have a value. Besides this the others aid in constructing trails, roads and other improvements which tend to make all property more valuable. On the other hand, the man who desires to hog the whole country and gives every one to understand that their room is better than their company, rarely, if ever, accomplishes anything and in the end they often lie down in paupers' graves all on account of the desire to keep everything to themeslves.

Not only does the man who stakes everywhere become a detriment to the mining industry, but so is the man who shingles the country with patents covering both quartz and placer mines as well. To prove this assertion I will cite

one instance that came under my observation while residing in Montana. An old prospector ventured into an abandoned district that many years before had been quite a producer of placer gold. The shallow diggings which could only be worked profitably in the early days had become exhausted and the hundreds of miners became scattered far and wide. This prospector in his search for the yellow metal chanced on some ground that had been overlooked in the days gone by that would pay well to work by primitive methods. To thoroughly test the ground, he packed to the nearest stream a quantity of the gravel on his cayuse and ascertained that he had made quite a strike. He then laboriously constructed a ditch to bring water to the claim, whipsawed lumber and was in readiness to reap the reward of his labor. When lo, and behold, along comes a Helena merchant who coolly informs him that he had obtained a patent to 160 acres there a number of years before, and ye old prospector could get off. It is well to add to this incident that all monuments were obliterated and the old prospector could find no evidence that he was encroaching on another person's rights.

To my mind there is no doubt but that the man who stakes claims everywhere, and the man who plasters the country with patents should be classed as following the dog in the manger policy according to the ancient fable, and I would strongly urge that this Congress use every honest endeavor to have, if not stronger laws enacted, to recommend that those already on our statute books be more rigidly enforced.

Sliding Scale Royalty

BY LOUIS D. HUNTOON, NEW HAVEN, CONNECTICUT.

In visiting a district for the first time, the attention of the mining engineer is always directed to the methods of mining and milling which have been developed in the district for the class of ore it contains, and especially so if the methods are not in use elsewhere.

The lead-zinc deposits of Southwestern Missouri present many interesting features. The leasing and sub-leasing of lands on a flat royalty is the special feature with which this paper is concerned.

The prerequisite of mining and milling in a district is securing the land and mineral rights. In Southwest Missouri this is accomplished by buying outright for leasing. The leases are of three kinds: Leasing for development only; leasing for development and mining, and sub-leasing.

In the first class, leasing for development only, the lessor guarantees to do more or less work testing the property with drill holes, and possibly, the sinking of a shaft. At the completion of this work the lessor generally sells or sub-leases.

The second class, leasing for development and mining, the lessor agrees to test and develop the property and then mine and mill the ore. The lessor pays a royalty on the gross returns of from ten to twenty per cent., but guarantees no minimum royalty.

In sub-leasing, the sub-lessor guarantees to operate the property and pays to the first lessor, five per cent. or ten per cent. more royalty than the original lease calls for. The drilling of a few holes costs the first lessor about $500, and, if he can then sub-lease without further expenditure, he is quite certain of very lucrative returns on his investment. The cost of sinking a shaft is about $2,000 to $3,000. With this additional cost it is only necessary for the sub-lessor to ship about $30,000 of concentrates to pay all costs of the first lessor. After this shipment the royalties paid the lessor on gross returns or profits, make an original lease very valuable, providing the property is operated.

This places upon the property a very heavy burden to carry and prevents the working of the lower grade of ores. These ores are lost to the market and the royalties are lost to the land owner. If the mill operates at a loss the first lessor and the land owner continue to receive their income, increasing the loss to the operator.

The above forms of lease are liable to, and do in some cases to my knowledge, work an injustice to all parties and to the district as a whole. The land owner is guaranteed the prospecting and continued working of the property, but no minimum royalty. He is assured of no definite return from his land. His land can, under these conditions, be held for a long period at a nominal expense to the lessor. The operating lessor in turn is not protected when the grade of dirt is low, or the selling price of concentrates is low. When gross returns on concentrates just equals the cost of production, the operating lessor must draw on his reserve capital to pay royalty. The custom of the camp, I understand, is for the company operating to hold little or no reserve in the treasury for amortization or the securing of new lands, all surplus earnings being paid as weekly or monthly dividends. This failure to keep the capital of the company intact, and a flat royalty on gross returns, also has a tendency to work a hardship to the company and the district as a whole, especially so when the ore is of a low grade. Mines and mills must close down when working on a losing basis with no money in the treasury. If these mines and mills were relieved from royalty on this low-grade ore, they could afford to prospect and in all probability would encounter rich ore bodies and again pay good royalties. The land owner, the company and the district as a whole, will be enriched by the mining of this second ore body.

Interesting figures are developed when the present royalty system is carefully investigated. When the dirt is low grade, or the price of concentrates is low, the greater part, if not all of the net earnings, or more, is paid to the land owner. When the mine is working high grade ore and making large net earnings, only a small percentage of the net earnings is paid to the land owner. These conditions are illustrated in Table I., the first line showing a loss to the operator, usually resulting in abandoning of the property. In Table V., the same grade of dirt shows a net income to both operator and land owner. Table II. shows the cash distributions of net earnings with varying recoveries and varying selling prices. Table III. shows the percentage distribution of net earnings. Comparing Tables I., II., and III., we find in Table I. that dirt giving a recovery of four per cent., with concentrates at $40, is worked at net earnings of ten cents per ton of dirt. The royalty on this is sixteen cents per ton, leaving a net income loss to the operator of six cents per ton. Conditions like this prevent exploration and further profits to both land owner and lessees.

TABLE I.

Recovery %	Tons	Gross Earnings	Cost Mn. Mill	Net Earnings	Royalty 10%	Net Income $60	%of Net Royalty	Earn's Opet'r 60%
4	40	$1,600	$1,500	$ 100	$160	loss		loss
5	50	2,000	1,500	500	200	300	40%	60%
7½	75	3,000	1,500	1,500	300	1,200	20%	80%
10	100	4,000	1,500	2,500	400	2,100	16%	84.
15	150	6,000	1,500	4,500	600	3,900	13.3%	86.7
20	200	8,000	1,500	6,500	800	5,700	12.3%	87.7

Distributions of net earnings on 1,000 tons of dirt; concentrates at $40 per ton. Mining and Milling at $1.50.

TABLE II.
Recovery.

Selling Price.	4% R.	4% O. $60	5% R.	5% O.	7½% R.	7½% O.	10% R.	10% O.	15% R.	15% O.	20% R.	20% O.
$40	$160	loss	$200	$ 300	$300	$1,200	$400	$2,100	$600	$3,900	$ 800	$5,700
50	200	300	250	750	375	1,875	500	3,000	750	5,250	1,000	7,500
60	240	660	300	1,200	470	2,730	600	3,900	900	6,600	1,200	9,300

Cash distribution of net earnings on 1,000 tons of dirt. Royalty 10%. Selling price of concentrates varying from $40 to $60. R-Royalty, O-Operators net income.

TABLE III.
Recovery.

Selling Price.	4% R.	4% O. 60%	5% R.	5% O.	7½ R.	7½ O.	10% R.	10% O.	15% R.	15% O.	20% R.	20% O.
$40		loss	40%	60%	20	80	16	84	13.3	86.7	12.3	87.7
50	40%	60%	25	75	16.6	83.4	14.3	85.7	12.5	87.5	11.7	88.3
60	26.7	73.3	20	80	14.6	85.4	13.3	86.7	12.0	88.0	11.5	88.5

Percentage distribution of net earnings on 1,000 tons of dirt. Royalty 10%. Selling price of concentrates varying from $40 to $60. R-Royalty O-Operators net income.

TABLE IV.

% Conc. Recovered	Royalty in dollars payable per ton with concentrates selling at or above $80.00	$70.00	$60.00	$50.00	$40.00	$30.00
20		24.00	21.00	18.00	15.00	12.00	9.00
19		22.73	19.83	17.00	14.11	11.29	8.40
18		21.47	18.66	16.00	13.24	10.59	7.80
17		20.21	17.50	15.00	12.35	9.88	7.20
16		18.94	16.33	14.00	11.47	9.18	6.60
15		17.68	15.16	13.00	10.59	8.47	6.00
14		16.42	14.00	12.00	9.71	7.76	5.40
13		15.15	12.83	11.00	8.82	7.06	4.80
12		13.89	11.66	10.00	7.94	6.35	4.20
11		12.63	10.50	9.00	7.06	5.65	3.60
10		11.36	9.33	8.00	6.18	4.94	10% 3.00
9		10.10	8.16	7.00	10.5% 5.29	10.6% 4.24	2.40
8	11%	8.84	10% 7.00	10% 6.00	4.41	3.53	1.80
7	9.4%	7.57	5.83	5.00	3.53	2.82	1.20
6		6.31	4.66	4.00	2.65	2.12	.60
5		5.05	3.50	3.00	1.76	1.41	.00
4		3.78	2.33	2.00	.88	.71	
3		2.52	1.16	1.00	.00	.00	
2		1.26	.00	.00			
1		.00					

Royalty on sliding basis dependent on per cent. of mineral recovered and price at which concentrates sell.

Maximum royalty to be 30% for 20% recovery.

The zero royalty is where the cost of operating equals the selling price of concentrates.

TABLE V.

Concentrates at $40 Tons Dirt	Recovery %	Recovery Tons	Present System Royalty 10%	Present System Operators net income	System Suggested Sliding Royalty	System Suggested Operators net income
1,000	4	40	$ 160	loss $60	28.40	71.60
1,000	5	50	200	300	70.50	429.50
1,000	7½	75	300	1,200	211.50	1,288.50
1,000	10	100	400	2,100	494.00	2,006.00
1,000	15	150	600	3,900	1,270.50	3,229.50
1,000	20	200	800	5,700	2,400.00	4,100.00
6,000			$2,460	$13,140	$4,474.90	$11,125.10

Comparison of present Royalty system with sliding Scale Royalty.

We also find in Table I. that dirt giving a recovery of five per cent., with concentrates at $40, is worked at net earnings of fifty cents per ton. The royalty on this is forty per cent. of the net earnings, leaving the operator a net income of thirty cents, which is less than sufficient to pay off the original investment to the stockholders.

Further consideration of Table I. shows that dirt giving a recovery of fifteen per cent., with concentrates at $40, is worked at net earnings of $4.50 per ton of dirt. The royalty here is only thirteen per cent. of the net earnings, or sixty cents per ton, while the operator's net income is 86.7 per cent. of the net earnings, or $3.90 per ton. The operator here can well afford to pay a much higher royalty, if the royalty with the lower grades is reduced.

By placing the royalty on a sliding scale as shown in Table IV., dependent upon the recovery and the selling price of concentrates and with a guaranteed minimum royalty to the land owner, a more equal distribution of net earnings will be made; the investor will run less risk in the return of capital invested; the lessor will receive greater royalties than at present with high grade dirt; and the entire district will be benefited by it being made possible to work these low grade ores, with the probability of encountering more high grade deposit.

The sliding royalty scale, given in Table No. IV, has been worked out by the plotting of a cost curve dependent upon the recovery and selling price of concentrates. No royalty is allowed other than the yearly minimum, on the sale of concentrates, when the cost of production equals the gross earnings. The royalty increases regularly until it reaches a maximum of thirty per cent. on gross earnings for twenty per cent. recovery.

Table No. 5 is a comparison of the two systems with concentrates at $40 per ton, showing the more equal distribution of profits. In this Table, it will be noted that under the present system, with concentrates at $40 per ton, and dirt giving a recovery of four per cent. to twenty per cent., the average royalty is forty-one cents per ton of dirt. In the system suggested, the average royalty is seventy-four and one-half cents per ton of dirt.

The placing of the royalty on a sliding scale, dependent upon the selling price of concentrates and the percentage recovered from the dirt, I consider equitable to both parties and the district as a whole. The sliding scale royalties given in Tables IV. and V. were computed with mining and milling costs at $1.50 per ton of dirt.

Mining Engineering Education in the United States

BY VICTOR C. ALDERSON, PRESIDENT OF THE COLORADO SCHOOL OF MINES.

The Present Status.

Less than five years ago a celebrated Professor of Mining Engineering, in one of the famous mining schools of this country, said to the writer that all the forms of engineering education in the United States, mining engineering was the least progressive; that, while instruction in mechanical, electrical, and civil engineering was advancing rapidly, through advanced methods of instruction and well equipped laboratories all over the country, and new courses were being introduced like chemical, telephone, and fire protection engineering, mining engineering was lagging behind; that, while great private schools, like Columbia, Harvard and Massachusetts Institute of Technology were flourishing, and while the state mining schools of Minnesota, Michigan, Colorado, Missouri and California were doing excellent work, yet in many states no effort whatever was made to provide instruction in mining, in many others there was only a half-hearted attempt, and, on the whole, mining education was below the standard set by other kinds of engineering education.

A glance at the facts will help us to analyze the case. Departments of mining are now in operation at the following private institutions:

Massachusetts Institute of Technology, Boston, Massachusetts.
Columbia University, New York, N. Y.
Harvard University, Cambridge, Mass.
Yale University, New Haven, Conn.
Lehigh University, South Bethlehem, Pa.
Case School of Applied Science, Cleveland, Ohio.
Lafayette College, Easton, Pa.
Northwestern University, Evanston, Ill.

Departments of mining are in operation at the following institutions under state control:

Alabama Polytechnic Institute, Auburn, Ala.
West Virginia University, Morgantown, W. Va.
Georgia School of Technology, Atlanta, Ga.
Ohio State University, Columbus, Ohio.
University of Maine, Orono, Me.
Washington Agricultural College and School of Science, Pullman, Wash.

University of Oregon, Eugene, Ore.
University of California, Berkeley, Calif.
University of Nevada, Reno, Nev.
University of Utah, Salt Lake City, Utah.
University of Wyoming, Laramie, Wyo.
University of Texas, Austin, Texas.
University of Minnesota, Minneapolis, Minn.
University of Washington, Seattle, Wash.
State College of Kentucky, Lexington, Ky.
University of North Carolina, Chapel Hill, N. C.
University of Virginia, Charlottesville, Va.
University of Alabama, University, Ala.
University of Arkansas, Fayetteville, Ark.
University of Iowa, Iowa City, Iowa.
State College of Agriculture and Mechanic Arts, Ames, Iowa.
University of North Dakota, Grand Forks, N. D.
University of Kansas, Lawrence, Kas.
University of Oklahoma, Norman, Okla.
University of Idaho, Moscow, Idaho.
University of Tennessee, Knoxville, Tenn.
University of Arizona, Tucson, Ariz.
Pennsylvania State College, State College, Pa.
University of Nebraska, Lincoln, Neb.
Western University of Pennsylvania, Allegheny, Pa.

Separate schools of mining are maintained as follows:
New Mexico School of Mines, Socorro, N. M.
South Dakota School of Mines, Rapid City, S. D.
Colorado School of Mines, Golden, Colo.
Montana School of Mines, Butte, Mont.
Missouri School of Mines, Rolla, Mo.
Michigan School of Mines, Houghton, Mich.
Secondary Technical School for Practical Miners, Platteville, Wis.

In the following states there is no attempt, as far as the writer knows, to teach mining or metallurgy: Louisiana, Mississippi, Indiana, South Carolina, Florida, Rhode Island, Vermont, New Hampshire, Delaware, Maryland and New Jersey.

The list of places where a mining education may be obtained, seems formidable, but on closer inspection it will be found that the number of first class mining schools, whether as separate institutions or as departments of a university, is lamentably small. They can be counted on one's thumbs and fingers with some fingers to spare. Many of the institutions offering instruction in mining have only

a corporal's guard of mining students, lost in an army of mechanical, electrical and civil engineering students. Some of them with long and ponderous names depend upon the professor of geology to teach all that is taught of mining and metallurgy.

Recently the writer tried to ascertain the exact number of students in mining and metallurgy now enrolled in the different schools of the country. Inquiries were sent out and the replies received from thirty with results as follows:

10	schools	reported	less than	25	students
7	schools	reported	from 25 to	50	students
5	schools	reported	from 50 to	100	students
4	schools	reported	from 100 to	200	students
3	schools	reported	from 200 to	300	students
1	school	reported	more than	300	students

The total number reported amounted to 2,370. Allowing for the schools not reporting it is fair to assume that the number of students of mining and metallurgy, at the present time, in the United States in resident schools is about 3,000. All the schools known to have a large attendance are accounted for in this list. The attendance at the fifteen schools not reporting is known to be small, so it is clear that only eight mining schools in the country have an attendance of more than one hundred each. These figures, compared with the attendance at such great schools as Sibley College, of Cornell and the Massachusetts Institute of Technology, where the engineering students are numbered in the thousands, shows conclusively that in numbers, at least, mining education is lagging behind. It is also true, admitting that some few schools are well equipped, that the great bulk of the schools are ill prepared to give thorough instruction. From the point of view, then, of quality as well as quantity of instruction, mining education is lagging behind.

There are several reasons for this condition. The first is a long continued lack of appreciation of the need of technical training for the mining and metallurgical industries. The picturesque figure of the prospector, however, is rapidly disappearing. In his place comes the highly trained engineer—the expert in geology, in engineering and in chemistry. In place of the single miner panning out his gold, is the placer mining company with its huge dredge or its great water power, levelling hills and diverting whole rivers to secure the free gold. Probably ninety per cent. of the mining of today is done by incorporated companies employ-

ing every grade of labor from the "mucker" up to the highest priced engineer. The demand for competent mining men now exceeds the supply, because the real worth of the technical man is appreciated more fully than ever before. With this demand is coming a stronger and better support for the mining schools which augurs well for the future.

Another cause lies in the fact that in the west, where mining engineers are in great demand, schools are new and funds limited. Had the great metalliferous mines been found in the Allegheny mountains, the Atlantic coast would now be dotted with mining schools. Some of our great mining schools, to be sure, are located in the East, but they are not located in mining centers, nor in a mining atmosphere, nor where their students can have easy access to mines, mills and smelters. The Mecca for other lines of engineering education may be in the East, but the center for mining education will, of necessity, lie west of the Allegheny mountains.

Another cause is the failure on the part of legislators to recognize that the field of mining instruction may cover legitimately not merely the metal, but the great field of nonmetalliferous mining. In Colorado today there is the keenest demand for coal mining engineers, but only a limited supply. The center for coal mining engineering is, of course, in Pensylvania, but even in other states where coal mining is an important industry, as in Indiana and Illinois, no effort of any consequence is made to educate the coal mining engineer. As long as mining means to the average law-maker only gold and silver mining, just so long will he look upon appropriations for mining schools as benefiting only a few, but as soon as he sees the full breadth of the mining industry, and understands that it covers the rare metals, like tungsten and vanadium, the common metals, like gold and silver, lead, tin, zinc and copper, the entire coal and iron industry, and the great industries involving clay, gypsum, limestones, sandstones, granite, gas, oil and cement, then he is likely to be more friendly towards mining education.

Still another reason is the unorganized condition of the mining industry. While the farmer has succeeded in securing national recognition of his industry, has forced the government to organize a Department of Agriculture, and, on three occasions, has secured the passage of bills giving financial aid to state agricultural schools, the miner has secured nothing. The farmer has an army of scientific men in the employ of the government, all seeking to aid him in

solving the problems of scientific agriculture. Almost every state has an Agricultural Experiment Station, whose sole business it is to help him to increase the value of his product. The miner in the hills, who shares with the farmer the credit of engaging in an industry basal to all other industries, gets not a particle of assistance. With governmental recognition of the mining industry through the establishment of a Department of Mines and Mining, with headquarters at Washington, with governmental aid to state mining schools, and with the organization of mining experimental stations to aid the plain prospector and the small miner, mining education would no longer lag behind.

While some of the causes resulting in a low general standard for mining education remain operative, yet it is pleasant to record a marked improvement in the past few years. Chief among the favorable influences is the clearer appreciation of the need of trained mining engineers. This is due, in turn, to the appreciation of mining as less speculative and more substantial, as an industry, than formerly; also to the formation of large companies organized to work extensive properties requiring the services of competent engineers; and to the treatment of great bodies of low grade ores which necessitates the employment of many engineers, chemists and assayers of ability. These influences have caused an increased demand, to supply which the schools now organized are endeavoring as best they can. Those in charge of schools are doing all they can, but they need more and better trained instructors, better laboratories, more testing plants, and much more money.

It is pleasant to note, however, that a new interest in mining education is manifest. An optimistic view certainly prevails and the outlook is promising. Among the important events which compel this view, are the gifts of John Hays Hammond to Yale, by Mrs. Phoebe Hearst to the University of California, by John D. Rockefeller to the Case School of Applied Science, by Senator Simon Guggenheim to the Colorado School of Mines, the increased appropriations for buildings and current expenses by nearly all of the western legislatures, and the new departments of mining which have been organized at the Case School of Applied Science and at Northwestern University. Notable, too, is the establishment of a new and separate school of mines, authorized by the Legislature of Wisconsin, to be located at Platteville, Wisconsin, and designed to train practical miners. This is a new and important step, because it recognizes secondary technical education as of

industrial importance. It is also fortunate that action was taken by a state legislature, for it thus takes on a public character, and, no doubt, will lead other states to recognize the need of fostering industrial education as an aid to industry.

The Scope.

The engineer, no matter what his special field, is the pioneer of the twentieth century. Especially is this true of the mining engineer. Industry would be paralyzed without coal, iron, copper, gold, silver, lead, zinc, clays, cement and all the other products for which the mining engineer works. As his work is broad and comprehensive, so is his education. In addition to the knowledge of the electrical, mechanical and civil engineer, he must have the training of a chemist, a metallurgist, a geologist and a business man, besides, he must have as it were, a stomach like that of an ostrich, a heart as vigorous as a force pump, and a physique like Sandow; in the camp, he must rough it with the Slav and the Pole, but in New York he must have the polish of a Chesterfield; besides all these qualifications, he must be a skilled manager, a practical economist, and above all, a dividend producer. Few occupations demand so much of a man as that of a mining engineer. However, many a young man is now preparing to enter the profession. Why? Because American spirit will not down. Wherever there are difficulties to be overcome or obstacles to be removed, there the young American will be found. For more than twenty years I have been dealing with the education of young men in the prime of their youth, preparing for their life work. I have seen them go into the army, into journalism, into law, into medicine, into business, into the ministry, into all branches of engineering, but those who enter the profession of mining engineering are the most enterprising, the most self-reliant, the most ambitious, the most all-around Americans of them all.

The scope of mining education should be broad; it should be philosophic; it should be human. For breadth there are few professions that can surpass it. Some persons educated in geology alone, think they are mining engineers; others delude themselves with the same fond hope because they are familiar, through training or experience, or both, with the mechanical, the electrical, or the chemical aspects of mining. Some, still more deluded, think they are mining engineers because they can handle the instruments well enough to survey underground, or manipulate a furnace and run a fifty cent assay.

The real mining engineer is not any of these, but all of them combined. He may not practice all of these accomplishments, but his education should include them, and more. The peculiar features attendant upon the organization of some mining companies have frequently been of such a nature that "favorite sons" or "worthy nephews" have been placed in charge of mining properties and have been "educated" at a fearful cost to the stockholders. Such disregard of the fundamental principles of success in mine management is so culpable that no one should sympathize with the directors or stockholders who permit such blunders to be made. The fault lies in expecting a man—honest and well intentioned, undoubtedly—but without broad professional training and practical experience, to succeed in a position where these qualities are the prime requisites. Besides the ordinary subjects fundamental to all successful engineering education the mining engineer should understand such professional subjects as underground surveying, assaying, the principles of ore dressing and metallurgical treatment, mine sampling, mine examination, mine reports, the economics of mining, mine management, mine plant design, mill construction, mining law, and business forms.

The mining engineer, when examining a property for a prospective purchaser, holds a relation to his client as close, as exacting, as distinctly ethical, as does the lawyer or the physician to his client. He is, perhaps, more subject to temptation than any other professional man. If purchasable, he may be bribed to make a favorable report on a worthless property, fleece his client, but fill his own pockets with the price of his reputation. He must be ever on the watch to prevent being duped into reporting favorably on a "salted mine." On the other hand he must not be so conservative as to turn down really good properties. He cannot see through solid rock, but he must have, as it were, a nose for ore. On his report thousands or millions of dollars may be made or irretrievably lost. He must, therefore, be a man of sound, ripe judgment, not over-confident, nor too conservative. Such a man must, of necessity, be a philosopher—not a recluse nor a metaphysician, but a man who has a broad view of life, who can judge character, motives and intent; who can divine why the owner is willing to sell—because the mine has been worked out, or because he really has not the necessary capital to continue development work.

High personal character and lofty ideals as to professional ethics should distinguish the mining engineer. While

the professors of law and of medicine are recognized by law, while mine inspectors are required to pass an examination showing their fitness for the work, and even street peddlers must secure a license, yet the engineer has no professional status under the law. The mining engineer may practice on any one whom he can persuade to accept his work. The public at large has no way to determine whether he has made any preparation whatever for a professional career. The great engineering societies, recognizing this defect, try to remedy it by making membership in their societies a passport to a good professional standing. This is, however, not sufficient. There should be legal restriction upon those who desire to practice engineering as there is upon those who desire to practice law or medicine. In Illinois, for example, no man can legally practice architecture who is not certified by the State Board of Examiners as a competent architect. In the mining states it would be a great boon to the investing public if all who desired to practice mining engineering should first be certified by a State Board, either through direct examination or on general professional experience as competent mining engineers. Such action would go a long way towards eliminating mining frauds and fake promotion schemes; besides it would place the professional work entirely in the hands of competent men, who would strive to uphold the dignity and ideals of the profession. It would further eliminate the unfit because it would show to the public at once who the fit and the unfit were.

Like the regular army, the industrial army is composed of commissioned officers, non-commissioned officers, and privates. The privates must, in either army, be taught their duties by practice under the guidance of trained officers. In our present organization the commissioned officers are trained in our schools of mines, but, with the exception of the new school at Platteville, there has been no attempt by the state or by the general government, to train the non-commissioned officers, although this is a branch needing attention fully as much as any other. Fortunately, through private enterprises, begun in the coal districts of Pennsylvania by the International Correspondence School, there has been developed an influence for the better training of practical miners in comparison with which the entire efforts of the state and nation pale into insignificance. Such work, however, should not be left to private enterprise, good though it may be. The states interested in the mining industry should, as Massachusetts is now doing, through her Industrial Education Commission, investigate the need of secondary technical education and solve the problem, possi-

bly, as Wisconsin has done, by the organization of practical schools in the mining camps for the training of practical miners, by increased aid to schools already existing, or by the organization of experimental plants to aid in the solution of the problems confronting the mining industry.

In most educational work we begin at the bottom, as it were, and work upwards trying to develop a young man up to a certain standard. In mining engineering education we are forced to proceed in the opposite direction. We are shown by the profession what grade of efficiency a young graduate should possess. Given this standard we are obliged to work backwards and to force into a four year curriculum the necessary amount of training. This squeezing process results in a heavy, rigid course with numerous failures, but it produces good mining engineers.

The action of the General Electric Company at Schenectady, New York, and the Westinghouse Electric Company at Pittsburg, in taking electrical graduates into their works for additional training, suggests the close relationship which should exist between the engineering school and the profession. At the present time there is no such relation existing between the mining school and large mining companies. Such a relation could, in many cases, be entered into with profit. However, there is another way to bring about the desired connection, that is by equipping the mining schools with extensive experimental plants, to do for the mining industry what the Agricultural Experiment Stations do for agriculture.

Millions of dollars have been wasted on mills that were ill-adapted to the ore to be treated. The reason for such waste is that there are few opportunities for exhaustive tests to be made so as to determine the best method of treating a particular ore. To be sure, there are private testing plants, like those in Denver, but they are by no means complete in their work, nor authoritative in their results. In order to make the relation as close as possible the mining schools, as far as practicable, should have large, complete and well equipped testing plants, so that ore, in carload lots, could be thoroughly and scientifically tested so as to determine, beyond question, the method of extracting the maximum values. If such plants were open for the use of practicing, mining engineers and owners could send their ore to be treated, not only would there be the most cordial relation between the school and the mining industry, but both would be immeasurably benefited.

Finally, to recapitulate, mining education as a national question, has never received the support and attention it richly deserves. Recent events, however, contain hopeful signs for the future. There is much work to be done, not only in developing the high grade schools, but in fostering education for the practical miner, in elevating the mining profession to a higher plane than it now occupies, in securing both from the states and from the general government greater financial support, and in bringing the mining school and the mining industry into hearty co-operation for their mutual benefit.

What Can the Profession Really Expect from the Mining School Graduate?

BY MILNOR ROBERTS, SEATTLE, WASHINGTON.

The preliminary training that was received by mining engineers who are now successfully practicing their professions varied widely in different cases. Some men gained their knowledge and skill wholly from experience and individual study, others had a collective scientific course for a foundation, while in recent years many have graduated from mining schools. A consideration of these wide variations leads to one of two conclusions: either the qualifications of a mining engineer do not conform to a fixed standard, or else if any criterion exists it is not accepted the world over. Assuming that there is only partial truth in the former conclusion, regarding the latter it must be admitted that within certain limits there is a considerable lack of uniformity and agreement of ideas.

Mining engineering is acknowledged to be one of the most difficult professions in which to prepare. The various problems arising in it would require for their exact or perfect solution a knowledge of many branches of engineering as well as of other professions, sciences and trades covering a wide range. To master these many useful adjuncts to the principal training before beginning to practice would cause unwarranted delay, besides being impracticable. Therefore one must choose first the absolutely necessary portions, those on which future knowledge may be built and those which would be difficult to attain later.

The question "What can the profession really expect from the mining school graduate," can first be answered in a general way. The most obvious purpose of a mining school is to teach not only the principles of the sciences and of engineering but also the technical subjects needed by a mining engineer. Men of the profession are in the best position to say what training is most useful to meet their duties and they can with propriety ask that preparation shall be in accordance with their opinion. In other words, the profession can reasonably expect from the mining school graduate whatever it reasonably demands in his education. To criticize the results of this training without indicating how it shall be obtained or considering the methods now in use seems illogical. Proceeding on this assumption, it is profitable to discuss the kind of preparation needed and to state what amount of it seems most desirable.

Preparatory schools, high schools and academies in all parts of the country give practically the same instruction, resulting in, or rather, largely on acount of nearly uniform college entrance requirements. There is general agreement among our institutions of collegiate rank as to the studies needed in the first two or three years of an engineering course. In the upper class and graduate years, however, and in the vacations there is opportunity for choice of subjects and of the length of time allowed to each.

The quantity of preparation evidently varies with the time taken to acquire it. But unfortunately experience has shown that a steady diet of this intellectual food when continued overlong becomes not only unpalatable but indigestible. This is true from the very nature of mining, where familiarity with natural conditions which cannot be reproduced or forcibly explained in the laboratory is a necessary qualification of the engineer. Now if there is one thing that a mining student ought to avoid it is a predigested food, hence the value of imitating those features of ancient times who alternated games and dances with their courses of food, in order to help digestion and whet their appetites. Vacation courses, summers spent in mining and tours of inspection are recognized as useful aids to the assimilation of laboratory and class room knowledge. If the field experience which may be gained partly before and partly after graduation is considered part of the preparation, it is impossible to draw a line at which instruction may be said to end and practice begins.

Regarding the kind of training most desired, the benefit of a broad foundation reinforced by sterling habits of work rather than a specialized structure without the latter bracing is generally recognized. Its value is emphasized by the fact that to a greater extent in mining than in other industries the exact technical studies which will prove useful immediately cannot be foretold except for a particular district or a certain branch of the work. Furthermore, it may be convenient or necessary at some later time to take up a different branch from the one originally intended. A student who can devote an extra length of time to preparation should be warned against the mere collecting and memorizing of information on a number of more or less parallel technical subjects. An investigation requiring original effort will prove of greater interest and will show the need of advanced study and continuous reasoning.

Among the qualities which may rightfully be expected in the graduate is accuracy of observation within the limits

of his knowledge. For example, a student with only a few months of field experience who attempts to describe an occurrence of ore may not realize the bearings of the facts he himself observes, or he may even fail to observe certain relations which would be apparent to a trained eye. But on the other hand whatever notes or sketches he makes should be reliable.

Coupled with the quality just mentioned is the trait, especially commendable in a young engineer, of having an accurate estimate of one's own capabilities. There need be no confusion of this judicial frame of mind with weakness, or the fear of failure in an undertaking. For instance, the examinations of even a small mining proposition may involve questions of mining law. A wide-awake young fellow would be expected to learn this fact and at least call attention to it, even if he could offer no advice on the subject. Sometimes the problem in hand contains commercial factors which demand more business experience than a graduate has had time to accumulate. General principles and sound reasoning are not always of much assistance in answering questions of mining law, especially where local rules intervene, nor are they applicable to every transaction in business. We must expect, then, to find inexperience in such matters the rule rather than the exception with graduates.

It would seem that the only logical basis on which the subject of a mining school graduate's qualifications can be considered is that he is to be concerned with the working of a *mine*, no matter of what sort. It is difficult to compare the running of a soft iron ore mine in Michigan with one of Colorado's high grade silver properties but the underlying principles of the operation, the life of the task and the spirit of the workers is the same at each. In so far as the young engineer stationed at either mine, while fulfilling his own duties, loses sight of the aims of all parts of the operating system and their mutual relations, he is failing to qualify himself for an active charge. In order to have a clear understanding of the mine it is absolutely essential to possess a knowledge of the ore, its probable life and the methods of mining and treating it. The profession can demand that these latter points shall be made of the first importance.

If the above view is held the recent graduate may be excused for ignorance of other technical subjects which in themselves may be as available as those mentioned. It may happen that a mine needs only transportation facilities to put it on a working basis. An aerial tramway is suggested

and the engineer is called on for drawings. A graduate should be able to show clearly whether or not the plan suggested would meet the needs of the situation. His map and profile of the route should be acceptable and his specifications should bear weight. But unless he has had considerable experience with tramways, only slight reliance could be placed on his opinion regarding the advisability of installing it exactly as designed in the particular place in question. Even a graduate would hardly have risked his reputation by designing an aerial tram such as was recently ordered in the state of Washington, with masts and a knuckle tension station located on a glacier. As another instance, suppose that the deciding element in the plan is the treatment of the ore by some metallurgical process of recent invention. The graduate might not be familiar with the working details of the process but he should know of its existence and should be able to inform himself concerning it.

Opposed to the cases just described is the one where the engineer in charge builds an excellent tramway to a property or constructs a creditable mill upon it, only to find that the composition of the ore is not exactly as stated in the information furnished to him when he assumed charge and, therefore, a different system of treatment must be adopted. For a mining engineer to depend on anyone, except those working under his instructions, for information on the nature of his ore and the possible methods of recovering the values, seems an anomaly. To use a mild parody, "the mine's the thing."

There is an apparent exception to this rule in the case of a well established mine in which the ore is thoroughly understood and the principal need is for an ingenious mind to devise methods to lower the costs and increase the output. However, no mine has yet been found which will not bear watching. The need of a geologist's eye on the ore in a mine of this type opens a splendid opportunity to the mining graduate. He can show his skill at "reading the signs" and reporting them to the consulting engineer, and at the same time make himself useful in other capacities which will bring him experience.

On acount of the conditions under which most mining is carried on and because of the fact that it cannot be made an exact art to the same degree as mechanical engineering, for instance, the mining engineer, even when in a subordinate position, is more dependent upon himself and less subject to instructions and guidance than men in other cor-

responding professions. For these reasons it is a greater step from the college to the mine than most other fields of labor. Some of the large mines furnish an ideal entry to professional practice and judging from incidents of the past few years mine owners have found that the benefits of the plan are mutual. Mining graduates in such situations will be useful in proportion as they are given a chance at tasks belonging strictly to their profession.

One of the demands which can reasonably be made is that students shall be familiar not only with the daily routine of a mine, the arrangements of shifts, the pay system and so forth, but also with the reasons governing these affairs. Information of this character is usually included in the mining curriculum but it should also be mastered at first hand. A summer spent underground will yield a student little benefit if he does not carry away a clear understanding of how the day's work was done.

It would be a great boon to the profession if a graduate, chosen at random could be intrusted with the charge of men. Unfortunately it has been found in the past that only one young man here and there can fill the job of boss. The knack of handling a group of workers to perfection is said to be a talent but it is none the less true that a person can school himself to it with very good results. With the latter object in view, students looking for vacation employment are advised to try for positions in which they can learn the art of superintending fellow workmen. If a graduate shows a lack of capacity in this direction, his superior should give him every opportunity to overcome his weakness, because he will be undependable while it lasts.

Students today obtain much more practice in the methods of handling men than they did formerly. With the systematizing of all lines of business and the adoption of units related to one another as the blocks in a pyramid, has come the present methodical arrangement of college work. In class reports, in laboratory tests and on the athletic field there is plenty of opportunity for co-operation and the subdivision of labor. There is no reason why a graduate should not be able to keep or to oversee the keeping of time-books and cost sheets, especially after a brief period of instruction in his duties. These positions give their holder a clear insight into the details of operation. Needless to say an engineer would not wish to devote to this character of work a large part of his time for an indefinite period.

Specialization has produced as remarkable results in mining as in other technical branches. As experts in vari-

ous lines are being employed more generally from day to day to contribute their best efforts to the working out of a mining proposition, it becomes highly necessary that there shall be an equally skillful man who can direct the efforts of his co-workers to the greatest mutual advantage. The mining students of today, who are to accomplish this in the future, need the advice of those who are now obtaining results. If the active mining engineers will generously point out the way, the younger generation seems quite able to follow at good speed.

Secondary Technical Education Applied to Mining

BY LEWIS YOUNG, ROLLA, MISSOURI.

The prospector who cannot identify the common minerals, who knows nothing of geology and assaying, is today at a great disadvantage; the machine man who does not understand something of the mechanism of the rock drill is an expensive nuisance; the mill foreman who cannot make simple tests on the ores he is treating usually saves only a small percentage; the coal mine foreman who cannot produce coal cheaply without endangering the lives of the miners can no longer find employment; the mine superintendent who knows nothing of mining geology may find some new ore bodies but he will have the odds against him. The great coal and metal mining camps of the East and of the West require thoroughly competent, ambitious men for positions of responsibility in mine, mill, and smelter. The man who knows nothing of the technical and scientific principles underlying the industry will continue on the pay roll, while the man who knows "how" and "why" receives a salary.

In the mineral industry there is a great demand at the present time for men who have received a thorough college training in mining and metallurgical engineering. Many first-class mining schools, colleges, and universities offer three, four or five-year courses to train men in the sciences underlying the industry and in the application of these sciences to practice. Graduates of these courses find employment as assayers, chemists, surveyors, draftsmen, foremen, superintendents, and managers of many of our large mining companies. These college graduates and the institutions which have prepared them for their life's work have played an important part in the development of mining and metallurgy in this and many other lands.

However, side by side with the college graduate is found working many a man who may have lacked the opportunity to study mining or metallurgy in college and who does not write E. M. or Met. E. after his name. Many of the leading men in the mining profession have by hard work, personal study, and persistent efforts prepared themselves outside of college and are qualified to rank with the best of the college bred men.

Many worthy men who have availed themselves of every opportunity to study the principles and the science

underlying the routine tasks in the mine, mill and smelter have risen from the ranks and hold responsible positions as foremen, assayers, or engineers. These men become more valuable to their employers in proportion as they understand what they are doing.

The call for college graduates will continue but there is also a growing demand for men who have a fair mining education—men not of necessity graduates. To provide such training there must be "Secondary Technical Education Applied to Mining."

Courses of Study.

You are all undoubtedly familiar with the great influence of the Secondary Technical Education on other industries. That it is of at least equal importance in the mining industry no one will deny. Recently Secondary Technical Education has received considerable attention in both coal and metal mining. The man who desires to secure a mining education without spending four years at college, (1) may take a two-year course in mining at any one of a number of good mining schools; (2) may take a short course (several months) at some mining schools; (3) may attend a night-school; (4) may attend local mining clubs and institutes; or (5) may study by correspondence. Correspondence methods are discussed at length in another paper, and therefore, receive no further mention in this paper.

Two-Year Mining Courses.

Many of the mining schools recognize the fact that they owe it to the industry to assist men who cannot find time to complete the courses for the college degrees. Such men may be interested in mining because of investments and may desire to secure knowledge in some special line in order that they may look after their own interests more satisfactorily; others may be mine operators who have difficult problems to solve and who have discovered the value of a knowledge of some science; still others may desire to qualify themselves for a respected and more remunerative position which requires a specific knowledge and training. To such ambitious men many institutions of learning gladly open their doors and waive entrance examinations, and many college rules, provided these men are of some specific age, of good character, and demonstrate their ability to profit by their opportunities.

The Missouri School of Mines has for over twenty years been of assistance to many practical men in this way and

in many instances these men after completing a short course have taken a full four years' course and qualified for a degree. Other institutions have had a similar experience.

In the West and Northwest there is a growing demand for educational opportunities by men actively engaged in mining. The popularity of such courses is shown by an article which appeared in a metropolitan newspaper of the Northwest: "Since the course was established it has grown in popularity among the mining men of the Northwestern states and those of British Columbia, and each fall there is an increased number of inquiries from mining men for detailed information about the course and the scope of instruction which it covers. This year twenty-six mining men registered in the shorter course, coming from the various grades of work in the widely distributed mining fields of the Northwest. One has been a smelter superintendent; another has been a mine foreman; others are property owners who desire practical instruction in the development of their properties in order that they may prosecute their work to the best advantage. Others are men who have worked in mines more or less and expect to return to their several localities with the opening of work in the spring with a better knowledge of the technical details of mining; still others are young men who are just starting in a full four years' course at the university, but plan to return to the university another winter and take advanced work along mining lines."

Short Courses at Rolla.

The prescribed two-year course in mining and assaying at the Missouri School of Mines and Metallurgy includes in the first year the following subjects: Higher Algebra, Solid Geometry, Trigonometry, English, General Chemistry, Qualitative Chemical Analysis and Mechanical Drawing; in the second year: Surveying, Mineralogy, General Geology, Assaying, Quantitative Chemical Analysis, Mining and Ore Dressing. Other subjects may be taken if the student is properly prepared and shows good reasons for not taking a regular course.

These short course men are very diligent, ambitious and thoroughly practical and usually have a good influence on the study body because of their practical knowledge and diligence. At some of the other mining schools the studies of the short courses are entirely optional and the character of the work is determined by the student's experience and ambitions.

Coal Mining.

In coal mining especially there is a demand for men thoroughly acquainted with mining methods, mine ventilation, mine gases, mining machinery, etc. Most of the states require coal mine officials to pass examinations in order to demonstrate their fitness for a given position. To qualify for these examinations requires careful study, a thorough knowledge of elementary mathematics, the mechanics of mine ventilation, the chemistry of mine gases, the elements of mechanical engineering, some mechanics, and a knowledge of physics and other sciences. It is not surprising, therefore, that Secondary Technical Education has progressed very rapidly in the coal mining districts.

In various parts of the state of Pennsylvania, the following methods of Secondary Technical Education in coal mining are in vogue: Correspondence courses, lecture courses by mining employes, mining institutes conducted by Young Men's Christian Associations, day and night schools at technical institutes, and special and two-year college courses.

Bituminous Mining Clubs.

It is especially interesting to note the progress and success of the work of the industrial and educational departments of the Young Men's Christian Association, both in Pennsylvania and in other states. The bituminous department, with headquarters at Greensburg, Pa., has organized "Bituminous Mining Clubs" and "Institutes" with the plea that "Technical and Moral Education makes a man more efficient in the position he occupies, gives him greater earning capacity, is a requisite element in success, and brings deeper enjoyment to the industrial life."

The men who teach or lead in the study of mining at the coal mining clubs, are mine foremen, fire-bosses, engineers, or other practical men about the mines, depending upon what a club wishes to take up. A club meets at least once a week in the Young Men's Christian Association rooms or in rooms furnished by the coal mining companies. Once every two or three months a "Local Institute" is conducted. District Mining Institutes are held annually, the program consisting of papers on various phases of mining, presented by prominent mining men, of addresses on mining topics, and of the discussion of mining club plans.

The bituminous region of Pennsylvania has been divided into eleven districts. The institute committees are composed of state mine inspectors, superintendents, engineers, etc.; in all, about four hundred leaders over the

region on all of the committees. It is estimated that at the present time there are one thousand men studying mining through these clubs in western Pennsylvania.

Y. M. C. A. Metal Mining Courses.

The Young Men's Christian Association has planned a similar system for other coal mining districts in the East and in the West. In Colorado and Utah definite courses are to be offered this winter in metal mining camps. The Salt Lake City Young Men's Christian Association offers a number of courses that are of interest to mining men, including two courses in Chemistry, two in Electricity, one in Metallurgy, one in Mining, one in Trigonometry, one in Surveying, and one in Topographical Drafting. Chemistry and Metallurgy are taught on two nights a week by demonstrative lectures; Mining is taught by a series of lectures. Surveying involves Saturday afternoon field work and one night for the compilation of field notes. At the present time the enrollment in each of these classes averages twelve men.

The two objectives of these Young Men's Christian Associations' courses are:

"First:—To enable the worker to increase his knowledge and skill and thereby increase his earning capacity and to fit him for larger work and a better position.

"Second:—To increase his knowledge and ability in the position which he now fills, even though his present work may not actually demand this increase of efficiency."

In many of the mining camps the first educational work of the Young Men's Christian Association is really of a primary nature. In one of the mining camps of the San Juan district of Colorado, one association is teaching twenty-three Greeks to speak English. At another camp in the same district the classes include men of seven nationalities. The work of the Young Men's Christian Association in these camps is slowly telling and demonstrating that there is a great need for Secondary Technical Education in the mining camps.

Methods.

Methods of technical education are changing and improving rapidly. In no division has greater advancement been made than in agriculture and in agricultural education. That engineering and mining schools have as able and progressive educators, no one will deny, but the fact remains that, as a class, the agricultural educator has accomplished more during the past ten years than has his mining colleague. It is to be especially noted that Secondary Techni-

cal Education in Agriculture has received much attention. The results speak for themselves. The Farmers' Short Course, the Stock Show, the Dairy School, the Corn Show, the Farmers' Institute, the Corn Special and the other means of disseminating information regarding the farm and farm products have enabled the agricultural schools to come closely in touch with the industry, have materially improved the quality and the quantity of farm products, and have been factors of economic importance to the farmer, the dairyman, the stockman, and the horticulturist.

Mining Experiment Stations.

One of the leading educators in agriculture on being asked to explain the phenomenal advancement in agricultural education replied that in his opinion the progress and the growth were possible only because of the methods of education used and because of the agricultural experiment stations. These latter offer almost ideal opportunities for demonstrative work for the student, permit of investigation and research, and enable the educators to work out problems of scientific and economic interest. Without the experiment station, our schools of agriculture would be almost useless as judged by present day American standards, and it is because of the experiment station that the methods used in Secondary Education in Agriculture have been so eminently successful.

Recently two engineering experiment stations have been established by states of the Middle West. It is generally conceded that these stations will not only assist in the solution of problems in engineering, but they will also materially improve the quality of engineering education.

The mining experiment station is not a new idea, nor a fanciful one. There is much experimental and testing work awaiting the opening of such plants. There are refractory ores to be tested and there is drilling machinery to be tried; there are safety appliances to be demonstrated and electrical smelting is to be adapted. Many other lines of investigation could be pursued which would make possible important advances in the industry. When such mining experiment stations will have been established at the various state mining schools, it will be possible for mining educators to assist the mining industry as agricultural educators have helped agriculture and at the same time the equipment and facilities for teaching will be greatly improved.

Future.

The advances made in Secondary Technical Education in mining are thoroughly creditable to the individuals and the institutions which have been doing the pioneer work. The success of the courses which have been offered and the demand for technically educated men for subordinate and secondary positions have fully demonstrated that Secondary Technical Education in Mining is not only practical, but necessary.

The state institutions, however, require support from the states and the nation so that the men desiring a secondary course may have at least equal advantage with the college man.

The American Mining Congress is in a position to exert influence in behalf of the schools offering short courses in mining, in establishing local mining institutes and in establishing state mining experiment stations. The agricultural experiment stations receive both state and federal support; the mining experiment stations should be supported similarly. The Farmers' Institutes are usually supported by the states in which they are held. The Legislature of Missouri makes an appropriation of five thousand dollars per year to the State Board of Agriculture for this purpose. The Agricultural College helps out, by supplying lecturers in the person of its teachers, without compensation, the Board of Agriculture bearing their traveling expenses to and from the institutes. The Department of Agriculture at Washington details some of its officers to work of this sort, but there is no federal appropriation directly for this purpose.

With additional teaching facilities at the various mining schools, with first-class mining clubs and mining institutes similar to the Farmers' Institutes and with mining experiment stations in each mining state, Secondary Technical Education can be much more effectively applied to mining.

Relation of the Mining School to the Mining Industry

BY ROBERT H. RICHARDS, BOSTON, MASS.

It is taken for granted that the mining industry is the chief thing and that the school exists to help the industry. A difference of opinion may exist as to how this should be done.

The mineral industry has such a strong bearing on the welfare of the community that it is well to dwell upon this relationship a moment before taking up the main thread.

The miner brings the ores to the surface, the smelter separates the metals, metals without which there can be no advancement in the community, no civilization. What did the stone age man have? A stone hammer, a stone knife, a stone arrow head, a tent of skins. He had advanced as far as he could without metals. We are so accustomed to use metals and articles manufactured of metals or by means of them that we do not think of the immense advance that has been made in consequence of the work of the miner and metallurgist, and of the wonderful age in which we live.

If we look about this room every metallic object in sight has been made from ore got by the miner and refined by the smelter. Every object in wood, glass, pottery, plaster, cement or other material than metal has been gathered, shaped and finished by tools of metal. And again, the business of mining and metallurgy furnishes a great field for gaining a livelihood. Great numbers of men are employed in the ranks of labor and of the skilled mechanic, considerable numbers also in engineering, management, financing of mines, also the mercantile pursuits to furnish supplies. Finally, as an investment of funds, the successful mine is among the most profitable of investments, and the unsuccessful mines may be no worse for the stockholder than the unsuccessful rail or manufactory.

The points of contact between the community and the mining industry are then varied in kind and many in number. For economy in the world's work, for best results in quickest time, all forces tending toward the same end should work in harmony, each doing its own part. This is the case with the mining industry and the mining school. Mining plants should be ready to supply certain necessary experience to students the school cannot give. Hence the need of mine practice. It cannot do the whole work without

great waste of time. Hence the need of school training. There should be a cordial relationship between school and mine.

The school asks the mining industry to take its pupils and be patient with them for a little time until they acquire the experience with men in command and men employed, things that no school can teach. A few vacation months at a mine, mill or furnace is worth a great deal to help a student appreciate the value of his school work, to clinch his knowledge, to make it a useful tool, and work off his crudity.

The universal verdict is that a student leaving a school should spend a year or more at work at mines or furnaces doing laborer's or mechanic's work. He not only gains the knowledge of things by contact which the school failed to give him, but and still more important, he gains knowledge of men. A man to direct others must know what the other man is thinking of. The young man who began as a laborer knows this from his own experience. The young man who did not so begin, is at a great disadvantage. Therefore we ask the works and mines to have a little patience with the young beginners just out of school. Many works are already doing this in a very liberal way, and I wish here in behalf of the schools to present our thanks to those in charge of the mining industry for the fine way they are doing this. We ask further that those in charge of industry forgive the occasional misfit which the young school man makes and do not charge off his misdemeanors and mistakes as a universal attribute of school men.

Besides the knowledge of things by contact that a student can learn at the works, the sense of responsibility he acquires is of immense value. It is impossible to give in the school the sense of impending fate which impresses facts on the brain in mines and furnaces. A furnace man must get his 300 tons a day smelted or lose his job. A miner must get his pump running in three hours or the pump will be drowned, and the mine flooded. This kind of active work and experience is a great teacher.

What now may the school do for the works in return for favors received? Those in active work with the constant and incessant demands upon them have little time to investigate problems and to seek for the underlying principles on which the most perfect solution may depend, or to find what others at a distance are doing in the same line, and if they are self-made men, they are probably wise in experience, but weak in mathematics. In most mines there have been short periods of depression because of failure to grasp some

salient point which a trained engineer would have seen.

The school teaches the alphabet of machinery and processes of fundamental knowledge just as useful here as the real alphabet is in working out words in a dictionary. The mining school cannot give the experience, but can give the training in mathematics, physics, chemistry and drawing, and it can give the pupil access to the accumulated fund of professional methods of all time. This leads us up to the school's main duty to the mines and works. If a school can inspire enthusiasm for the profession in its pupils and can bring the pupils to the point where they have love of knowledge, love of accuracy, love of industry, it has led its pupils to a point where they are ripe to become engineers, for they will be naturally seeking problems to solve and solving problems when found, problems in excavating, in sorting, in tramming, in hoisting, in dealing with men, problems in moving materials, in concentrating ores, in economy of waste, in retreating waste, in dealing with the markets, in handling the property to the advantage of the owners, and indirectly, of the community.

The student must acquire a love of knowledge, a love of accuracy and a love of industry. We expect the school to develop this in him. How can the school do this? It can only do it by making the problems the school sets before the pupil real, live, interesting ones. A real problem as new to the teacher as to the pupil has the greatest power to awaken enthusiasm in the pupils. Every small problem solved in the school laboratory whets the appetites for greater ones in the field.

The school has to make things real to most of its pupils who have never seen a mine. The pupil who goes to the school from the mining region while he is an apt pupil and interested in the profession, he is unbalanced by giving more value to the details in his own district than to fundamental principles. He must be balanced up by showing him the value of fundamental principles and the differing practice of other districts. The school must be so organized to help both kinds of students. One of the best things the mines and works can do for the schools is, when the teachers bring their students on visits, let the teachers know some of the real problems the profession is struggling with so the teachers can get into the spirit of the game, and carry back problems to work over at the school, thus getting inspiration for their work which they pass on to their students. Furnish them specimens, samples, drawings, photos. Students become immensely interested in actual

needs if something they do is going to count. It makes the profession real, a living interest to them.

The school contributes to the success of the mining industry, the mining industry is vital to the success of the community, and therefore the community must support the mining school.

Some Suggestions Concerning the Training of Mining Engineers

BY ROBERT PEELE, NEW YORK CITY.

For some years past the subject of engineering education has received much attention from both teachers in technical schools and practicing engineers. Many able and illuminating papers have appeared in the transactions of technical societies and the engineering press. The authors of some of these papers have dealt with questions relating to preparatory training for the engineering schools; others with questions as to what subjects should be comprised in the course of study and the best methods of teaching. There have been lengthy discussions concerning how much and what kinds of practical instruction and laboratory work should be given in the schools, and whether these should precede, accompany or follow, the presentation of the theory.

The subject is of the greatest interest to engineers and employers as well as to instructors and pupils of the schools. As might be anticipated there is considerable diversity in the opinions that have been expressed. These differences of opinion, however, are unimportant as regards instruction in the fundamental subjects, such as mathematics, physics, mechanics, chemistry, draughting, etc. They are noticeable chiefly in discussions as to the character of the training in the later years of the course of study; and to what extent it is feasible or desirable to introduce into the curriculum such practical work as might materially shorten the young engineer's novitiate, by bridging over the often unprodctive period intervening between the completion of his school training and the time when he shall have really become fitted to assume his place as a capable practitioner. An urgent insistence upon the necessity of making the course of study as practical as possible comes not only from managers of works, but also from the older engineers, to whose lot usually falls the duty of imparting to their young brothers post-graduate instruction in field methods.

Graduates of engineering schools are but the partly elaborated raw material from which engineers are developed and many find themselves unable at first to grapple successfully with the practical details of their profession. The fault is usually laid at the door of the schools themselves, on the kind of instruction given in them and the shortcomings of the members of the teaching staff. But

this view does not, I think, cover the case. There are just as great differences in the mental characteristics of the crowds of young men, who every year besiege the schools for admittance, as among those who strive to enter any other professional or business career. Some choose a course in engineering not only because they are thoroughly in earnest but also because they have exhibited a genuine aptitude for it; others drift in, with no particular bent or inclination for engineering studies; while a few enter against their wills, at the desire of their parents.

During the first year or two of the course a weeding out process eliminates some of the poorer students, who are mentally inferior or who neglect their work. But this process of natural selection is often stifled, or at least not allowed sufficient freedom to work its results. If untrammelled or actually assisted in its operation, an improvement in the average quality of engineering graduates would be brought about. It should be part of the duty of each instructor to observe the capabilities of the students under his charge; to encourage where encouragement ought to be given, and to dissuade some from attempting to pursue farther a career for which they appear to be unfitted. I am aware that this is a difficult function to fulfill, especially because, at the end of the first year, or even the second, the student may not yet have "found himself."

A young man who has entered an engineering school may be an earnest student, and still lack the particular aptitudes necessary in an engineer. He may be able to pass a satisfactory examination in theoretical chemistry, without possessing the qualities essential to success in the quantitative laboratory; he may be a neat and accurate draughtsman and yet find difficulty in applying the laws of mechanics and of resistance of materials to the simplest problem in machine design, having an imperfect conception of the proper proportions and inter-relations of parts; though excellent in analytical geometry and the calculus, he may yet be deficient in common sense without which none can hope to become a successful engineer. Nevertheless, granting the difficulty of giving the doubtful student sound advice in so important a matter, affecting as it would his whole future life, much might be done by a wise interference before it is too late to avert serious discouragement and disappointment.

Two further considerations are: The unfavorable effect on the morale of the body of students in a class, produced by the incompetency and lack of interest of even a few; and the waste of the instructor's time and energy in his

endeavor to keep poor students up to their work. Poor students require far more help and attention than good ones, and the instructor's efficiency is wrongfully reduced by having to push the unwilling or incompetent to a graduation which may barely escape failure. An adverse element of the problem of dealing with students of this kind is the desire of every school—of both governing board and teaching staff—for large enrollments. The privilege of showing each year a gain in numbers is sometimes considered of more importance than evidence of improvement in the quality of the graduates.

The first year curriculum in many engineering schools is substantially the same, irrespective of the branch of engineering taught. In a few, where several courses are maintained, leading to different degrees, the first year studies are identical, or nearly so, for all the courses, whether civil, electrical, mechanical or mining engineering. In these cases, marked differentiation of the courses begins with the second year, the divergence becoming greater and greater in the subsequent years.

Our practice in the mining schools of this country is to take the graduate of the high school or preparatory school, at the age of 17 (preferably 18) years, and give him four years more work in those branches of study that experience has indicated to be essential or desirable in the training of the mining engineer. The greater part of the first three years is devoted to mathematics, mechanical draughting, physics, chemistry, geology, mineralogy, surveying, etc., together with certain civil, electrical and mechanical engineering subjects, all with their accompanying laboratory work. Generally, some of the elementary mining courses are given in the third year, but most of the mining and metallurgical work falls in the last year, together with the advanced subjects of the other engineering branches. The distinctly mining courses occupy say one-third of the lecture recitation hours of the third year, and form one-half to two thirds of the hours in the fourth year. About three-quarters of the total afternon hours of the fourth year are usually occupied by laboratory work in ore-dressing, metallurgy, mining design and to mining thesis or project work.

In the best equipped mining schools a large part of the first two vacations is devoted to field surveying, lasting, say twelve to fourteen weeks. Some time in the second vacation may be given also to field work in geology and at mines and metallurgical works. The last vacation is taken up mainly by study or work in the mines, to which may be added several weeks more of field geology and visits to metallurgical

and ore-dressing works. The periods available for these branches of field study usually range in the aggregate from eight to ten weeks. In many schools the laboratory work of different kinds, including draughting and engineering design, occupies all the afternoons of the week except Saturday. In some Saturday afternoon is also utilized. Nearly all of the preparation for recitations, and the study of lecture notes with collateral reading, must therefore be done in the evenings.

It is generally recognized that the course of study leading to the degree of Mining Engineer is broader than that for the other engineering branches, in that it must contain a greater variety of subjects and in this sense cover more ground. This very fact would seem to militate against thoroughness of instruction in each of the individual subjects. Besides the mathematics, natural sciences and the specifically mining subjects, instruction must be given to a limited extent in civil, electrical and mechanical engineering, since all of these have their part in the equipment and operation of mines and reduction works. Thus, under civil engineering would fall the Theory and Practice of Surveying, including the elements of Railroad Surveying, Resistance or Strength of the Materials of Engineering, Graphic Statics and Hydraulics; under Electrical Engineering, the Principles and Elements of the Dynamo, Direct and Alternating Current Machinery, Principles of Electro-Chemistry and Electro-Metallurgy; under Mechanical Engineering, Mechanical Draughting, Engines and Boilers, Engineering of Power Plants and related subjects.

These courses, with their accompanying laboratory work, may be provided for in two ways, according as the mining school stands alone as an independent institution, or forms a division of a larger organization, such as a university or general technological institute.

In the first case, the maintenance of adequately equipped departments of instruction for the different engineering subjects constitutes a serious problem, on account of the large first cost and the running expenses of laboratories and the size of the requisite teaching staff. Not all of the mining schools of this class, therefore, can offer efficient courses in these allied branches of engineering.

In the second case—as in some of the best and most thoroughly organized institutions—the mining school is one of a group of technical schools. Each school has the equipment necessary for specializing in its own subjects and the mining students have the advantage of receiving their

instruction in civil, electrical and mechanical engineering from these respective schools or departments.

Thus the system of instruction as it actually exists in mining schools has grown up under several influences, such as: the mode of organization and size of the school, depending largely on its financial support; its location, whether in a mining region, or at a distance and forming part of a university or other institution with an extensive equipment; lastly, its chosen field, that is, whether the instruction is intended to include only the subjects most closely related to mining and metallurgy or whether it shall afford a broader training, in which the fundamental sciences are more emphasized, in preparation for and relation to, the study of mining engineering.

With this brief review of what composes a course of study in mining engineering, we may now consider the results obtained, and inquire as to how far the schools succeed in imparting a satisfactory education. It is evident at the outset that the course is a severe one. It has become so gradually. Twenty-five or thirty years ago, when electrical engineering as a study was barely thought of and when mechanical engineering was far less developed and specialized than now, the student of mining was not burdened with such a multiplicity of subjects. A larger proportion of the work in and about mines was formerly done by manual labor, and the limited variety of mining and ore-dressing machinery made the equipment and operation of mines a simpler matter. The attention of the student was therefore concentrated in a narrower field, in which more thorough work could be done. More time could be given to chemistry, physics, mineralogy, and the applications of these sciences to mining, metallurgy and ore-dressing. On the other hand, it is probable that the graduate of that period had less grasp of the practical side of mining as a branch of engineering. The young men of today are in constant, though often unconscious, touch with the multitude of mechanical devices which play their part in our daily life, and they are inevitably brought into contact in one way or another with engineering works of the most varied description: all of which cannot fail to develop the intelligence of things practical.

But these very conditions have so broadened the field of study that the customary four years' course is in danger of being over-crowded in the effort to keep abreast with the times. If the student's work be done in haste and under a feeling of pressure, his mental vision for the time being tends to become restricted. The development of his deliber-

ative faculties may be impeded by living too much in an atmosphere of facts, for the proper assimilation and arrangement of which he has insufficient time. In presenting some of the engineering subjects undue prominence may be given to descriptions of methods and plant, the details of which vary from time to time as practice changes and advances, and too little to principles on which practice is based. The teaching of facts is one of the lower functions of the instructor, and when it is done without impressing upon the student the reasons for the existence of these facts and their relations to one another, the chief purpose of education are only partially fulfilled.

Undoubtedly the tendency of the present time is to consider the purely utilitarian aspect of technical education as first in importance. The student himself is usually much more concerned about the kind of position he will be able to secure after he graduates and the salary attached thereto, than about the character of the training that will fit him satisfactorily to fulfill the requirements of that position and insure a larger measure of success in after life. Both he and his parents look forward with interest to the time when he shall be able to pay his own way. Nothing is more natural than this point of view, for the period of education is long and its cost considerable. But, in endeavoring to turn out graduates who shall be immediately efficient as engineers and capable of earning good salaries, there is danger of encroaching too much on that portion of the four years which should be devoted to a sound training in those subjects which underlie all engineering; developing the student's thinking faculties and teaching him how to apply engineering principles to the solution of practical problems. Mine managers and others who employ young graduates have in a measure helped to bring about this condition, by expecting to much from the four years of school training. Though many graduates actually do meet the requirements in a surprisingly efficient manner, the early failures are numerous enough to attract attention and arouse criticism.

One reason for this has already been suggested. The young man entering the schools, though of all sorts and kinds, in their physical and mental capabilities, are driven through the course of study at the same speed and supplied with the same routine of work. Even if it were possible so to vary the system of training as to adapt it to each individual case, there would still be some failures. A uniform product cannot be expected from heterogeneous raw material. The exceptional men, who are naturally able and well-

balanced and endowed with the talent of common sense, may make good from the hour of their entrance into the field. Others, by assuming too soon positions of responsibility, attain success only through experience born of early failure. Still others, slower in their development, advance steadily after graduation, gaining experience in subordinate positions, learning to manage men, and so achieve substantial progress by the time they have been out of school a few years. There are also the "round pegs in the square holes;" young men who are unfitted for any engineering profession and who, long before graduation, should have been directed into a more suitable career.

If we are justified in attempting to turn out ready-made engineers, the present methods are not far wrong. The large amount of laboratory practice, and the vacation work and study in mines which have proved to be such valuable features of the course, do much toward familiarizing the student with the practical aspects of his profession. It may be objected thtat the time allotted to the summer class in the mines, as already outlined, is too short to be of much benefit. Experience shows, however, that a great deal is accomplished if this work be properly systematized under competent advice and supervision. The insight into actual practice become valuable immediately after graduation, as well as during the last year of school work.

But may it not be that more is attempted in other parts of the course than can reasonably be carried out? While recognizing the usefulness of the mining school, which has been so fully demonstrated that its graduates are everywhere in demand, we should also concede its limitations. The schools can and do give young men a great advantage over those not possessing such training and who have at their command only what has come within their own personal experience. The student of mining becomes familiar with many resources of information which to the practical man are unknown and therefore not available. But the schools cannot teach common sense, nor impart the invaluable faculty of controlling men and of knowing how to do work efficiently and economically. A not uncommon fault among young graduates is to consider themselves competent engineers, while still lacking the experience that is indispensable in developing maturity of judgment.

The tendency to over-crowd the course of study, caused largely by the rapid advances in every branch of mining and metallurgy, creates a situation difficult to deal with. If, while still retaining the advantages accruing from field

work and study, with whatever else shall aid in attaining a clear comprehension of the application of principle to practice, the fundamental aims of all education shall also be satisfactorily fulfilled, one of two things would appear to be requisite: either to lengthen the undergraduate period, or to revise the curriculum, as it now exists in many mining schools.

I am aware that any proposal to lengthen the time would meet with serious opposition. Four years of well-directed work should be sufficient to start a man in any branch of engineering. By prolonging the period of preparation there is danger that the student will become "overtrained" and less able to adapt himself to the new conditions which will face him in the field. While in the school, his sense of engineering perspective remains only partly developed, so that he is apt to assign undue importance to relatively trivial details. The cultivation of sound, independent judgment and self-reliance in attacking practical problems, must be acquired in the field, when the young engineer is in contact with actual engineering conditions.

Rather than advocate the adoption of a longer course I would suggest as a remedy for the conditions outlined that the list of studies now prescribed in those schools which, largely because of the demands of both employers and students, have become most highly developed in specialized work, be carefully weighed and examined, with the object of eliminating possible non-essentials. Every well-organized, progressive mining school finds it necessary from time to time to revise and readjust its curriculum, but probably still more might be done to reduce the tendency to excessive specialization. If the fundamental science subjects be not mastered in the school, it is more than probable that they will never be mastered in after life. It is quite possible that a part of the work now carried on in the school could well be postponed until after graduation. A thorough drill in principles, developing scientific habits of thought, will carry the student farther as an engineer than if, while devoting less time to these, he had been led to give more attention to the changeable details of practice; for, while still an undergraduate, his acquaintance with the latter will at best be superficial and his ideas often distorted.

In offering these suggestions, I would not for a moment advocate the abandonment of the vacation study and observation in the mines. They are of the utmost importance in leading the student to a better comprehension of the relations to practice of the subjects taught in the school and in arousing and sustaining interest in his work. We do not

want to turn out purely theoretical men, for there is no demand for them. Theory must be so supplemented by practice as to prepare the student for efficient, productive service, early in his career. But the fundamental scientific subjects too often rest under an implied stigma in being characterized as "mere theory," to be later set aside or superseded by something useful, called "practice." Practice illustrates principles..

The theoretical studies in themselves contain the elements of all engineering, and the broader the educational foundation into which they enter as essential constituents, the more effective will be the student's life training in his chosen field. It should be observed, however, that mathematics and the natural sciences must be so taught as to show the student of engineering that for him they are not an end, but a means. They are tools, of which he must learn the uses. His object in studying them is totally different from that of the student who aims to be an investigator in some one of the sciences.

These problems of modern engineering education I believe to belong peculiarly to our mining schools, because of the diversity of the subjects taught in them and the exacting nature of the curriculum. To study the question carefully, as it so well deserves, and to endeavor to improve our methods of instruction, while still meeting the immediate demands made on the young graduate, falls to the administrative and teaching staffs of the mining schools. But mine managers, engineers and other employers of the graduates of these schools, who are certainly not less interested, can do much toward assisting the solution.

With the development of the technical school, the old system of apprenticeship for engineers in engineering offices, formerly in vogue chiefly in Europe, has almost disappeared. It was wasteful of time and is no longer necessary. In recent years, however, another kind of apprenticeship has grown up in many mechanical and electrical engineering works, in manufacturing establishments and in the shops of some leading railroad companies, and it suggests a possible method of dealing with the conditions herein presented. Among the prominent concerns first to introduce this new system were the Westinghouse and General Electric companies and the Pennsylvania Railroad.

The object of the system is to fit graduates of colleges and technical schools for filling responsible positions in the engineering or operating departments of the works. The young men are taken into the shops on the same footing as the skilled mechanics, except as to salary. This is small at

first, with increases at stated intervals, or according to progress made, which is closely watched by foremen and superintendents. The course of training lasts several years, each apprentice being moved systematically through the different departments of the works, in order to gain a comprehensive knowledge of the whole. They are not expected to acquire sufficient skill in any one branch to compete with the journeyman machinist or electrical worker, but rather to become familiar with shop methods and operations; to learn what constitutes a day's work and whether that work is good or bad.

Notwithstanding the material differences between the conditions existing in mines and manufacturing establishments, it is possible that such a system in some modified form might be introduced for graduates of mining schools. During the past fourteen years, in taking classes of students into the field each summer, to study in the mines, I have found managers and superintendents in nearly every case interested in the students' work, as well as cordial and helpful in extending the privileges necessary for carrying on that work. But any plan for post-graduate training should be adopted with caution. To secure the best results the young engineer must stand convinced of his personal responsibility. He must enter the mine or works with the realization that he is to be neither nursed nor favored, that his future depends wholly on himself. If rightly understood, a plan of this kind might be made of advantage to both employer and young engineer.

The writer of this paper refrains at this time from making any specific suggestions as to changes in curriculum or the proportionate time to be given to each kind of work entering into the training of the mining engineering student. Having had experience himself both in field practice and in teaching, he believes that useful conclusions can be reached and definite recommendations made, only after detailed study and thorough discussion of the subject.

The Value of Correspondence Instruction to the Mining Man

BY H. H. STOEK, EDITOR MINES AND MINERALS, SCRANTON, PENNSYLVANIA.

Origin of Correspondence Instruction in America.

The expression "this enterprise was started in answer to a distinct need and fills a long felt want" is very much overworked nowadays. There is, however, probably no better example of an undertaking started to supply a distinct demand than is to be found in the beginning of the system of teaching mining by correspondence in the United States.

In 1885 the state of Pennsylvania revised its mine laws and in the revision there was incorporated a provision that mine foremen and fire bosses must hold certificates of competency based upon an examination in technical mining subjects.

At that time Mr. T. J. Foster was editor of the Mining Herald in Shenandoah, Pa., and an examination of the files of that paper for some years prior to and succeeding the year 1885 and of the Mining Pocket Books published under the same auspices discloses the germ of correspondence instruction. Technical articles were printed in the Mining Herald, written by well known engineers, such as C. M. Percy from England and others. These articles were intended to assist the ambitious and studious men about the mines, and after the passage of the law of 1885 they were especially designed for those wishing to fit themselves to pass the state examinations prescribed by the law of 1885. In 1887 the Mining Herald, which had been a weekly newspaper with a technical mining department was changed to The Colliery Engineer, a distinctly technical mining publication, Mr. R. J. Foster then becoming associated as one of the editors. The headquarters were moved to Scranton, Pa., in 1888. The correspondence columns of the journal were thrown open especially to all persons desiring to prepare themselves for state examinations, and such persons were urged to ask questions, or to answer such questions as were asked by others upon any subjects pertaining to mining, the questions and answers being published each month in the paper. This feature of the paper was so popular that it soon became apparent that this medium alone could not supply the instruction and assistance needed in connection with the state mining examinations. Consequently,

in August, 1891, the Colliery Engineer Company began the preparation of leaflets for the use of men studying to pass the examinations for foremen, assistant foreman, and fire boss. The subjects of these leaflets were Mine Surveying, Mine cases, Ventilation, Mining Methods, Mine Machinery, etc.

Preparation of Mining Text Books.

The choice of the foundation upon which the whole superstructure of correspondence instruction has been reared showed remarkable foresight and a keen appreciation of the whole problem of industrial education. This foundation may be said to be the furnishing of highly specialized text books adapted for study without the assistance of a teacher.

The course of study is adapted to any person, no matter how limited his preliminary education, providing he can read and write; consequently, it begins with elementary arithmetic and advances step by step through the other branches of elementary mathematics such as Algebra, Geometry and Trigonometry, each step being completed before the next is taken. The idea of a complete course in mathematics, looked upon as a mental training, has been cast aside as requiring more time than the student by correspondence can ordinarily give; only such essential steps in the mathematical ladder have been selected as are needed to understand the higher branches of technical knowledge.

No attempt has been made to adapt ordinary textbooks to correspondence instruction, but special books have been prepared, designedly different from other technical books in being every day working books.

These two fundamental principles, namely, simplifications of the courses so that they can be studied by any one who can read and write, and the preparation of suitable books, have been strictly adhered to in all of the later development of the International Correspondence Schools, and they form undoubtedly the strongest elements in its success as an educational institution. Every student receives the lesson papers to be studied in the form of small pamphlets, each containing about fifty pages so that he can carry his lesson in his pocket with him wherever he goes, and many a man in mine or mill uses his noon time or smoke time during the day in study. In addition to these pamphlet lessons papers each student receives what is called a reference library which consists of a duplicate set of all the lesson papers, systematically arranged, indexed and bound in half

leather. This gives him a mining library for constant reference, and investigation has shown that probably 25 per cent. of those who enroll as students use their books at home without sending in any written work to the schools. The great and permanent value of this wide dissemination of mining literature is apparent; and if correspondence instruction had done nothing else for the mining world than to distribute throughout the entire mining world about 100,000 bound volumes of the highest type of mining literature and an equal amount of mining literature in pamphlet form, its inauguration would have been worth while.

Since its incorporation the International Textbook Company has spent over $1,500,000 in preparing its books, and each year spends large amounts in preparing new books and in revising and perfecting the old ones.

The exact effect of this literature is indeterminate, since it is used not only by the original purchaser, but since it is now found in practically all of the leading libraries in the United States, it has become undoubtedly one of the greatest factors in connection with technical education in the United States. Some of the principal librarians in such industrial centers as Pittsburg report that the books published by the International Textbook Company are more used by the working classes than any other technical books upon their shelves. Until the mining books of the International Textbook Company were put upon the market most of our mining literature for instructional purposes was of English origin and therefore distinctly un-American. No one knows this better than those who have attempted to carry on classes in mining, for then work was rendered very difficult because there were no suitable text books, and the lecture system, which is bad enough for collegiate work, is absolutely unsuitable for elementary work and secondary education such as is required by most of the students of mining by the correspondence method.

Inspiration Advertising.

Another distinctive feature of the correspondence system as worked out under Mr. Foster's general direction is what he calls inspirational advertising, that is, convincing the masses of people that they need education and that they can secure it in their homes without giving up their daily occupation. In this way the technical school room has been brought to the home just as surely as general news is brought there by the newspapers. A distinct advance has thus been made in the educational scheme and a gap which formerly existed has been bridged.

One of the strongest features of correspondence instruction is the very feature which for many years made it unattractive in the eyes of educators, that is, its commercial side, by which we mean not because it is operated as a business, for private schools, academies, etc., are operated in the same way, but because one of the strongest arguments urged for getting an education was the financial betterment to be expected as the result of this education. The securing of an education simply for the sake of being educated is an excellent theoretical idea, but the securing of that particular specialized brand of education that makes it possible for a man to increase his earnings is a more distinctly American idea.

In general about 25 per cent. of the enrollments taken by the International Correspondence Schools are secured in response to the natural demand for educational books and for a bettter education. About 75 per cent. comes from the "men from Missouri" who must "be shown" before they take up educational work. One of the greatest accomplishments of correspondence instruction and one but little appreciated is undoubtedly the inspiration it has given to careless or indifferent persons, by first arousing their ambition, then by inspiring them with self-confidence so that they are fitted for better things, and by furnishing the means for satisfying this ambition. Only a small portion of those enrolled for correspondence instruction comes from the educated or cultured classes, for the only qualification is an ability to read and write English, and indeed many of the foreign population have started before they could understand and read English with any facility, and have gained their knowledge of the English language largely through correspondence study.

The fact that three-fourths of the men who take up correspondence work must be induced and persuaded to do so, brings out an ethical side of such instruction which is not commonly appreciated. The 25 per cent. who take up correspondence study voluntarily would probably devote a similar amount of time to studying or reading of some kind. The 75 per cent. who are induced to undertake such study would probably not employ their time thus usefully, and large numbers of them would undoubtedly spend the evenings in the saloons and gambling dens.

Mr. T. J. Foster in his Presidential Address at the Fifteenth Anniversary of the International Correspondence Schools, October, 1906, said: "If Mr. Carnegie will supplement his magnificent gift for libraries by establishing a

foundation to provide a half million dollars annually to be expended in advertising the benefits of education and the resources of his libraries he will be surprised by the great increase in the number using his libraries." This kind of advertising Mr. Foster has aptly named "Inspirational Advertising."

Mining Courses Offered by Correspondence.

The following courses in Mining are offered by correspondence:

Mining Engineering, including Coal Mining, Metalliferous Mining and Metallurgy, the text being included in thirteen volumes of approximately 600 pages each and covering practically every phase of mining knowledge.

Complete Coal Mining Course.—The portion of the general Mining Engineering Course having to do specifically with coal mining.

Mine Foreman's Course.—An abridgement of the Complete Coal Mining, intended for those who wish to prepare especially for mine foremen's examinations.

Fire Bosses' Course.—A still further abridgement than the Mine Foreman's Course of the Complete Coal Mining Course, intended for those who wish to pass the examination for fire boss.

Metal Mining Course.—That portion of the Mining Engineering Course dealing with metalliferous mining.

Metal Prospector's Course.—An abridgement from the Metal Mining Course.

Mine Surveying and Mapping Course.—Designed to give full instruction for one working on a mine survey corps.

Complete Metallurgy Course.—Contains all of the subjects pertaining to metalliferous mining from the Mining Engineering Course.

Hydrometallurgy Course.—An abridged Metallurgy Course.

Smelting Course.—An abridged Metallurgy Course.

Milling Course.—An abridged Metallurgy Course.

Manufacture of Iron and Steel.—Includes the fundamental principles of iron and steel manufacture, inorganic chemistry, and quantitative analysis.

Number and Occupation of Correspondence Students of Mining.

Since October 16, 1891, when Thomas Coates of Plymouth, Pennsylvania, enrolled as the first student in mining 34,496 (October 7, 1907) persons have taken up correspondence mining courses, scattered through every state and

territory in the United States, in fact in practically every country of the world, large numbers being found in South Africa, Australia and other far-away countries.

In the various courses of the International Correspondence Schools 50 per cent. or more of the scholarships are sold to men engaged in the engineering trades or professions, some of whom are graduates of scientific schools, who buy the text for reference purposes because they are concise, complete, practical and thoroughly well indexed. The success of correspondence instruction depends in great part on the fact that it is primarily utilitarian and secondarily educational (as the word education is commonly employed). The percentage of students in the mining courses who are already connected with mining is probably greater than 50 per cent. especially in the Coal Mining courses, since the incentive for taking these courses is in so many cases the desire to secure a state certificate of competency, and these certificates are based upon a term of service in the mines as well as upon the result of an examination upon the theory of mining.

There are many students who are connected with mining only incidentally; this class includes brokers, bankers, mining investors and engineers who are connected with operations allied to the mining industry. This class of students find the books prepared for correspondence study about the only ones available for their use, for while the books are distinctly practical and technically accurate, the language used in them is so simple that they can be understood by the layman in mining matters to whom the specialized books on geology, metallurgy, etc., are usually sealed volumes on account of their extreme specialization and ultra-technical language. Again, if questions arise in connection with the contents of the correspondence school books, the student has a right to ask for full explanation, a privilege not accompanying the purchase of an ordinary book.

Results of Correspondence Instruction.

As to the results of correspondence instruction in general, up to October 1, 1907, approximately 1,034,000 scholarships had been sold by the International Correspondence Schools. About 100,000 students have been awarded diplomas of graduation or have made considerable progress in the advanced subjects of their courses. Approximately 300,000 more mathematics, physics, drawing and other important subjects, while several hundred thousand others have successfully pursued their studies by means of Inter-

national Correspondence Schools text books without sending in exercises for correction. During the fiscal year ending December 31, 1906, there were corrected 772,481 examination papers, drawing plates and language records. In connection with the sale of these scholarships over 2,000,000 bound volumes of technical literature have been sent out.

Quoting again from Mr. Foster's Presidential Address, "It is much easier to resolve to study than to study, and many are enrolled who do not become students. For the man who agrees to study and pay, and does not, correspondence instruction is not responsible. About two-thirds of those enrolled pay for their scholarships, occupy the status of a matriculated student in a college or university, and are entitled to instruction. Three out of every four of these are benefited. It can be stated definitely, therefore, that one-half of those who enroll as students in the International Correspondence Schools are permanently, definitely benefited. All of the students who complete one subject of their course complete on an average three subjects, that is, Arithmetic, Geometrical Drawing and Mechanical Drawing, or Blow-piping, Assaying and Mineralogy, or Arithmetic, Mensuration and Mine Ventilation. As it takes the average student more than four months to finish each subject, this shows that one-half of the students enrolled study at least one year. Since 90 per cent. of all the students enrolled cannot work Fractions, those who complete one subject, that is, Arithmetic, are benefited, and since the problems in Arithmetic are varied to suit the trade for which the course is intended, every person completing Arithmetic at the same time learns something of the applications of his trade."

The first 500 students in the International Correspondence Schools were enrolled between October 16, 1891, and May 20, 1892, in the Complete Coal Mining Course, which was the only course taught at that time; 385, or 77 per cent., of these, completed one or more subjects of the course and 46 completed the course. The average number of papers completed was ten, the majority completing the preliminary papers on Arithmetic, Mensuration and Mine Ventilation, which papers are those needed to qualify them to pass the examination in which they were especially interested. Many of these original 500 have passed away or have been lost sight of, but from a list of 100 of them it is found that with few exceptions they were miners when they enrolled. Fifty per cent. of this number are now coal operators, mining engineers, mine inspectors or mine superintendents, and

the rest are mine foremen. Nearly all of these original students enrolled without personal solicitation, and as they had a strong incentive to do good work, namely, a definite examination to pass, it is probable that the results obtained with them are somewhat higher than the average of correspondence instruction.

It is probably true that the students in the Coal Mining courses study more than in some of the other courses for the reason that they have generally a definite goal before them, in being required to pass a state examination in many states before they can occupy a position of responsibility. This gives a definite aim which is even stronger than the incentive to increase the salary.

In judging the results of correspondence instruction the fact must be kept in mind that such instruction is not designed for the few who have time and means to attend a technical school, but for the large part of the artisan population, probably ninety-five per cent. of the whole, who from force of circumstances. cannot attend such a school, and who in most cases have not even had a high school education. Correspondence instruction is not therefore a competitor of collegiate instruction, but it aims to do for the many what our colleges are doing for the few. It is not claimed that correspondence instruction is the panacea for all the ills of the industrial world, but it is firmly believed by the writer that when rightly understood and rightly applied it is one of the most potent factors making for the betterment of the industrial classes at the present time.

The facts thus far given are historical and statistical and can be verified by anyone through an examination of the books of the International Textbook Company in Scranton.

The proof of the pudding, however, is in the eating of it, and in order to find out the opinion of mining men throughout the country with regard to correspondence instruction the following circular letter was sent in the United States and Canada to about 120 mining men occupying positions of different degrees of responsibility and including every state mining official and mine inspector.

"One of the questions for discussion at the next meeting of the American Mining Congress to be held in Joplin, Missouri, November 11th to 16th, will be the subject of 'Mining Education in the United States.'

"I desire to get the opinions of prominent mining men throughout the United States upon the subject of 'The Value of Correspondence Instruction to the Mining Men.'

I will appreciate it if you will answer the questions on the accompanying sheet and return them to me at your earliest convenience."

(1) Have you ever been a student of Mining by correspondence?

(2) If you have studied Mining by correspondence, how much of your success do you attribute to correspondence instruction?

(3) What advancement in position or income have you made which you can trace to your correspondence instruction?

(4) What is your opinion of the value of such instruction to others with whom you have come in contact as regards their general efficiency about the mines?

(5) In the state examinations, how do students of Mining by correspondence compare with other applicants who have not taken correspondence courses?

(6) Give some notable instance which you have seen of success due to correspondence instruction.

Signature .....

Official Position .....

To this circular letter 66 replies were received and a number of letters were returned on account of imperfect addresses. As these replies came from all over the United States and Canada and from persons in no way connected with the International Correspondence Schools they furnish a good index of the opinion in which correspondence instruction is held by men who have tried such instruction personally and who are also in a position to judge of its results with others whom they have observed.

In answer to the first question, "Have you ever been a student of mining by correspondence?" 44 out of 66, that is, $66^{2}/_{3}$ per cent., stated that they had, and in most cases practically all of their technical knowledge had been secured by this method of instruction. A number of others who have not taken courses stated that they had used the books of the International Correspondence Schools and found them very helpful. Of the mine inspectors and chiefs of departments of mines throughout the United States, 35 out of the 54 who replied have been students of mining by correspondence. Nearly all of the inspectors appointed within the past fifteen years have been correspondence studence. Most of the state officials who have not been students by correspondence had been appointed without an

examination or had secured their certificates of competency before the introduction of correspondence instruction in the United States. In many cases these same men state that they realize full well the greater advantages now open to young men through the medium of correspondence instruction.

Question 2. "If you have studied mining by correspondence, how much of your success do you attribute to correspondence instruction?"

This is, of course, a rather difficult question to answer, as it is difficult to determine just what part of a man's success is due to each of the items contributing to it. However, 21 out of the 65 who answered state that they consider that "*practically all*" of their success can be attributed to correspondence instruction, while 11 others state that their success is "*very largely*" due to such instruction. Several college graduates replied that they had been materially helped in connection with their work by taking correspondence instruction after receiving their college degrees.

One man replied that he attributed very little of his success, and four that they attributed none at all to such instruction.

Question 3. "What advancement in position and income have you made which you can trace to correspondence instruction?"

A large number of those replying have advanced from the position of miner at the face to various positions of responsibility such as secretary and treasurer of a coal company, mine inspector, general foreman, etc. The most noticeable advancement is probably one man from a photographer at a dollar a day to a mining geologist and engineer, due entirely, he says, to correspondence instruction. Another notable instance is that of advancement from the position of janitor to state inspector of mines. Increases of salary vary from 100 per cent. to 500 per cent. Only two report that they have made no advance in salary since they began studying by correspondence.

It is not claimed, of course, that some of these men would not have made advancement studying by the ordinary methods, but their advancement has undoubtedly been more rapid and a larger number have succeeded that otherwise would not have done so, owing to the almost insurmountable difficulties of studying alone and without assistance. The courses in mining are difficult, and the fact that a man has backbone enough to give up his nights to study

after a hard day of labor is an index to the character of the men who successfully carry on correspondence courses.

The fact that a man must work to successfully complete a course of instruction by correspondence, and that he must frequently do his work under trying circumstances and must deny himself certain pleasures and privileges in order to do it, marks such a one as a man with ambition and a man with backbone, and even for the sake of argument, assuming the impossible, that is, that a man derives no good from the contents of the books he studies and from writing out answers to the questions contained in them, any man who has the nerve to study for several years in order to know the why and wherefore of his daily work is bound to be a better man. One man in answer to this question writes: "After completing my course I worked as a miner and was then selected out of twenty-five other applicants for foreman of an iron mine."

Question 4. "What is your opinion of the value of such instruction to others with whom you have come in contact as regards their general efficiency about the mines?"

This question and the one following form the critical test of the success of correspondence instruction and the answers received are very interesting. It is difficult to tabulate this information as each reply is expressed in different terms of appreciation. Fifteen state simply that they have the "*very highest opinion*" of the value of such instruction. A large number of others say that men who have taken such courses are more reliable, have more fixity of purpose, are most ambitious, take a greater interest in the affairs of the company, give their superiors less trouble, are up-to-date in their methods, and that men with such instruction are much above the average of their fellow workmen.

One Chief of Department of Mines writes: "It has brought about greater efficiency among mine managers, it brings young men to the front who would otherwise remain working at the face, and enables the older men to keep up with the times and with the advancements in mining life."

A mine manager in Illinois writes: "I have had personal experience with a great many students of correspondence schools in mining work and I find them in general much more efficient and practical than men who are not such students."

One inspector of mines states that he has never come in contact with any person who has shown extra ability because of correspondence instruction, but he adds that he

does not wish to appear as depreciating such instruction, since he has only been thrown in contact very slightly with those taking such work, and, by the way, he is located in a part of the country in which the correspondence work has not been pushed to any great extent.

Question 5. "In the state examination, how do students of mining by correspondence compare with other applicants who have not taken correspondence courses?"

This is a question which, of course, applies only to the states in which coal mining is carried on, and only in such of them as have certificated foremen, fire bosses, etc. Without exception the replies state that students who have studied the theory of mining by correspondence lead the others who have prepared themselves in such examinations; that they give better answers and show greater reasoning power, and that their examination papers are more satisfactory to the examining boards. One member of an examining board writes: "In this locality students by correspondence always get higher percentages than those who study by other methods." Another member of an examining board from British Columbia states that correspondence students stand foremost in the examinations in that section. Another states that they compare as a polished gem to the rough diamond. A mine inspector from Montana writes: "Of fourteen successful applicants for certificates of competency, the examination papers on file in this office show that the seven highest graded papers were those of correspondence school students."

Another writes: "I am in a position where I can see the particular benefits derived from correspondence courses in the state examinations for mine foreman and hoisting engineer. Here the students of mining by correspondence are about the only successful ones in these examinations. I cannot speak too highly for the correspondence courses in mining."

Another writes: "I was never a correspondence student until I had successfully passed the mine foreman and mine inspector examinations, but have since become a student, and can now see how much easier a student by correspondence can fit himself for an examination than one who has to depend upon studying by himself from textbooks without any person to explain and make things clear which he is unable to understand."

Another Chief of Department of Mines writes: "The applicants for state examinations who have not taken a complete course by correspondence do not compare favor-

ably with those who have. Those that have completed a course and have practical knowledge of mine work stand the best examinations and get the highest certificate of efficiency."

At an examination for State Mine Inspector held at Uniontown, Pennsylvania, in May, 1903, nineteen of the candidates were International Correspondence School students. Fifty were not such students. The following table shows the relative results:

Candidates	Number	Number Passed	Per cent-age	Number Failed	Per cent-age	Average Percent-age Mark Received in Examin's
I. C. S. Students	19	15	79	4	21	75.2
Not I. C. S. Students	50	7	14	43	86	54.7

The average percentage received by the International Correspondence School students was 20.5 per cent. higher than that received by the other contestants; 65 per cent. more of the former passed than of the latter.

Question 6. "Give some notable instance which you have seen of success due to correspondence instruction."

Nearly all of the answers, whether by those who had or had not studied by correspondence themselves contained recited instances of men occupying responsible positions which, in the opinion of the writers, could be directly traceable to their instruction by correspondence. Some few stated that their observation had not been extensive enough and answers such as the following were very common:

"Too numerous to mention."

"I know hundreds of young men in Illinois."

"Have employed a number of correspondence school men in my laboratory and have found them very efficient."

"Instances of benefit derived are to be found in every camp in this state."

"Two men who could not read and write when they enrolled are now superintendents."

"A friend of mine who could not do simple multiplication is now a good mathematician, surveyor and a very successful mine manager."

One man from Montana writes that after completing the course he applied for a position and was told that "no correspondence school students need apply." The same employer would probably have made the same response to a college graduate.

A well known mining engineer of Denver, a college graduate and for some years a teacher, writes: "Have met a number of men in responsible positions, all of whose technical education had been in correspondence instruction."

The following letter from the chief mine inspector of one of our states accidentally came into the writer's hands. It was written without any idea that it would be used in this way and in response to a letter of inquiry from a young man in Canada:

"Your letter of the 14th, relative to recommendation of the International Correspondence School in mining and metallurgy is just at hand. In reply permit me to say that I have taken the complete course in mining in this school and am fully warranted in saying that the benefits derived from this study have been of incalculable value to me as a mining engineer.

"It is true that I was pretty well prepared to do mining engineering before I ever studied or took up the correspondence school. However, I acquired a great deal of information from that school that I did not have.

"I would advise that you take up a special course of Mine Engineering in this school, along with your complete course in mining. When you have completed these courses, if you have had practical experience, I feel that you will be fully prepared to do mining engineering.

"I know a number of young men that have taken these courses along with their practical experience in mining, and with such instructions as they got from myself and others, they are well qualified mining engineers, and in many instances more thorough and competent than a great many engineers graduating from mining schools."

Another engineer from Denver who has had a great deal of experience with correspondence students in mining writes as follows in regard to the general subject of correspondence instructions:

"I value correspondence instruction very highly, but even higher on ethical grounds than on practical; for the spirit and thirst for education that will drive a man to correspondence instruction marks him, at least nine times out of ten, as a valuable man. The tenth man is the one who holds the mistaken idea that the diploma, with its effect on possible employers, is the great end and aim of the correspondence courses, and who, because he has no one to watch him, will copy answers to examination questions directly from his text book. He simply wants the mark and diploma without the education, and is no more worthy of consideration in connection with the general value of correspondence education than is the 'student' in the school or college who 'cribs' his way through. His diploma or certificate won't fool his employers very long,

and the same lack of principle that leads him to 'crib' will sooner or later get him into trouble with his employers, even if he does succeed in 'holding down his job.' So we will eliminate him and consider only the man who studies for the love of study, of the increased knowledge and efficiency it will bring him. The other fellow is simply cheating himself and throwing away his money. But to the man who is really after results, the correspondence school offers in many cases the only practicable way to attain them. The willingness to take up, honestly, a course of study, in addition to or connection with a man's regular work, is in itself a mark of that man's superiority.

"As to the character and efficiency of the instruction, while it must necessarily occasionally lack some of the clarity of personal instruction—since students' questions cannot be answered as soon as asked, and the sequence of a series of interdependent questions may have become somewhat broken by the time the answers are all in; still, the instruction papers are today written in such clear and simple language as to largely obviate this difficulty. The International Correspondence Schools text books have a high value as reference books on account of their clearness and simplicity.

"I think so much of correspondence instruction that I recommend it always to working men who show a desire to know more of the theoretical and technical side of their work, and even consider myself, and other engineers, not above profiting by it in the way of brushing up on special subjects. I want to take up a course in electro-chemistry and am going to do so as soon as I can get established somewhere where I won't have to pack and unpack my stuff about once a week."

This canvass of the opinions of prominent mining men throughout the United States has at least strengthened the opinion of the writer of the value of correspondence instruction. It is not the panacea for all of the ills of mining. It cannot make an impractical man a practical one. It cannot furnish brains to the brainless man nor tact to the tactless man. It does, however, offer to the ambitious man a means of obtaining a technical knowledge which he has never had until the correspondence system of instruction as outlined above was put into force.

Correspondence Schools have not only provided water for the horse to drink, but they have taken the drink to the horse, thus minimizing his efforts as much as possible. They cannot, of course, force the horse to drink, but if he

will half try, the drink has been made as palatable as possible. I do not mean by this that correspondence courses are easy courses. Far from it, and really the only dissatisfied correspondence school students with whom I have come in contact are those who thought that all that was necessary to secure a knowledge of the theory of mining was to pay the price of a course, and that in some mysterious way the International Correspondence Schools would turn on the knowledge faucet and allow the streams of information to flow at will down their throats. Such persons probably prefer liquid refreshment to solid because it is too much trouble to chew the latter.

Gypsum: Where Found, Its Use and Its Manufacture

BY C. O. BARTLETT, CLEVELAND, OHIO.

As I understand it, one of the principal objects of the American Mining Congress is the creation of a separate Department of Mining by the Government, similar to the Department of Agriculture, honestly believing that the mining industry is so great and so important that it should have a department by itself.

If this is done by the government it must necessarily include all kinds of mining; not the precious metals alone, but all kinds. For instance, there were produced in the state of Vermont very nearly as many dollars' worth of granite as the total output of gold in South Dakota. There were over $20,000,000 worth of clay products produced in the state of Ohio last year, nearly three and a half times the value of the gold produced in South Dakota. There were produced in the state of Ohio during the last year more than 27,000,000 tons of coal, and counting its value at $1.50 a ton, this equals more than $40,000,000 worth of coal. There will be received at Cleveland and the nearby ports more than 40,000,000 tons of iron ore this year. Counting the value at $6 per ton, which is low at the present time, this amounts to more than $240,000,000.

Again, there is another thing very favorable to the cheaper minerals. As soon as the gold is received it is turned over to the Government and the cash is paid for it. But with clay, iron, granite, etc., the work is just begun. The vessels and railroads take the ore and deliver it to the docks. From there it goes to the furnaces and through the different processes until it comes out different kinds of machinery, each process adding to its value, and also adding very much to the wealth of the country, and very much to the common wealth of the people, for it requires an army of workmen to do the work. There are two salt factories in Cleveland extracting from the bowels of the earth right under the city of Cleveland more than 500 tons of salt a day. On the top of the ground are situated large iron manufactories, turning out great quantities of iron in the form of wire, nails, bolts, etc., while underneath at a depth of about 2,000 feet are the mines of salt.

I venture the assertion that in the state of Colorado, which I understand is the banner state in the production of

gold, in the near future the production of coal will exceed the value of the gold. In fact, it is very nearly to that point now. In 1906 there were mined in Colorado about $22,000,000 worth of gold, and over 10,000,000 tons of coal. Counting coal at $2 a ton, it means over $20,000,000 worth of coal mined in the state of Colorado, but a very little less than the value of the total amount of gold. This was in 1906, and it is a question if this year does not bring the coal ahead of the gold. The largest deposits of coal in Colorado have hardly been touched, especially in Routt county; not only bituminous coal, but anthracite, of which I understand there are large quantities.

There are many other cheap minerals that must, and necessarily should, receive the attention of the government. There is one company in the city of Cleveland, with quarries near that city, that is now shipping more than 85 carloads of their stone product a day, employing an army of workmen. This product goes to nearly every part of the United States. There is another company near Cleveland that is manufacturing a very high grade of pressed brick. They are making about 10,000,000 very high quality of pressed brick a year, which are shipped to all the cities from the Mississippi river to the Atlantic ocean and the present price is about $13 per 1,000.

Another industry belonging to this class is the gypsum, industry, on which I beg to submit the following:

Gypsum is found in many mountainous localities throughout the United States, and especially in New York, Ohio, Michigan, Iowa, Kansas and several other of the eastern states. It is also found in the eastern part of Canada. The largest deposits are found in Nova Scotia and Newfoundland, and it is of a very high grade. It is generally found near the surface and is easy to mine. In some places it is nearly pure and in other places it is necessary to sort it.

At the present time I presume that not one in five at this convention have ever heard of gypsum, but nevertheless it is used in nearly every city in the United States in one form or another. It is largely used for making ready-made plaster, and its use along this line is increasing very rapidly indeed. In fact, in 1900 there were produced only 429,000 tons. In 1906 there were produced nearly 1,400,000 tons, with a very marked increase in 1907. One company is now operating over 30 plants throughout the United States, and as I understand it, they are continually behind in their orders. Gypsum is also used for making Portland cement, crayons, and for many other purposes.

Most gypsum is quite hard. It generally contains about 25 per cent. moisture. The product manufactured from gypsum rock is generally called calcined plaster of paris. To manufacture this requires the following machinery:

The gypsum rock is first crushed in an ordinary 9x12 inch jaw breaker, which easily has a capacity of 5 tons an hour. From this breaker the crushed gypsum rock goes to the second crusher, called a pot-crusher, and is again crushed. From the second crusher the material goes to the dryer, where about 10 per cent. of the moisture is taken out. The products of the fire should not be allowed to come in contact with the material while being dried, on account of the danger of discoloring it. From the dryer the crushed gypsum rock should be ground and elevated to the bins over the calcining kettle. Different machines are used for grinding, but as a general thing the horizontal French Buhr mills are as good as anything to reduce the rock.

The calcining or boiling is done in a large open kettle, generally 10 feet in diameter and 10 feet deep, with heavy wrought steel sides and cast iron or very heavy steel bottom, made convex so as to better resist the heat without sagging. The kettle should have four flues, about 12 inches in diameter, running through it near the bottom. Inside of the kettle is a heavy shaft supported from above, with very heavy sweeps or stirrers below the flues near the bottom, and some mixing paddles above the flues. The shaft must necessarily be very strong and should be supported from above, otherwise the weight of it would tend to break down the bottom of the kettle. The kettle should be set in brickwork, with fire front, doors, grate bars, etc. The heat passes directly under it and around the sides, then through the flues and out at the stack. The ground gypsum is fed into the kettle in quantities of about ten tons at a time and continually stirred and boiled until the remainder of the free water is driven off. It usually takes about two hours to boil one batch. It should be brought to a temperature of 265° F. When properly boiled it will settle, after which it is ready to be discharged, which is done through a discharge gate on the side near the bottom, same being operated by a lever from above.

A large proportion of the calcined plaster is used in this form. If it be desired to make a finer grade it will be necessary to boil it the second time, which in reality is taking out the water of crystallization. If this water of crystallization is once started it must be taken out, otherwise

the calcined plaster will be spoiled. A competent and reliable man should always have charge of this calcining kettle, for it is the most important part of the business. After calcining it can be either passed over a grading reel and graded, or else the whole product can be ground on Buhr mills, after which it is ready for use.

Elevators, conveyors and good, heavy bins, which should be made largely of steel and iron, will also be required. Everything about a gypsum plant should be very strong and substantial.

The necessary machinery for making the above mentioned quantity of calcined plaster will weigh about 75,000 pounds. It will take about 125 horse power to drive it and will cost in the neighborhood of $10,000. The cost of mining the gypsum depends upon circumstances, and varies from 25 cents per ton up. The cost of manufacturing this product in quantities of not less than 50 tons a day will be about $1 a ton, counting 10 per cent. depreciation of machinery, which is ample, 6 per cent. interest on the investment of, say, $10,000, and allowing 30 cents a ton for mining.

As above stated, calcined plaster of paris is used in making ready-made plaster. In fact, it is the base of all of this product and is generally used in the proportion of one-third calcined plaster to two-thirds dried sand, with a small amount of hair and retarder. The retarder is necessary to prevent the plaster from setting too quickly. For stone or brick work the proportion of calcined plaster is about one-fourth. Wood fibre is largely used, also asbestos fibre, which is preferred by some. There are no patent formulas for making ready-made plaster. It is free to anybody and everybody, and anyone who buys so-called patent and secret formulas for making ready-made plaster is simply buying gold bricks.

Tariff on Zinc Ores

BY S. DUFFIELD MITCHELL, CARTHAGE, MISSOURI.

Like most subjects touching so many sides of our industrial life, the one before us of "Tariff on Zinc Ores" has accumulated an almost impenetrable covering of technicality, and, to get at the underlying body, perhaps one should be a composite mineralogist, metallurgist, lawyer and statesman. I, therefore, approach the discussion with diffidence, fearing that to my own undoing I may "rush in where angels fear to tread."

However, in spite of the apparent serious aspect of the subject, there appears a somewhat redeeming quality of humor in it, as that, for instance, manifested in the absolutely irreconcilable interpretations by the Board of General Appraisers in New York, and others, who have trumpeted scientific and legal definitions of the sections of the tariff act with bewildering promise of solution, but whose notes have died away to the faintest echo.

For within the past two years have you not heard that the lawyer-Secretary of the Treasury, the Attorney General of the United States, the Board of Appraisers at New York, and many expert tariff lawyers, have played battledoor and shuttle-cock with this subject, and there is even now disagreement among them all as to the facts and the law.

Even the United States Circuit Court Judge of Texas, before whom the questions were argued on appeal more than six months ago, has seen not the guiding light to lead him forth from the wilderness, and has failed thus far to make the pronouncement so anxiously awaited.

In the summer of 1904 prices of zinc ore at Joplin were depressed and the demand somewhat curtailed. In October the base price was about $40 per ton, but by January and February, 1905, the price had attached itself to a comet and was soaring between $55 and $60. For the succeeding few months prices receded somewhat, but during the last half of that year showed great strength and were well maintained around the $50 mark.

During a large portion of this time the ore buyers vied with each other for the ore. This competition for ore and enhancement in values, were brought about solely by the smelters. There was no concerted action among the producers, either to raise the price, or to regulate the output. Many of the more far-seeing operators did not view the situ-

ation with complacency. For we knew that the law of gravitation must govern even zinc ore prices—at some time. Throughout the year of 1905 the price of 60% jack at Joplin averaged $46.95 per ton: it had been $35.92 in 1904. During the whole of the year 1905 with jack at $46.95 and spelter at St. Louis $5.73 per hundred, the ratio between mineral and metal was as 1 to 8 1-5. The zinc operators had always been given the sop that a 1 to 7 ratio would give the smelters only a fair margin of profit.

From this, one is well able to deduce the fact that during the whole of the year 1905 no smelter made money; that it was impossible to pay the high price for ore; take the moderate price for spelter; pay operating expenses, fixed charges, interest on bonded indebtedness; and have left even the widow's mite for the holders of engraved certificates of moisture. As a conclusion this must be correct, for during the months of January and February, 1905, the ratio between the prices of ore and spelter was as 1 to 8¾.

During the latter part of 1904 the smelters began the importation of zinc ores from British Columbia and Mexico. By a ruling of the Treasury Department in October of that year, such ores were admitted under paragraph 181 of the tariff act as "lead bearing ore" and paid the nominal duty of 1½ cents per pound on the lead contents.

The mine operators of this district then agitated the subject of securing a rational classification of these ores; a committee was appointed to have charge of the subject and discussion was opened with the Treasury Department at Washington. There for six months the weather vane was variable. In July, 1905, the Secretary of the Treasury in a letter, said that instructions would issue that lead bearing ore must contain four per cent. lead to be lead ore (a construction entirely apart from his powers as an official); that zinc sulphides might be dutiable as metallic mineral substances under paragraph 183 of the act; and that calamine was free. These promised instructions were never issued. In September, 1905, he declared he had expericenced a change of heart; that while before he had concived a strong leaning towards the position of the domestic mine operators, his attitude had since changed and he then thought zinc ore was not dutiable because there was no free metal in it.

After urgent appeal the whole matter was referred to Attorney General Moody for opinion. Three propositions were argued in printed briefs submitted to the Attorney General. Representing two operating companies and myself, I presented an intervening brief, urging one position

which New York attorneys, representing the producers, refused to argue.

The Attorney General sustained all three contentions and accordingly on February 10, 1906, the Secretary of the Treasury telegraphed the Collectors of Customs, as follows:

"You are hereby instructed, following the advice of the Attorney General, to classify ores chiefly valuable for the zinc which they contain as metallic mineral substances in a crude state, under paragraph 183 of the existing tariff act, at the ratio of 20% ad valorem. You will admit calamine, silicate of zinc, free under paragraph 514."

Such in brief was the preliminary skirmish which preceded the larger contest, now pending in the courts. This controversy is based upon protests filed at the ports of Laredo, Kansas City, Philadelphia and other places.

The record in the case now pending in the Circuit Court of Texas squarely raises the three questions:

First—What is calamine? Does it apply exclusively to hydrous silicate of zinc, or does it include both the silicates and both the carbonates of zinc?

Second—Are ores of zinc "metallic mineral substances in a crude state" and dutiable; or are they "minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture," and therefore free?

Third—What is the scope and meaning of the term "lead bearing ore" when lead and zinc are combined in the same ore?

First.

Calamine: Paragraph 514 places calamine on the free list.

For the year ending June 30, 1907, over 66,500 tons of ore, classified as calamine, were imported from Mexico, or 75% of the total zinc importations from that country. The Board of Appraisers ruled that "the term 'calamine' covers both the silicates and the carbonates of zinc, that this is so, when the word is regarded in its broadest sense, so far at least as tariff construction should go."

It was said that the word was scientific; not familiarly used in ordinary speech and having no "popular" meaning. The distinction of Dana that only the hydrous silicate of zinc is properly calamine, was admitted, as well as the fact that he is the accepted American authority on the nomenclature of zinc ores. But it was said that the foreign mineralogists recognize no such distinction.

Again, it was said that in view of the fact that silicates and carbonates of zinc are found in nature commingled;

are of the same value; used for the same purpose; and that zinc ore is nowhere provided for by name; it is more than a conjecture that Congress, under the name of calamine, intended to cover both the carbonate and silicate of zinc.

It was further stated that calamine has been mentioned by name in the free list in every tariff act since 1792, except in the acts of 1846 and 1857, where it was dutiable. In none of the tariff acts has zinc ore been provided for by name. It was then argued that if any presumption arises at all, it is that Congress intended no duty on zinc ores, as such, rather than that by changing the designation "lapis calaminaris" to calamine (in the act of 1846) it was intended to charge certain kinds of zinc ore with duty.

Such is the decision of the Board of General Appraisers. It will be remembered that this Mining Congress at its El Paso meeting in 1905, passed a resolution to secure a correct interpretation of the term "calamine" in accordance with the definition established by Professor Dana.

I dismiss the subject of calamine with this brief synopsis of the official finding of the General Appraisers, because the discussion is purely scientific and involves only mineralogical technicality.

Second.

Paragraph 183: Are the ores of zinc "metallic mineral substances" or are they "minerals crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture"? If the former, they are dutiable at 20% ad valorem; if the latter, they are free.

The Board of General Appraisers, who had decided 180,703 various protests before our 13 protests claimed their attention, found no difficulty in ruling that zinc ore is not a metallic mineral substance, because it contains no free, native metal; and because one cannot by the dexterous use of tweezers pick out of the ore particles of spelter; also that the ore, by the usual system of concentration, has not been advanced in value or condition; but that such process is merely "to avoid paying freight charges on rock and dirt." As Jones pays the freight, and the Joplin miner never pays it, it is interesting to learn by quasi-judicial determination, that our $25,000 concentrating mills have for their prime object the removal from the smelter of the burden of freight charges.

It seems to lawyer and layman alike that the word "metallic" clearly includes a zinc ore, which is capable by process of smelting to yield spelter (metal) in a commercial quantity.

There can be no doubt that zinc is a "mineral substance." So are marbles, stones, clays, earths and a hundred like articles, specifically mentioned in the schedules preceding the metallic schedule; but the latter are not metallic in appearance, nature or composition.

The Supreme Court of the United States (Marvel vs. Merritt, 116 U. S. 11) defined the noun mineral as "any inorganic species having a definite chemical composition," and ore as the "compound of a metal and some other substances, as oxygen, sulphur or arsenic, called its mineralizer, by which its properties are disguised or lost."

Following Webster, it was said that a mine is "a pit or excavation in the earth from which metallic ores or other mineral substances are taken by digging, distinguished from the pits from which stones only are taken and which are called quarries."

As a tariff law deals with articles of commerce between nations, the courts have ruled that its words and terms must receive a commercial, an every day business man's interpretation. Its language should be exempt from a construction, which resorts to the technicalities which are properly resorted to in the interpretation of solemn instruments of writing or those acts of legislation which involve property rights and liberty.

Thus construed, "metallic mineral substance" can only mean a mineral substance useful for the metal to be derived therefrom. Judge McPherson, an eminent Pennsylvania jurist, in construing this paragraph, ruled that the term "mineral substance" means "ore," and that "metallic" signifies metalliferous in ordinary speech, and is not to be confined to its strictly scientific, dictionary meaning.

Several mineralogists of high standing testified before the Board of Appraisers that there are but five metals, of commercial consequence, which occur in nature in a free state. These are gold, silver, copper, platinum and iridosmium.

Every one of these five metals is, by Congress, specifically placed in the free list: they bear no duty; metallic mineral substances are subject to 20% duty.

"Metallic mineral substances" were mentioned in the tariff acts of 1883, 1890 and 1897, and it remained for the Board of Appraisers to discover in the year 1907, that Congress almost twenty-five years ago had enacted a provision of law which is absolutely without effect.

The point is this: Congress says metallic ore shall be dutiable; the Board of Appraisers says a metallic ore must contain the free metal to be dutiable; all the free metal

ores are put by Congress in the free list; therefore the board in effect says that no metallic ore is dutiable. This view, if correct, destroys paragraph 183 entirely, for there is nothing to come within its provisions; there can be no dutiable crude metallic mineral substances whatever.

Had not Congress foreseen this wisdom of the board and made specific provision for the ores of iron, alumina, lead, nickel, and many others, these would have gone the road with the ores of zinc, unless one could have picked out the spike from the iron ore, the kitchen ware from the alumina, or the lead pipe from the lead ore. I am not much overdrawing the situation.

I do not want to appear hypercritical of government's counsel; but after a close study of the record, I think they were guilty of sins of omission and commission. It should have been shown by positive proof that the process of securing spelter from zinc ore in one operation; that after the ore is placed in the retort it sees not the light of day until it is drawn off as spelter; that the spelter is one degree removed from the ore, and therefore that metal as metal must be in the ore.

It could, at least, have been shown in proof that by the mixture of zinc ore (the sulphide), limestone and coke in the retort spelter can be procured directly from the ore without resort to calcination.

In lieu of this, the record shows that witnesses for the importers by their testimony, made out a very intricate system of zinc smelting: First, calcination for burning out the sulphur; second, distillation in the retort and turning the ore into zinc oxide vapor; third, condensation of this metallic vapor into physical spelter.

With the record in this shape, it was good argument for importer's counsel to say, "We have the exact analogy of this proposition in the tungsten ore case." To use their words, "the analogy to zinc ore is perfect." Do you not read that the court there said that tungsten metal is two degrees removed from the ore? But said government counsel, "Tungsten metal is used exclusively as an alloy to harden steel." And said counsel for importer, "The suggestion is unfortunate for the government, since a chief use of metallic zinc is as an alloy with copper in making brass."

From the lawyer's viewpoint it is difficult to see how the tungsten ore case bears at all on this zinc ore case, for it is said in opinion that the change from tungsten ore to the metal is "an expensive and intricate process." The statement that "the ore does not contain particles of metal" is obiter dictum. How unlike zinc smelting is the conver-

sion of tungsten ore into tungsten metal is shown by its process: the powdered tungsten ore is treated with soda and saltpeter in a reverbatory furnace; the melted material is subjected to acid; and on evaporation crystallized into tungstate of soda; on adding muriatic acid to the latter, tungstic acid is precipitated; by igniting tungstic acid with charcoal or a current hydrogen, metallic tungsten can be obtained in the form of a powder.

A very elaborate system indeed of addition, subtraction, evaporation and acidification, compared to the simple process of zinc smelting. This tungsten case is the legal authority for the defeat of zinc ore being classed as a metallic mineral substance.

Paragraph 614: The proposition that zinc ores are "minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture," and are therefore on the free list, was affirmatively ruled by the board of appraisers.

While it has been decided that any labor bestowed upon an article is a process of manufacture, the decisions are irreconcilable as to where an article stops being crude and when it becomes a manufactured product. It is unprofitable to discuss these cases. The practice of the treasury department is well settled that removing the gangue or impurities from ore is not manufacture or refining but is "one of selection," that it is "mainly for the purpose of economizing in the cost of transportation."

But I insist that the point was not well developed or strongly argued, that the most important function of mill concentration (after eliminating gangue and rock) is the separation of the zinc, the lead and iron. To that extent the zinc is very greatly "advanced in value or condition by refining."

For do we not all know how zinc is penalized when containing iron and even a very small percentage of lead? And how an excess of lead over this limit precludes many buyers from buying zinc ore?

Third.

Paragraph 181 provides that "lead-bearing ore of all kinds," shall be dutiable at 1½ cents per pound "on the lead contained therein." This clause offers the utmost difficulty of construction.

What is "lead-bearing" ore? How does it differ from the term "lead ore" used in prior tariff acts? Why was "lead ore" in the tariff act of 1894 and prior acts changed to "lead-bearing ore" in the act of 1897?

Secretary Shaw took a short cut and said that "lead-bearing ores" within the spirit of the law, must bear sufficient lead to justify its reduction for the retention of this lead; he then arbitrarily decided that four per cent lead is sufficient to justify such reduction and retention.

This brought a protest from the local committee having in charge the tariff matter, because it was claimed he had no authority in law for such ruling; it was attempted legislation on his part, and not the promulgation of a regulation as to the collection of the duty. The lead-bearing ore might include all ores containing lead, even though the lead is so small a per cent. as merely to exist chemically and not as a commercial product. But so far as actual protection was concerned, it was felt that we were about as well off with only a trace of duty as a sum of $1.20 or more suggested by the secretary.

Let us go back twenty-five years and review generally the statutes and their absurdly forced construction, to find the cause of discontent among the lead producers and the smelters, and the reason for their periodic protests and demands for a change in the law. The tariff act of 1883 provided a tariff on lead ore of 1½ cents per pound. Large importations of silver-lead ore were made; silver ore was free of duty. It became the settled practice of the treasury department that such ore was classified either as silver ore or lead ore, according to which mineral was the component of chief value; if the value of the lead exceeded the value of the silver contents, the whole was classified as lead ore and duty was taken at 1½ cents per pound on the gross weight: if the silver exceeded in value the lead, the entire bulk (including the lead) came in free of duty. The vice of this practice was apparent. When the tariff bill of 1890 was in process of construction the western lead miners petitioned the committee on ways and means for such change in the language of the lead ore clause, as would afford protection on the lead *contained in* all the ores.

Congress made such change in the law and the act of 1890 provided that lead ore should be dutiable at 1½ cents per pound, and added the statutory proviso,

"That silver ore and all other ores containing lead shall pay a duty of 1½ cents per pound on the lead contained therein."

The Wilson bill of 1894 left intact the wording of the McKinley act, but the duty on lead ore was reduced to ¾ of a cent. Still the Treasury Department was tenacious of its former rulings and adhered to the classification of silver-lead ore according to the component mineral of chief value.

Until the act of 1897 the practice still was to classify the imported ore either as lead or silver ore, according to which was the more valuable part; if the classification made the bulk silver ore, then under the proviso of the statute the lead contents were dutiable according to tariff rates existing; if, however, the bulk was lead ore, then duty was taken on the gross weight according to the lead schedule.

Still the western lead smelters were dissatisfied. They declared that the government was exercising an unfair advantage in collecting duty on waste rock and silver, when the importation happened to fall in the category of lead ore.

They clamored for relief, and a delegation in January, 1897, from the four corners of the country appeared before the Committee on Ways and Means to have their grievances righted.

Some members of the delegation were content to let remain the duty of ¾ of a cent under the Wilson bill; others insisted upon a return to the duty of 1½ cents per pound under the McKinley bill; all demanded a change in the construction of the law. It is of interest to note that Messrs. Dingley, Payne and Dalzell thought that the Treasury Department rulings were not "the intention of the framers" of the act and that they were "not a fair construction under the act."

Some of the delegation insisted that lead ores, carrying less than 5% of lead, should be admitted free; others insisted on a limit of 10%; the representative of the Association of Missouri Lead Miners stated that the average of their ore mined was less than 7% lead and that the recovery by concentration did not exceed 5%. Our southeastern neighbors suggested a limit of 8% and that an excess of lead over that should be dutiable at "¾ of a cent per pound."

To show the unsettled and unsatisfactory status of the law from the smelter standpoint, I quote somewhat at length from the testimony of their representative at the hearing in January, 1897:

"By a peculiar and somewhat strained use of terms, silver bearing ores in which the value of silver contained therein preponderates, are classed as silver ores, though the quantity of silver may be an insignificant number of ounces, while the remaining metals are figured in tons. Ores of this sort are said to contain the lead, which is an exceedingly ridiculous proposition on its face. With equal propriety one might speak of a house being contained in one of its closets. In the case under discussion the injustice of this unique classification is particularly conspicuous. For instance, A imports 100 tons of silver bearing ore containing

60 tons of lead, nearly 40 tons of waste, and the comparatively insignificant physical item of 4,000 ounces of silver. This enormous proportion of lead is valued at $2,400. The few ounces of silver, by the same regulation is valued at $2,600, and, presto, it becomes at once a silver ore, and the importer pays duty only on the 120,000 pounds of lead therein, amounting to $900. B imports another 100 tons of similar ore, from the same mine, containing 60 tons of lead, nearly 40 tons of waste, and 3,600 ounces of silver. The lead, as in the previous illustration, is valued at $2,400, while the silver, happening to be 400 ounces less in quantity, is valued at $2,340. Presto again and we have lead ore, and duty is assessed and collected on the entire importation of 200,000 pounds. Does it not strike you, gentlemen, as somewhat absurd that a paltry difference of $60 in the valuation of the two metals should determine the character of the ore and compel the payment of $600 additional duty on 80,000 pounds of useless substance."

At the hearings of January, 1897, no one appeared before the Committee on Ways and Means to plead the cause of zinc ore. The final draft of that bill gave the lead miners and the lead smelters all they had asked and much more, for paragraph 181 provides that:

"Lead bearing ore of all kinds" shall be dutiable at "1½ cents per pound on the lead contained therein."

Congress unconsciously stabbed the zinc miners in the back, as recent events have proved. The policy of the dominant party in Congress at that time was "protection," and for the mere asking, zinc ores could have received the liberal consideration of the Legislature.

The paragraph 181 in reference to "lead-bearing ore" was passed to avoid the absurdities which for twenty years had existed in reference to importations of silver-lead ores. So far as that class of ore is concerned the Dingley act effected a wholesome and a just change; because now lead bearing ore, containing silver, regardless of the preponderating quantity of either, pays duty on the actual lead contents.

If, however it shall be finally determined that zinc ore is a "metallic mineral substance," what shall be done in the classification and collection of duty upon an importation of zinc-lead ore, where the difference in value of each metal therein is a few dollars or a few cents?

Suppose the case of imported ore, in which the metallic zinc value is $16 per ton and the lead contents are 4 per cent.; and that the ore is imported by a zinc smelter for the zinc; the zinc is the component of chief value and under the

law prior to the act of 1897, would pay 20 per cent. ad valorem duty, or the sum of $3.20. But the importer will claim now that it is dutiable only on the 4 per cent. lead contents at 1½ cents per pound or in the sum of $1.20; because the law of 1897 says "lead bearing ore of all kinds" shall be dutiable; and having paid duty as lead bearing ore, the right of the government is claimed to be exhausted to collect any further duty. This *seems to be* the principle of of construction running through all the revenue acts from the earliest times.

However, whether that *may be* established as a principle of law, I find a very recent decision of the United States Circuit Court of Appeals at New York in which there is a slight disposition to change that rule and the broad principle is laid down that "in applying a tariff law, a single article may be constructively separated into parts subject to different classification."

If this be the true principle, then in the case of lead-zinc ore the zinc and the lead may be segregated; the ad valorem duty taken on the zinc contents; and the specific duty taken on the lead contents.

Congress in changing the language of the law from "lead ore" to "lead bearing ore of all kinds" evidently contemplated a radical change only in the case of silver-lead ores. What change (if any) Congress intended to effect in the case of all other ores in which lead enters into combination is as yet problematical.

If the lead ore alone is dutiable, we have an absurdity shown in one of the protests now pending before the Circuit Court of Texas, where zinc silicate was present to the amount of 6.51 per cent.; zinc carbonate 31.89 per cent., in all 38.40 per cent. of zinc contents, worth $16 per ton, on which the duty would be $3.20; and in which the lead contents were one-half per cent., on which the duty on the lead would be but 16 8-10 cents per ton.

Ad Valorem Duty.

The question naturally presents itself, whether an ad valorem duty upon zinc ore is fair protection to the zinc miners of the United States. Ad valorem duty is proper and defensible upon many classes of imports. It is right to assess tariff on an ad valorem basis upon expensive paintings, statuary, fabrics, etc., etc., when the value is dependent upon the antiquity, or other intrinsic value, of the article imported: no other satisfactory assessment could be made as to them.

But ad valorem duty always suggests the chance of fraud in under-valuation of the merchandise, and the more inexpensive the imported article, probably the more lax are the government customs officials in insisting upon full valuation.

Lead ore has been dutiable almost from time immemorial at a specific rate. Neither producer, smelter, nor consumer has been heard to object. Why not then impose a specific duty of at least 1 cent and possibly 1½ cents per pound upon the actual zinc contents.

Recurring again to the hearings before the Committee on Ways and Means in January, 1897, we find that representatives of the lead miners spoke of the then menace of the Mexican lead mines to the domestic producers.

Thus a representative spoke of the great impetus the McKinley bill of 1890 had given to lead mine development in San Bernardino county, California; how the reduction in duty of the Wilson bill had put quietus upon the business; how the Mexican mines were flooding our markets with lead to the extent of 100,000 tons annually; and how this entire foreign production could be displaced by the domestic mines, if the duty of the McKinley act were restored.

The St. Joseph and Doe Run Lead Companies of Southeastern Missouri presented in substance the same arguments; and further stated that the Mexican lead mines had been so developed; their output so large; their advantage in freight rates so great; and their scale of wages so low, that they were absolute masters of the situation and that they "hold the power to keep down the industry absolutely and to limit any tendency in upward prices in the domestic market."

These suggestions as to conditions in 1897 are gravely important to the zinc miners of this general district and to those also of Colorado, Wisconsin, Askansas and other states of the Union where zinc mining either is, or shall be, a leading industry. The menace of Mexican zinc ore today is as great as the menace of Mexican lead ore was ten years ago.

Speaking of local conditions in the Missouri-Kansas district, I can say that a vast majority of the producers have always hoped for greater stability of ore prices. In the early part of 1905, after zinc ore had reached a much higher price than $35 per ton of 60% ore, I attended a meeting of operators who controlled more than half the ore production of this district and a contract good for one year to deliver ore to the smelters at $35 per ton base price could have been

effected. The smelters spurned the offer. Again in April, 1906, an offer was actually made to the smelters and a contract would have been signed to sell ore based upon the quoted St. Louis price for metal. This proposition contemplated a graduated scale of prices, the extremes of which meant $40 ore when spelter was $5 and $52 ore when spelter was $7. This offer was rejected.

Events since that time have abundantly proved from the smelter's standpoint, the wisdom of such a scale of prices, had it been accepted by them.

As bearing upon the question of supply and demand in the zinc ore market of the world for the near future it may not be unprofitable to cast about and see what the probable world's supply of zinc ore may be.

First of all the so-called Broken Hill Zinc field, of New South Wales, Australia, contains stupendous zinc ore deposits in the heretofore abandoned tailings of the silver-lead mines.

In November, 1905, was organized "The Zinc Corporation, Ltd.," with offices at Melbourne, Victoria, and a capital stock of $2,500,000, whose object was to purchase and treat these tailings to recover the zinc, lead and silver contents. This syndicate *then* had secured control of almost 6 million tons of tailings, averaging 17 to 22% zinc; 6 to 7 oz. of silver and 6 to 10% lead to the ton. The holdings of the syndicate were then estimated to be in metallic contents:- 900,000 tons of zinc; 22 millions ounces of silver; and 360,000 tons of lead; representing at that time at current market sales a value of over 132 million dollars.

The vast wilderness of Mid-Africa gives promise of producing large tonnage of zinc ores. Not far from the great Zambesi Falls zinc is quarried out of the kopjes and calcined on the spot; it is 50 to 60 per cent. zinc and the cost of mining and sending the ore to Wales is $19.50 per ton; it costs $14.60 to reduce the ore to spelter; and therefore $34 to make a ton of spelter. As the ore averages 50 per cent. metal the spelter cost was $68 per ton, when the London price was $130 per ton. Some time ago it was estimated that the mineral tonnage in sight was 750,000 tons.

For the fiscal year ending June 30, 1906, free and dutiable zinc ores to the value of $813,000 (quantities not given by collectors of customs) were imported from Mexico: and for the year ending June 30, 1907, there were imported from the same country 66,500 tons of calamine, valued at $11.79 per ton and 23,000 tons of dutiable zinc ore valued at $14.75 per ton, making a total for the year of 89,500 tons of zinc

ore, valued at the sum of over $1,123,000: an increase for the year of 1906-07 of over 38 per cent. over the value of the preceding year.

Colorado for the year 1905 mined zinc ore which produced four million seven hundred and seventy-five thousand dollars of spelter and in 1906 the spelter production was five million three hundred thousand dollars worth. Wisconsin in 1906 produced about forty thousand tons of zinc ores.

It is well known that many new fields are being developed in the United States; that the domestic production of zinc ore is rapidly increasing; and that the annual output of the high grade Missouri mines is more than holding its own. Therefore, the conclusion is inevitable, that the total domestic production of zinc ore must soon supply the spelter requirements of the country. If we must have competition, then let us compete among ourselves, and not with those who are not of our blood and whose methods of life and ideas of government are far beneath our standards.

In the first session of the 59th Congress, the Hon. C. M. Shartel introduced House Bill 3030, which was referred to the Committee on Ways and Means and ordered to be printed. The bill was introduced by request of the ore producers of this district and has never been reported by the committee.

This bill possesses many good features and, if it were now law, would undoubtedly give the domestic zinc miners a fair modicum of protection. It provides for a specific duty of 1 cent per pound upon the zinc contained in all zinc-bearing ores. Section 2 provides:

"That the term 'zinc-bearing ores' means all ores, whether crude, concentrated or otherwise, which contain zinc in any form or condition, either free or in combination, and in which the zinc is of more value than any other single component, irrespective of whether such ores are lead-bearing ores or not. Such value shall be determined as of the time and place of importation."

The draughtsman of this bill is a gentleman long experienced in the practice of tariff law and it may seem self-flattering for me to raise objections thereto.

But we find the bogey of "component material of chief value" between lead and zinc expressly provided for in the above quoted section. The bill should be so drawn as to relieve us of such tribulation.

The zinc ore and lead ore importers should not be relegated to the situation which existed prior to the McKinley act of 1890, between silver and lead ores.

Suppose the average stable price of lead ore to be $60 per ton and that of zinc ore to be $45 per ton; and the specific duty on lead to be 1½ cents per pound on the lead contents; and upon zinc to be 1 cent per pound on the zinc contents. It will be found that 1143 pounds of zinc ore exactly equals in value 857 pounds of lead ore. The duty on the zinc contents is $11.43; the duty on the lead contents is $12.85; a difference of $1.42½ more for the lead contents.

No Mexican mine probably produces such ore; but what nature has failed to do artificial means may do, if it should prove profitable to the importer to try it. I speak not of probability but possibility. While the mixing of ores for the purpose of securing favorable tariff duty may involve moral turpitude, it seems not to be a fraud against the government.

The treasury department many years ago (T. D. 9492) issued stringent regulations prohibiting the mixing of ores to raise the silver contents and thereby escape the duty on the component lead contents. Yet we find in one case (In re Chichester, 48 Fed. 281) the deliberate mixing of the ores from several mines, so as to give the ores a high content of silver, and to make the importation dutiable only on the lead contained, instead of on its gross weight as lead ore. Upon appeal to the board of general appraisers it was held that "there is nothing" in the law "to warrant a discrimination against the importation of mixed ores. * * * There is no such * * * prohibition in regard to ores of any kind, and no such discrimination can be lawfully made, except after further legislation by Congress."

The case was appealed to the Circuit Court of the United States, but the main question was left undecided. For a long time since then the mixing of ores still continued in reliance upon the opinion of the board.

So with the fluctuating prices of lead and zinc ores, it might be profitable to import lead and zinc ores so mixed, and after importation by concentration to separate the two minerals at a low cost and market each at the appropriate smelter.

The equitable procedure seems to be to cast to the winds the classification by component material of chief value and impose the specific duty on the lead and on the zinc, contained in the same importation. Under such law, the lead smelter will import for the lead contents and the zinc smelter for the zinc contents. There will be no object for chicanery; and protection is dispensed with an even hand to both lead and zinc producers of the United States.

I believe the bill should contain a specific repeal of par. 514, which places calamine (an ore of zinc) upon the free list; and should make it dutiable as a zinc ore. There would then no loophole for argument as to the implied repeal of that paragraph.

Whether 1 cent per pound duty on the zinc contents of the ore is adequate protection is a question of perplexity. It may be assumed that the price of zinc ore and the consequent price of spelter may be put so high that the consumer may curtail in large part his use of the metal and use a substitute which may be procured at a less price. To this extent the demand for a specfic duty on zinc ore must be exercised with discretion.

It is interesting, however, to note that $60 lead, 80 per cent standard, and $45 zinc, 60 per cent standard, sell for exactly the same price per pound of metallic contents.

But during the years 1905 and 1906 and the nine months of 1907 the Joplin price of lead ore has averaged $71.04 and the price of zinc ore has averaged $45.51 per ton.

The fact that the metallic lead has brought almost .89 of a cent per pound and that metallic zinc has brought a little more than ¾ of a cent per pound, may be significant. Is the fact that lead ore has sold 20 per cent. higher than zinc ore due to the protective duty upon lead? Would zinc ore have sold higher had the law given adequate protection to it?

The fair query then is, why, if for years the duty of 1½ cents per pound on lead has proved satisfactory to the producer, smelter, and consumer of lead, is not the same rate equitable for zinc ore?

Not including the production of New Jersey, we find that the domestic production of zinc ore for the year 1904 was 413,000 short tons; for 1905, 434,000 tons—an increase of 5 per cent; and for 1906, 500,000 tons, an increase of 15 per cent.

The importation of zinc ore for 1904 was an unknown quantity; in 1905 it was 41,000 tons, about 9½ per cent. of the domestic production; and for 1906 it was 89,500 tons or 18 per cent. of the domestic production; and about 31¾ per cent. of the entire Missouri-Kansas output.

In 1906 the imports of lead were about 16 per cent. of the domestic production.

It is undeniable that with the rapid development of Mexico, the building of railroads, and the future discovery of mineral products, the United States will be more and more the outlet and market for these zinc ores. The extor-

tionate price of fuel in Mexico almost precludes the smelting of ores there.

If the Mexican export of zinc ore in 1906 was over 31 per cent. of the production of this district, who can tell what it will be for 1907 or prophesy its magnitude in 1908 and succeeding years? How are we to know whether the vast product of Australia may not seek a market here?

It behooves the zinc producer of the United States to guard well the future. Unless a tariff is demanded of Congress and secured which will be protection to the fullest extent, it may be a sorry day for the mine operator and the mine laborer too.

The smelter has always been alert to his interests, for there is duty on all manufactured forms of zinc; zinc in blocks or pigs, is protected by a duty of 1½ cents per pound; in sheets, two cents per pound; and even zinc "old and worn out, fit only to be remanufactured, one cent per pound."

Even "articles or wares * * * composed wholly or in part of * * * zinc * * , and whether partly or wholly manufactured," have a high protective wall around them of 45 per cent ad valorem.

The paint schedule says that zinc oxide and white paint or pigment containing zinc, shall be dutiable at one cent per pound; when ground in oil 1¾ cents per pound: white sulphide of zinc 1¼ cents per pound; and chloride of zinc and sulphate of zinc one cent per pound. The producer of the raw material alone is without his protection.

Along the lines suggested in this paper, I venture to propose a form of bill, placing a duty on zinc ore, which, if Congressional action can be secured before a probable general revision of the tariff subject, is so moulded as to be an amendment to the lead paragraph of the Dingley Act of 1897. It fully meets the requirements of the domestic zinc miner, it is adverse to no interest of the domestic lead miner or smelter, and it is confidently believed to be free of the apparently objectionable features which are contained in said House bill 3030.

An Act to define the duty on lead bearing ore and zinc bearing ore and to determine the method of sampling and assaying the same; to amend paragraph 181 and to repeal paragraph 514 of an Act, approved July 24, 1897, entitled, "An Act To provide revenue for the Government and to encourage the industries of the United States;" and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That paragraph 181 of an Act, approved July 24, 1897, entitled, "An Act to provide revenue for the government

and to encourage the industries of the United States," be, and the same is hereby, amended so as to read as follows, viz:—

181. Lead-bearing ore of all kinds, one and one-half cents per pound on the lead contained therein; zinc-bearing ore of all kinds, including calamine, one cent per pound on the zinc contained therein: *Provided*, that all ores imported, which shall contain both lead and zinc, shall pay the above specified duty upon the lead contained therein and also upon 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 warehouses 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 customs 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 provisions of this paragraph.

Sec. 2. That paragraph 514 of said recited Act, and all acts and parts of acts inconsistent with the provisions of this act be, and the same are hereby, repealed.

Sec. 3. That this act shall take effect and be in force upon its passage and approval.

And now may I engage for a short while in discussing a matter not exactly germane to the main subject—the question of *policy* of the domestic zinc operators in demanding a specific duty on zinc ore? Regardless of party creed, all operators of this district demand an adequate import duty upon the mineral. We are now a unit in the court litigation seeking to impose on zinc ore a meager protective duty of 20 per cent. ad valorem.

The Joplin zinc industry 10 years ago was in value 3 and 3-4 million dollars; five years ago about eight million dollars; last year over fifteen million dollars. The value of production still increases. And while the local mining industry is not exactly infantile: the districts of Wisconsin, Colorado and elsewhere are of more tender age; and the aggregations of districts needs protection.

The domestic operators produce the raw material, and have no protection; the smelter sells the manufactured product and enjoys adequate protection. It is the same situation which confronted the farmers under the Wilson Bill:—free trade in raw wool—tariff on woolen textiles. The Dingley bill righted that wrong; you all well know the result.

Five years ago six to ten thousand dollars was the cost of an average mill under the then existing mining conditions; today, fifteen to twenty-five thousand dollars is the price of a good plant under our present mining system. Years ago, short lived soft ground mines, with high mineral values, were operated: today less than three per cent. sheet ground mines with large mineral area, are profitably operated; then wages were much lower and labor hours longer: today wages are very high and the eight hour underground law is rigidly enforced. High wages and the labor law are not objected to by the mine operator, other things being equal.

If the smelter succeeds in the present tariff suit and no duty is placed on zinc ore, then one of two results must follow, either the low grade sheet ground properties must close indefinitely or else the price of supplies and labor must be largely reduced. Labor amounts to sixty per cent. of the operating cost. We prefer to pay to labor the present prices and have an adequate stable price for our mineral output.

The average importation of zinc ore from Mexico still continues; for the months of July, Aug. and Sept., 1907, it aggregated 22,000 tons. If we must compete with Mexican ore, then in a way we are driven to compete with Mexican mining conditions. To the miners, I assure you, this is no dream.

Let me call your attention to the wage scale of a large Mexican mine. These figures are authentic:

Mine Employes:—

Foreman	$2.85	to	$5.00	per	day
Shift Boss, 8 hours	1.71	to	2.14	"	"
Hoistmen, 8 hours			2.00	"	"
Common laborers, 12 hours	.25	to	1.00	"	"
Muckers, 8 hours			.65	"	"
Blacksmiths, 12 hours	.75	to	1.75	"	"

Blacksmith helpers, 12 hours.....	.35	per day
Compressormen, 12 hours	1.28	" "
Mill Employes:—		
Clerk, 8 hours	$18.00	per week
Ore Weigher, 8 hours	10.00	" "
Wilfley Concentrator man, 8 hours.....	1.50	" day
Zinc room man, 8 hours.....	3.00	" "
Common laborer, 8 hours.....38 cts to	1.00	" "

These figures are in Mexican coin; worth less than one-half the value of U. S. money. Compared to the scale of wages existing here, the Mexican wages are one-ninth to one-half our scale of prices.

There are at least 8,000 miners in this district; the weekly pay roll probably reaches the sum of one hundred and fifty to two hundred thousand dollars. This money is immediately circulated among local merchants. Cut this by one-fourth or one-half and the result would be most disastrous to general business.

Protection in principle is intended to foster infant industry; also to prevent ruinous competition of foreign trade with established domestic industry; and last, but not least, to enable the domestic industrial concern to pay a higher wage to labor than it could do if subjected to foreign competition based on the wage of the laborer who is un-American in habits, may be semi-civilized; and whose living necessities may be measured by scant requirements. Adequate tariff duty on zinc ores is defensible under all three of the heads above mentioned.

It is safe to assume that domestic investment in zinc mines is many fold in excess of the amount of investment in smelters. As an industry the mining is of greater financial importance than is the smelting of ore. The golden rule of business and legislation therefore should be to give adequate protection to the producer of the raw product, as well as to the manufacturer of the metal.

It is said that the recent reported increase in Mexican freight rates, by order of the president of that country, will eliminate zinc ore shipments to the U. S. and relieve us of the need of statutory protection. My answer to that proposition is that the domestic operator and laborer should have the situation more securely in hand, than it possibly can have when its dependence is based upon some foreign potentate's embargo, or the whim of a railroad directorate.

The domestic zinc mine operator must have the bulwark of specific duty. And to your Senators and Representatives, from now on, let that be your unceasing slogan.

How Long Will Our Coal Supplies Meet the Increasing Demands of Commerce?

BY EDWARD W. PARKER, WASHINGTON, D. C.

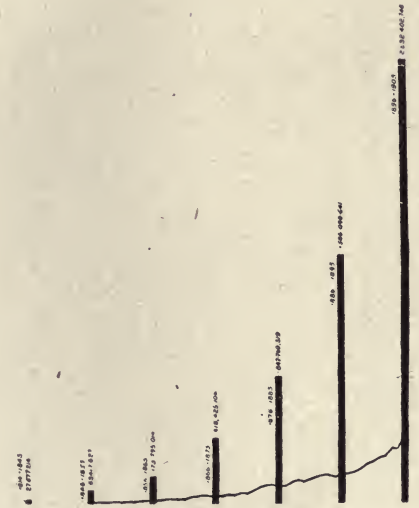
The story is told in Canada of an old lady whose faith is of the kind that moveth mountains. She lived some distance from the beaten paths of commerce, and modern methods of heating and lighting were unknown to her. But one day her son, who had been "to the city," brought home with him a kerosene lamp and a can of oil. She naturally inquired what the oil was and whence it came, and on learning that it was petroleum or rock oil, she commanded her son to take it back—she would have none of it. She could not understand the wickedness of men who were stealing from the Lord the fuel that He had stored in the world for the purpose of consuming it when time should be no more.

We are not called upon to interpret in what manner the promise of the destruction of the world by fire shall be brought about, but certain it is that man is consuming at an enormous rate not only the combustible material stored beneath the surface of the ground, but we are told by Mr. Pinchot that the forests that formerly seemed inexhaustible will have been practically destroyed by the middle of the present century, if the present rate of destruction continues. The use of wood for fuel is not so great proportionately today as it was a century ago, but other demands upon the forests have taken its place. A recent report of the Forest Service states that the present annual consumption of firewood is about 100,000,000 cords, valued at $350,000,000, and that the total forestry consumption represents about 20 billion cubic feet, worth nearly $1,100,000,000. The consumption of lumber has increased more rapidly than the population. My reason for referring in this paper to the forest destruction will be shown later.

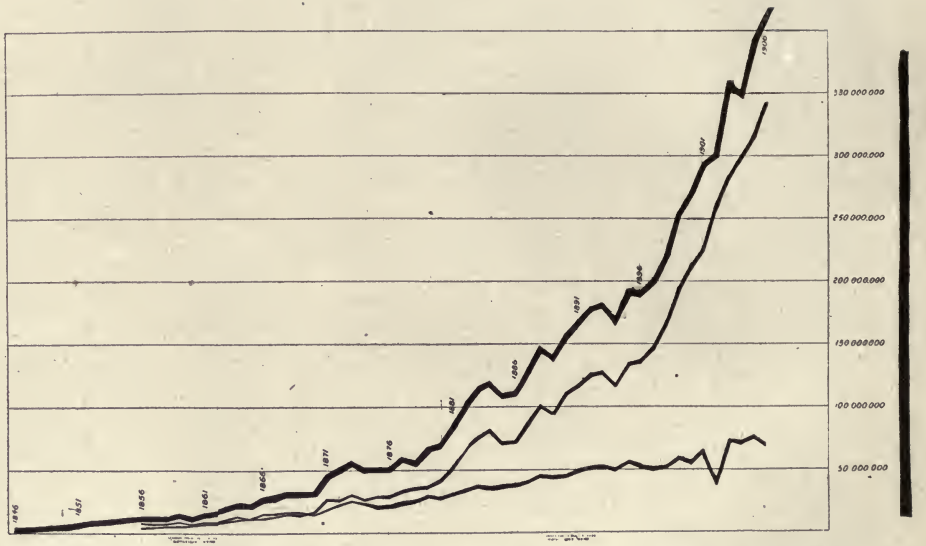
The subject assigned to me for this meeting by your distinguished secretary is "How Long Will the Supply of Coal Meet the Increasing Demands of Commerce?" The question is one to which, of course, no accurate reply could be given, for the answer is predicated upon the determination of one unknown and unascertainable quantity, and that is the rate of increase which the demands of commerce will take. Other and scarcely less important factors also enter into the solution of the problem. Among these may be mentioned the improvement which must be brought

about in (1) the methods of mining, assuring a greater percentage of recovery from the mines and a larger proportion of usable fuel and less waste and inferior coal (by inferior coal I mean slack coal or fines which are sold at low prices, or not at all); (2) processes for using economically the slack or low grade coal; (3) more efficient methods of combustion which will increase output of energy per unit of fuel consumed; (4) the utilization of other forces of nature which will to greater or less extent diminish the drain upon our coal supplies. Much is already being done and more will be done in the development of better methods in the mining, preparation and utilization of coal. The government, through the Technologic branch of the United States Geological Survey, is spending thousands of dollars in the way of scientific investigation of fuel utilization, and although this work is of recent inauguration, having had its inception at the Louisiana Purchase Exposition, highly valuable results have been obtained, and these are being published and gratuitously given to the public as fast as they can be compiled and published. I shall not attempt to go into these, as I understand you are to have a paper by Prof. Joseph A. Holmes, under whose direction this work is being conducted. I will only mention the fact that one of the results accomplished during the Exposition period was the demonstration that producer gas for power purposes could be made from bituminous coal and lignites with an increase of from 200 to 300 per cent. over the efficiency obtained from a steam power plant. It is significant, too, that when one of the gas engine manufacturers was approached with a proposition to install one of his engines as a working exhibit at the St. Louis Exposition, the proposition was declined because of want of belief that producer gas from bituminous coal could be so used. I speak from personal knowledge on this point, for I did the approaching. One of the coals successfully used at this exposition plant was a California black lignite or sub-bituminous coal containing 8 per cent. sulphur. I am informed by Prof. Fernald, in charge of the producer gas investigations of the Technologic branch, that 66 2-3 per cent of the power represented by the installation of producer gas plants during the last year are for using bituminous coal, while 80 per cent. of the number of plants are designed for anthracite.

As to the utilization of other forces, the development in the harnessing of water courses which has been made possible through the long distance transmission of power by electricity is one of the wonders of the present time. The great Susquehanna river is being dammed at McCalls Ferry,



Production of Coal in the United States by Decades to 1905.



Ratio of increase in Coal Production in the United States by Decades.

Pennsylvania, for the purpose of sending power electrically to Baltimore and Philadelphia, two cities a hundred miles apart. The power of Niagara Falls is being utilized to a great extent already, and it is a momentous question as to whether we can better afford to permit what remains to be used for power or to preserve it as one of nature's art works. Is it better to use it for utilitarian purposes or for its beauty and grandeur? I am sufficiently uncommercial to hope for the latter.

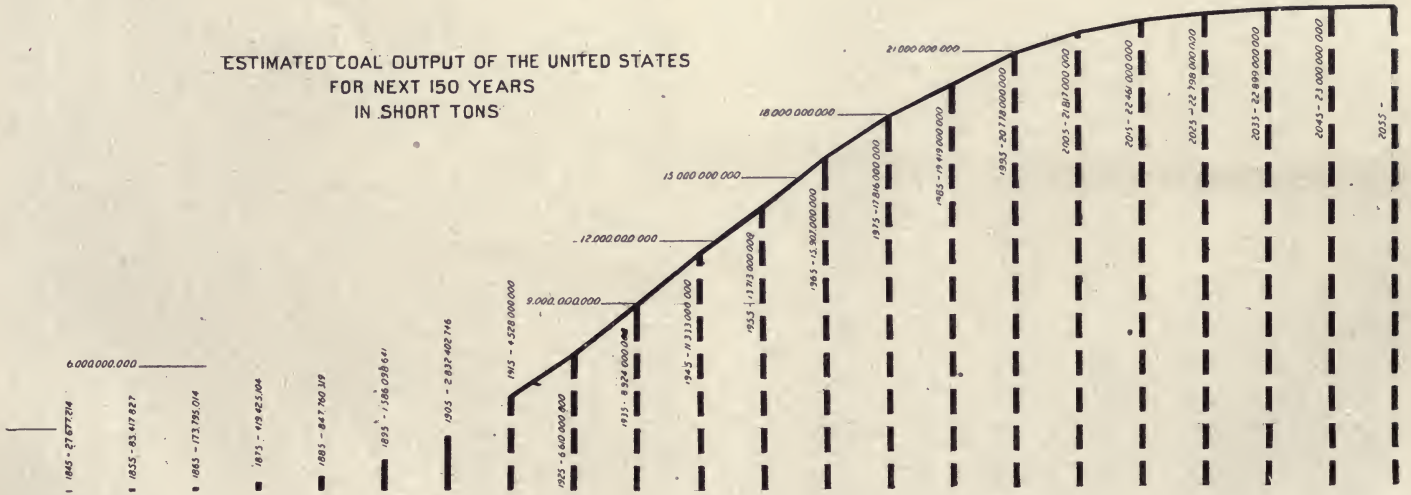
As to the interesting demands of commerce on our coal supply, our only method of forming an opinion on this point is from what has preceded (as Patrick Henry once remarked, "We have no way of judging of the future but by the past"). And our past, so far as coal mining is concerned, presents an interesting history. I have prepared and present here a chart which illustrates better than I can tell in figures the rapid, almost phenomenal, growth of our coal mining industry. It shows the total production of coal in the United States for each ten years to the close of 1905. Each decade shows an output approximately double that of the preceding one, which means that the production in each ten years has been equal to the production up to the beginning of that decade. How long can or will this continue? Let us prolong the curve as it would show for the future if this history were to continue. I have done this on another chart, which is on a scale of about one-eighth of the one showing our record in the past. It will be noticed that while the production has approximately doubled, there is a decreasing ratio in the percentage of increase during each decade. For instance, the total production of coal from the earliest times to the close of 1845 was nearly 28,000,000 tons. In the decade for 1846 to 1855, inclusive, the production was something over 83,000,000 tons, or practically three times the total production to the beginning of that decade. In the ten years ending in 1865, the total production was 174,000,000, an increase of about 70 per cent. over the total production for the beginning of that decade, but this was the period in which the Civil War occurred, and coal mining, like all other industries, suffered a relapse. Moreover, the records of production for that period are incomplete, and it is possible that the actual tonnage was more than we have recorded. In the ten years from 1866 to 1875, the coal production amounted to nearly 420,000,000 tons, and it was in this decade that the wonderful development in the coal mining industry actually began. The production for this ten years was two and one-half times that of the preceding ten years and was 35,000,000 tons in excess of the total production up

to the beginning of the decade. In the following decade (that ending in 1885) the production was again somewhat more than doubled, but not in the same proportion as in the preceding ten years. The production in the decade ending in 1895 was 87 per cent. larger than that of the preceding one and was over 30,000,000 tons in excess of the total production to the close of 1885. In the ten years from 1896 to 1905 this country produced 2,832,403,000 tons, an increase of 78.5 per cent. over the preceding ten years.

If we can assume that the production will continue to increase with the decreasing percentage ratio, the production for the decade ending in 1915 would be 60 per cent. over that of the decade ending in 1905, and the total production for the ten years would be 4,530,000,000 tons, or an average of 453,000,000 tons per year (our production last year was 414,000,000). In the next ten years there would be an increase of 54 per cent. and the production for the ten years would amount to something over 6,600,000,000 tons. If we prolong the curve in this way for another hundred and fifty years we find that the production would become fairly constant between 2046 and 2055, with a decennial production of approximately 2,300,000,000 tons a year, as compared with the production of the present time of something over 400,000,000 tons.

The anthracite fields of Pennsylvania have been pretty thoroughly studied, and it is generally accepted that if the production were to continue at the present rate of about 65,000,000 long tons a year, the supply would be practically exhausted in between 70 and 80 years. It is not to be assumed, however, that the production will be maintained at this rate and then suddenly cease, but that the decline would be gradual, and with possibly an increase in the percentage of recovery of the coal in the ground the total exhaustion of the fields will be put off for 150 to 200 years.

Mr. M. R. Campbell, in charge of the economic geology of fuel, has prepared with much care an estimate of the contents of our bituminous coal fields, and he places the quantity of coal in the ground when mining first began at 2,200,000,000,000 tons. From this there has been extracted, to the close of 1906, about 4,625,000,000 tons, and estimating that for every ton of coal mined there is half a ton lost, this represents an exhaustion of nearly 7,000,000,000 tons, or 32 hundredths of one per cent. of the supply. If we estimate that by 2055 the production would amount to 2,300,000,000 tons annually, and the percentage of recovery remains the same, the supply, in the light of present knowledge, would be exhausted in approximately 700 years. I am convinced,


ESTIMATED COAL OUTPUT OF THE UNITED STATES
FOR NEXT 150 YEARS
IN SHORT TONS
6.000.000.000
9.000.000.000
12.000.000.000
15.000.000.000
18.000.000.000
21.000.000.000
1845 - 27.677.214
1855 - 83.417.827
1865 - 173.795.014
1875 - 419.425.104
1885 - 847.740.119
1895 - 1.586.098.641
1905 - 2.832.402.746
1915 - 4.528.000.000
1925 - 4.660.000.000
1935 - 8.324.000.000
1945 - 11.333.000.000
1955 - 13.913.000.000
1965 - 15.302.000.000
1975 - 17.186.000.000
1985 - 19.419.000.000
1995 - 20.178.000.000
2005 - 21.217.000.000
2015 - 22.440.000.000
2025 - 22.960.000.000
2035 - 22.660.000.000
2045 - 22.000.000.000
2055 -

however, that before we have proceeded many years further our methods of mining and our methods of fuel consumption will have so improved that this waste will be materially decreased and that our descendants will recover from 90 to 95 per cent. of the supply. This is being done in some regions at the present time. This and the investigation of other forces of nature's may put off for many years the date of complete exhaustion.

I should like to call attention to the fact that the great increase in our production of coal has been due to our industrial development. In the middle of the last century, when the population of this country was 23,191,876 persons, the total amount of coal produced in one year was about six and a half million tons. This represents a per capita consumption of a little more than one-fourth of a ton. Ten years later the consumption was a little over one-half of a ton per capita. It should be remembered that at this time a large amount of the fuel used for household purposes, and to a considerable degree for manufacturing purposes also, was wood. In 1880 the consumption of coal had increased to one and one-half tons per capita and in 1906 it is estimated that the per capita consumption was almost exactly five tons of coal. So that in a little over 50 years the per capita consumption has increased from one-fourth of a ton to five tons—twenty times. It might be well to mention here that the fuel consumption of wood in the middle of the last century is possibly more than replaced by our present consumption of petroleum and natural gas, for in addition to the coal consumed in 1906 we used nearly 400,000,000,000 cubic feet of natural gas and 126,500,000 barrels of petroleum. The natural gas consumed was equivalent to approximately 18,000,000 tons of coal. About 80 per cent. of the petroleum produced, or say 100,000,000, was burned in making light or heat, which would have been equal to the consumption of 25,000,000 tons of coal.

As I have stated, our production of coal in 1906 was 414,000,000 short tons. The total production of the world was 1,000,000,000, short tons. In the combustion of each pound of coal about two and one-third pounds of oxygen are taken out of our atmosphere and three and one-third pounds of carbonic acid are given off. Take the combustion of the United States product alone and ignoring what additional supply is added by the consumption of oil and gas by the exhalation of man and animals, the quantity of carbonic acid thrown into the atmosphere last year by the consumption of coal in this country was approximately 3,000,000,000,000 pounds. What becomes of it? One of the great consumers

of carbonic acid is the forests, and these, as I have pointed out, are being used up even faster than the coal. It is true that the cultivation of our farms and the raising of our enormous crops of corn, of wheat, of hay, of vegetables, etc., provide for the consumption of this product of fuel combustion, but will they be able to do so if we continue to increase the production and consumption of coal as indicated by the chart? One scientist has told me that the corn crop of Kansas will take up as much carbon dioxide as all the trees cut in a year. I am not in a position to deny it, but I am inclined to doubt it. On the other hand, leaf decay and the oxidation of plant life year by year, form another source of carbon dioxide which probably equals the consumption of it by growing vegetation. In fact, no less an authority than Kelvin has been credited with the prediction that the supply of oxygen will be used up before the supply of carbon as represented by our coal beds and forests. This would produce a condition that would make the earth uninhabitable by man, but, before that time arrives, we may rest assured that man's genius will have so subdued and utilized the forces of nature that the need for the combustion of fuel in the production of heat, light and power, will have passed.

I have shown that, assuring a certain ratio of increase in our production of coal when the supply may be expected to fail, and while there is no fear of an immediate exhaustion, it is also true that our best and cheaply mined coals will, at the present rate of drain upon them be largely depleted by the end of the next century. We are taking the cream and leaving the skim-milk. The users of anthracite coal in the East are already feeling the effects of the lessening supply, and we will do well to heed the warnings which bid us practice greater economy in the mining and utilization of our fuel supplies.

Prospecting for Oil and Gas

BY DR. ERASMUS HAWORTH, LAWRENCE, KANSAS.

My theme is "Prospecting for Oil and Gas," by which is meant going out into new territory and discovering and opening up new oil and gas fields. If we have advanced far enough in gaining knowledge of the origin and hiding places of these important products of Nature's laboratory to understand the fundamental principles by which Nature was governed in their compounding, then we ought to be able to carry such prospecting beyond a mere wild search and accidental discovery and we should have our actions based upon some fundamental working hypotheses.

Prospecting for any mineral substance intelligently must presuppose at least some knowledge of its usual occurence and its usual association with other materials; at least some knowledge of its origin and the natural conditions governing its existence. If this is not correct, then all science and learning are mockery in this particular and the "Open Sesame" of the Ancient with his wand remains the only guide. Certainly with our boasted knowledge and learning of the twentieth century we will not admit this. And yet our knowledge of fundamentals is so limited, and minerals and ores and precious gems have been so successful in choosing their hiding places that thus far in our history, it must be confessed, many of the most valuable discoveries have been made by accident.

There seems to be a certain association of minerals and of mineral materials which results in our considering the occurrence of certain things as signs of something else. We have, for example, "coal blossom," the expression meaning that something discovered indicates the presence of coal, an idea gained by experience that this "something" is associated with coal, and having found the first, proper search will reveal the other. Likewise, we have "mineral blossom" for gold, for silver, for lead, for copper, and for every other material usually mined. Then again, we have a certain knowledge of geographic distribution gained by centuries of experience. Such experience will prevent our searching for gold or silver or copper or other metalliferous deposits on the broad plains and fertile fields of the great Mississippi Valley region excepting in a few localities. But after a fashion this is begging the question, for we should know

more fundamentally why the areas named do not contain the ores mentioned.

It is my firm belief that when we have sufficiently assembled all knowledge of association of materials, we will be able to place prospecting on a firm and scientific basis. Already we do not seek for coal in granite rocks. And why? Because we have never yet found the two associated. We understand the processes of Nature forming granite are in a measure antagonistic to the processes forming coal, and, therefore, they could not be associated. In our search for the metals, we go to mountainous districts, or to regions where natural forces have greatly disturbed the outer part of the earth, making many fractures and fissures in which valuable deposits could be placed; and we avoid areas where no disturbances of Nature have occurred and where the rocks are soft and friable so that fissures and openings could not remain in existence, even were they once formed. This custom is so well established that we follow it almost unconsciously and possibly without asking or answering the question why. We have the experience of the entire human race for many thousands of years to support us in such actions.

Let us occupy a few moments in looking over occurrences and associations of oil and gas in an effort to learn whether or not we may be equally wise in searching for these materials.

The first great general conclusion based upon experience and observation is that oil and gas almost always are found in a porous rock rather than in genuine fissure veins. Sandstone is the most uniformly porous rock known, and almost all the oil and gas known to man have been found in sandstone. Apparently, however, the reason for this is not because the sandstone is sandstone as such, but simply because it is porous and open. Throughout the great oil fields and gas fields of Western Ohio and Indiana oil and gas exist in a limestone which, by one of Nature's mysterious processes, has been made broadly porous, imitating in this respect an ordinary sandstone. In portions of California oil occurs in a metamorphosed shale which has been rendered hard and porous by metamorphic processes. It would seem, therefore, that the important fact here is that sandstone is porous and forms a natural receptacle or storeroom for the oil and gas, rather than a laboratory in which they are compounded.

Another great fact of observation is that in every oil field thus far developed, a bed of fine-grained, compact shale

or clay overlies the porous stone or receptacle, which serves as a blanket or covering to hold the materials in and keep them from escaping. This covering, or blanket, varies greatly in thickness in different places, but apparently is everywhere present. It would seem that it is an essential association.

The two observations just named are fundamental in importance. They prevent our hope of finding oil or gas in a sandstone immediately at the surface, and equally prevent our prospecting in regions where we know no porous rock exists. We would laugh at the man who would begin drilling in solid granite in a search for oil. It becomes desirable, therefore, to learn all we can regarding the way nature prepared these underground receptacles—the sandstones and the porous limestones. Many inexplicable conditions are observed in oil fields, inexplicable until we study Nature's processes in making sandstone.

I know an instance, for example, where a line of good oil wells had been drilled nearly a mile in length. Later, a well was put down between two of the old wells, which were 600 feet apart, and this last well found no oil, much to the surprise of everyone who knew about it. But upon investigation it was learned that the last well found no sandstone where the sandstone was expected. The explanation clearly is that, along the old sea beach on which the oil-bearing sandstone was formed elsewhere, a mud-bank, due to the particular combination of beach line and river mouth, had been formed, and the dry well penetrated a place where eddies deposited mud, while sandbeds were forming on either side.

Oil fields in general have been discovered by prospectors attracted by surface indications. Usually leaks or springs bring oil to the surface and prospectors have placed their drills nearby. We owe a great debt of gratitude to such prospectors and, in fairness, it should be stated that to them belongs nearly all the credit of having discovered every important oil field thus far developed in America. It was the accidental discovery of oil in boring for salt brine in many places throughout the Appalachian region which prompted the supporters of Colonel Drake to drill his famous well in Pennsylvania. It was the accidental discovery of escaping gas and oil in many places which led the prospector to make discoveries resulting in the development of many other fields. According to a personal letter received from Dr. G. W. Brown, now of Illinois, it was the discovery by him of asphalt in Miami county, Kansas, which

led to the drilling of the first well near Paoli, which must be reckoned as the starting point of development in the great Mid-Continental field.

And yet, in the aggregate, I venture to state that seaps and springs and escaping gas have led to a larger number of failures than successes. Such springs clearly show that oil and gas exist in a given territory, but they fail to show details of where to drill in order to get the good well. Nearly forty years ago, springs were found on a mountain side in California, but the wells drilled as a result of the discovery in general were total failures. The reason was that the prospector neglected to study his territory carefully and to learn from what particular formations the seaps were derived. Unfortunately, the drill was placed so that it went directly away from the source of oil rather than towards it.

In early days quantities of asphaltum were found in Cherokee county, Kansas, east of the Neosho River, and ever since the discovery, periodically, first one party and then another have taken leases in that vicinity with the hope that, by drilling deeper, large quantities of oil would be obtained. Here again disappointment has always accompanied honest efforts simply because the leaks come to the surface at a place far removed from the bodies of oil and the drill progresses in a wrong direction.

The Mid-Continental oil field, which lies astride the state boundaries between Oklahoma and Kansas, is now reckoned as one of the greatest ever discovered. During the calendar year 1907, it will produce about 40,000,000 barrels of oil, probably the largest amount from any one field in the United States. Throughout this entire field, oil is found in sandstone, not one individual sandstone bed, but in many. The field is much more spotted and uncertain than some others. Operators long ago ceased being discouraged by bringing in a dry well, or over-enthusiastic by bringing in a good one. The Mid-Continental field has many individual pools, each one limited in its extent in every direction. No two of them are exactly alike in conditions of thickness of sandstone or distance below the surface. But they are all closely similar in that the oil and gas occur in sandstone which has a firm, compact layer of shale overlying it. It is not uncommon for the drill to pass through a number of different sandstones, each one of which may be productive of oil or gas.

In order to portray a proper conception, let me liken the formation to a series of shelves in a kitchen cupboard, the shelves proper to be composed of limestones and the in-

tervening spaces to be filled with shale beds here and there carrying lenticular masses of sandstone. The drill, starting at the top, will pass through shelf after shelf of limestone with shale and sandstone intervening. These formations vary greatly in thickness, that is, the shelves are unequally distant apart. In some places, a half dozen or more sandstones will be passed, each one of which is filled with water that must be cased off in drilling, and a lower sandstone found so full of oil that more than a thousand barrels per day may be obtained from one well. Some of the sandstones are filled with gas instead of oil. Here a gas-bearing sandstone overlies the oil and there it underlies it. The shale beds between may be thick or thin, ten or twenty or thirty feet, or a hundred feet or more. It is not proper to say that the gas is shallower than the oil or that the oil is shallower than the gas. Often we have strong flows of gas above oil-bearing stones, but quite as frequently the gas lies below the oil.

In one very important respect the Mid-Continental field differs strongly from any and all oil fields farther east. Here there seems to be almost a total lack of important structural relations. In the Appalachian region, we have great broad anticlinal ridges and synclinal troughs which, in a measure, control the location of oil and gas. An anticlinal ridge is simply a fold where Nature has bent the rock strata upwards. It seems that when a gas body exists underground, the gas is trying to escape upwards and may be caught in this arch, or roof, provided our familiar fine-grained shale bed constitutes the roof. As gas is lighter than oil, it will lie on top of the oil should the two exist in the same sandstone, and as oil is lighter than water, the oil will lie on top of the water, should they exist in the same sandstone. In regions where anticlinal ridges exist, therefore, one should follow them in search for gas, and after the gas has escaped, oil may be obtained from the same wells, which, in turn, may be followed by water after the oil is exhausted. One eloquent writer, in describing the Appalachian region, said that the anticlinal ridges might be traced by the torchlights of the gas wells and the synclinal troughs lying between were accurately outlined by the dark valleys where no gas light could be found.

Many have searched in vain for well-defined anticlinal ridges and synclinal troughs in the Mid-Continental area. Here and there, locally, small and illy-defined anticlines have been discovered. Usually they are productive of gas, but occasionally they overlie mud-banks along the beaches of the ancient seas and, therefore, the necessary porous

sandstone does not exist. The absence of this important structural relation, which may be determined by surface conditions, makes prospecting in the Mid-Continental field correspondingly more hazardous. An extended study of the records of hundreds of deep wells reveals another important great general fact. The individual sandstone beds in the Mid-Continental field have a lesser horizontal extension than those of a number of other places. This is the immediate reason for the existence of so many pools.

The old Iola gas field, for example, had comparatively definite outlines, or perifera, uneven in direction, with an area eight or nine miles in greatest length and from three to four miles in greatest width. Nearby, but outside of the old field, other gas wells of equal importance have been found which seem to be entirely separate and distinct. The gas pressure in the two is not the same and the exhaustion of one does not affect the other. The reason evidently is that in each case a lenticular mass of sandstone contained the gas and that away back at the time each sandstone was forming, conditions along the old ocean beaches were such that each sandstone area was surrounded by mud deposits which provided no openings or pores to serve as a sieve in later times.

A careful study of the geology of this region shows that the trend of the old beach lies in a general way nearly north and south. This is certainly the explanation for the long drawn-out, shoe-string-like shape of the Mid-Continental productive field. Examine a map of Kansas and Oklahoma on which is marked the productive area and it will be found to consist of a long, narrow strip reaching from near Kansas City, a little west of south, by way of Iola, Independence, Bartlesville and Tulsa, on southward to beyond the Glenn Pool, a distance of nearly 300 miles. In transverse direction, it is seldom to find an extent of more than ten per cent. of this measurement, although here and there it may be considerably increased. But throughout this great distance north and south, it is only occasionally that nature has been liberal in supplying oil and gas. This local area has it in great abundance and that area has non: and our ignorance of Nature's processes is so great that the wisest cannot explain why.

Prospecting for oil and gas in the Mid-Continental field, therefore, is exceedingly uncertain in detail, but comparatively certain and sure in a broad general way. It is detail, however, which makes or breaks the individual prospector. If a company sufficiently strong could be organized to drill a hundred or a thousand wells, regardless of suc-

cess or failure, it is practically sure success would meet their efforts. But the individual, or the small company that can drill only a few wells unless success is obtained at first, is likely to meet failure first and go to the wall, only to learn that his follower is successful with his first well.

This brings me to a most important point, one hinted at earlier, namely: What is the origin of oil and gas? I believe that if we knew the origin of oil and gas, we would know better where to prospect for it. If we could penetrate the mysteries of Nature sufficiently to understand her manufacturing methods and could learn where her factories are located, we would know more about where to search for her store-houses. At present, there are two main and conflicting theories regarding the origin of oil and gas. One is held in a tentative way by nearly all the working geologists who are familiar with field conditions in oil and gas regions. The other is held principally by chemists.

The first theory assumes that oil and gas represent products of decay of organic matter which was imbedded in rock masses at the time they were formed. It supposes that during the formation of shale beds and limestones a varying amount of organic matter was included in the rock masses. Such organic matter, it is supposed, being shut out from the oxygen of the air, passed through various stages of partial decomposition similar to the way organic matter decomposes at the surface of the earth, excepting that it was not oxidized. This would yield a complex series of products, gas, light oils, medium oils, and heavy oils, such that their varying gravities would arrange them, as far as possible, with the lighter above the heavier. As all of them are lighter than water, and as ground-water is almost everywhere present and is continuously being augmented by rainfall, the tendency would be for the ground water to drive them upwards, ever upwards and out at the surface, producing the various leaks, seaps and springs. Here and there where conditions were most favorable, the porous rock—sandstone, limestone, or hardened shale—occasionally would be met where the oil or gas might find a resting place, held in place by an overlying, impervious shale bed. The pressure under which a body would exist might be dependent on the distance from the surface, which is the same as the pressure of the water holding it in place, or it might in rare cases be increased by water at great depths crowding the oil and gas out of great depths and driving them towards the surface.

This explanation in general is fairly satisfactory, but the great trouble is, we cannot be real sure that it is cor-

rect. According to it, we would expect to find oil and gas close to where they are manufactured. Therefore we would search for them in porous rock masses surrounded by black bituminous shale or by other rocks which could have produced them by decomposition of contained organic matter, either vegetable or animal, or both.

The old idea that oil was produced from beds of coal clings to many and is the same as that just expressed, excepting that it is more contracted and probably correspondingly less likely to be correct. Oil and gas may have been produced from coal, but if so, it must necessarily be true that they have been produced in much larger quantities by the much greater aggregate of organic matter disseminated throughout the great masses of stratified rock in such a way that it would not ordinarily be called coal. Every black shale, every bituminous sandstone, every limestone, certainly has contained more or less organic matter and, to those who hold other views regarding the origin of oil and gas, it is difficult to explain what has become of the products of decay of this organic matter.

When I first began studying this subject, I was puzzled to know how sufficient organic matter could have been imbedded in rock masses to produce the vast quantity of oil and gas already discovered. Today I am puzzled to explain what has become of the vast quantity of organic matter that we know was imbedded in all stratified rocks. The matter of quantity, therefore, need give no concern. Not a drop of water enters the ocean from the dry land without taking at least a trace of organic matter with it. Throughout all geologic time, vegetation has covered the dry land areas. Each spring it has budded, and bloomed and matured the ripened fruit; each autumn the fruit and the grass and the leaves have fallen to the ground only to be swept down to the ocean in great measure by flowing waters and to be imbedded in the silt and mud and the forming sandstones and limestones and thus shut out from the atmosphere so that complete oxidation was impossible. What has become of all this vast amount of organic matter? To those who believe in the origin of gas and oil as above outlined, the answer is that a portion of it has been changed over into gas and oil and is now lurking here and there in the stratified rocks and is escaping in seaps and springs in countless myriads of places, but in tops of anticlinal ridges and sandstone beds and porous limestones overlaid by impervious shales it is awaiting the drill of the prospector for an opportunity to escape to the surface.

Another view of the origin of oil and gas has been advocated for many years which may be called the chemical theory. This chemical theory is based upon well-known chemical properties of matter. It assumes that at one time at least a portion of the matter of the earth was in a molten condition and that while in that condition, carbon united with different metals forming carbides similar to that known to exist in ordinary cast iron. Gradually, throughout geologic time, water has come in contact with these metallic carbides and has brought about a decomposition of the carbides, producing oxides of the metals and hydrocarbons. In our chemical laboratories such changes can be brought about so that there need be nothing surprising if oil and gas should be produced in this manner.

Suppose that at a proper distance beneath the surface where the temperature is considerably above surface temperatures, percolating water should find carbides of iron and other metals. The reactions above named probably would occur and a complex series of hydro-carbons would be produced which, under the influence of water pressure, would migrate towards the surface along whatever channels they might be able to find, would be filtered or strained through clays and stones of various degrees of porosity, and would ultimately be found escaping in seaps or springs, or caught in pools in much the same way as though produced by decomposition of organic matter, as already explained.

This chemical theory of the origin of oil and gas, apparently is gaining favor of late. It is an all-important question. If, by some good fortune, we can decide which theory is correct, or possibly could find that still a new and unheard of explanation is correct, then it seems we would be in a position to formulate rules to govern our actions in prospecting, rules which would lead to ultimate success. But so long as there is a doubt as to how oil and gas have been produced and where on the earth or in the earth Nature's factories have been located, or are located, provided they are still in operation, just that long it will be impossible for man to entirely satisfactorily establish working hypotheses to guide his actions. And so long as this doubt exists, surely we must proceed in our prospecting in a measure without being governed by that high degree of intelligence for which all of us are longing and striving.

The Deflocculation of Non-Metallic Amorphous Bodies

BY EDWARD GOODRICH ACHESON, NIAGARA FALLS, N. Y.

In the year 1901, I was engaged in a series of experiments having as their object the production of crucibles from artificial graphite. In this work I was led into a study of clays. What I learned may be briefly stated as follows:

1st. The American manufacturers of graphite crucibles imported from Germany the clay used by them as a binder of the graphite entering into the crucibles.

2nd. The German clays are much more plastic and have a greater tensile strength than American clays of very similar chemical composition.

3rd. Residual clays—those found at or near the point at which the parent feldspathic rock was decomposed—are not in any sense as plastic or strong as the same clays are when found as sedimentary clays at a distance from their place of origin.

4th. Chemical analysis failed to account for those decided differences.

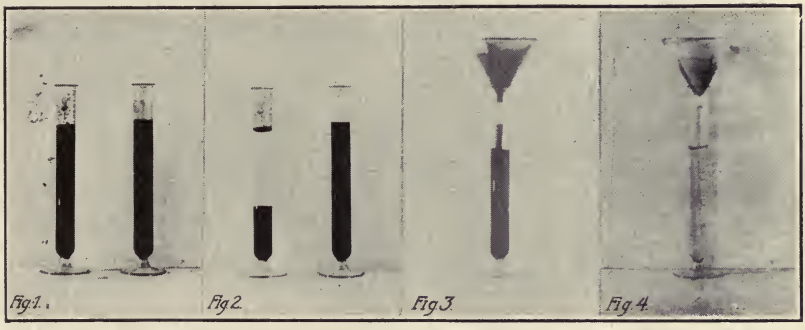
I reasoned that the greater plasticity and tensile strength were developed during the period of transportation from the place of their formation to their final bed, and I thought it might be due to the presence of extracts from vegetation, the washings from the forests being in the waters which carried them.

I made several experiments on clay with extracts of plants, tannin being one of them, and I found a moderately plastic weak clay, when treated with a dilute solution of tannic acid or extract of straw, was increased in plasticity, made stronger,—in some cases as much as three hundred per cent.,—required but sixty per cent. as much water to produce a given degree of fluidity, was caused to remain suspended in water and made so fine that it would pass through a filter paper. Being acquainted with the record of how the Egyptians had the Children of Israel use straw in making bricks, and how they substituted stubble for straw, and believing it was not used for any benefits derivable from the fibres but for the extract, I called clay so treated "Egyptianized Clay."

Having in 1906 discovered a process of producing a fine, pure, unctuous graphite, I undertook to work out the details of its application as a lubricant. In the dry form, or mixed with grease, it was easy to handle, but I wished it to enter

the entire field of lubrication as occupied by oil. In my first efforts to suspend it in oil, I met the same troubles encountered by my predecessors in this line of work,—it would quickly settled out of the oil. It obeyed the same laws covering the natural product.

So things stood until the latter part of 1906, when the thought occurred to me that tannin might have the same effect on graphite that it did on clay. I tried it with satisfactory results, the effect being obtainable with the natural graphites as found in the Ticonderoga and Ceylon varieties, and with the artificial product as found in Acheson-graphite. It was more essential and cheaply produced when the soft, unctuous variety of my graphite was used, this kind being composed of pseudo-morphs of carbide crystals, which had been decomposed in the electric furnace, the resultant graphite being very loose, porous and readily dis-



integrated and deflocculated. The effect was produced by treating the graphite in the disintegrated form with a water solution of tannin, the amount of tannin being from three to six per cent. by weight of the graphite treated. I found that while the effect may be produced in a very satisfactory way with distilled water, the waters as found in rivers, deep wells, etc., are improved by the addition of a trace of ammonia. The presence of carbon dioxide in the water will prevent deflocculation.

The accompanying Figures 1 and 2 show the effect of tannin in suspending graphite. Figure 1 is that of two test tubes, one containing water, a drop of ammonia and disintegrated Acheson-graphite; the other tube containing a similar amount of water, ammonia and graphite, with the addition of a little tannic acid. The photograph was taken immediately after the tubes were thoroughly shaken. Figure 2 shows the same tubes and contents, four minutes hav-

ing elapsed after being shaken, they not having been disturbed during that interval. These tubes furnish a very clear demonstration of the quick settling of graphite in plain water and the remarkable effect of the presence of tannin. All of the graphite put into the tube with the tannin did not remain suspended. In fact, in this case as illustrated, very nearly all of it had settled, only sufficient remaining in the water to give it its blackness. To cause a complete suspension of all the graphite necessitates prolonged mastication in the form of a paste with the water and tannin, and I find that after this mastication has been carried out that the effect is very much improved by diluting the mass with considerable water, and allowing it to remain some weeks with occasional stirring.

I have operated a masticator continuously for one month, without interruption, the machine having been charged with graphite and tannic acid made to a paste with water, and I afterwards found the graphite would remain suspended apparently for all time, not having shown any disposition to settle for a period of two or three months. In this condition I believe it is what would be called, by the chemists, "colloidal," but this word to me is wanting in significance and seems rather to be solely the name of a state or condition, and conveys no conception of the real condition of the body that is in suspension. I have adopted the name "deflocculated." This is a new word that is not to be found in the dictionary. Flocculation, however, is, and in the Century Dictionary I find it defined, as applied to chemistry and physics, as follows: "The union of small particles into granular aggregates or compound particles of larger size." If to this word we add the prefix "de," we have a word that would have the meaning of the undoing or resolving of the compound particles into their final molecular condition. I believe the body to be actually reduced to the molecular form, as I cannot conceive that the process of subdivision would cease at any definite point previous to the final subdivision to that form. When the subdivision has been carried to this molecular state, the body is apparently entirely free from the law of gravitation as we know it as applied to larger masses, and we have here graphite, which weighs approximately two and one-fourth times that of the water in which it is suspended, remaining indefinitely in suspension without any apparent disposition to seek a lower level. Is it not possible that to be colloidal is to be molecular, and to be molecular is to be free from the law of gravitation? We know that colloidal gold, weighing more than twenty times that of the water in which it is sus-

pended, will remain apparently indifferent to gravitation. It is customary to speak of the diffusion of gases; thus carbonic acid gas, although much heavier than air, will become diffused through the air, but if a volume of this gas be collected in a balloon, you will find that as a mass it is subject to the law of gravitation and will immediately seek a lower level.

I have found that this effect is obtainable not only with tannic acid and extract of straw, but I have also produced it with catechu and the extracts of sumac, oak bark, spruce bark, and tea leaves. It may be remarked that all these substances, with the one exception of straw, contain tannic acid, and were it not that I have obtained the effect with extract of straw, which is free from tannin, it might be assumed that tannin itself was the essential agent. It is quite possible that this list may be largely extended. I have produced the effect not only on clay and on graphite, but also on amorphous silica, alumina, lampblack, and my new product—Siloxicon, and it would seem that this list might be very much extended also. Indeed, it would seem that we might take it as an established law applying to all non-metallic amorphous bodies. When it be remembered how broadly scattered over the face of the earth are these amorphous inorganic bodies and these active organic agents, it is difficult to grasp to what extent this effect may be utilized in the economy of Nature—the effect of the organic acting upon the inorganic. Unquestionably it is this action that prepares the clay for the potters' use. May it not play an important part in the process of the preparation of plant food?

I have continually referred to the act of deflocculation as an "effect." I know of no law, either chemical or physical, that will account for the results produced, and we are therefore compelled to define it as an effect—a result produced by a cause.

Figures 3 and 4 illustrate an experiment with water containing 0.2 of one per cent. graphite. Figure 3 shows a glass funnel containing a fine filter paper resting in a test tube. In the tube below the funnel is a black liquid, which has passed through the filter paper. This black liquid is water containing 0.2 of one per cent. deflocculated Acheson-graphite. The fact of its having passed through the filter paper leaves no doubt in our minds of the impossibility of separating the water and graphite while in this condition by ordinary filtration. I have found that the addition of a very minute amount of hydro-chloric acid causes the con-

tained graphite to flocculate, i. e., group its particles into masses so that it will no longer pass through the paper. Figure 4 shows, as in the former case, the funnel, filter paper and test tube; but now in the lower part of the tube, below the filter, we find a clear liquid, this being the water in which the deflocculated graphite was formerly suspended, the graphite now being caught entirely in the filter paper above. It will be noticed that the filter paper in Figure 3 is black on the outside, this having been produced by the deflocculated graphite passing through the paper, whereas the filter paper, as shown in Figure 4, remains white on the outside, the graphite not having passed through its body.

This graphite, even after flocculation, is so fine in its particles that when dried en masse it forms a hard article. It is self-bonding, like a sun-dried clod of clay.

I have successfully used deflocculated graphite in water instead of oil in sight drop feed oilers and with chain feed oilers. I have a shaft in my laboratory measuring 2 5-16 inches in diameter, revolving at 3,000 revolutions per minute in a bearing ten inches long that had no oil on it for a month, deflocculated graphite and water being the only lubricants used, the feed being by chain, and it ran perfectly. On the same shaft is a similar bearing lubricated with oil, and this ran much the warmer of the two.

A few days after this test was started a pessimistic friend remarked that just plain simple water would give the same results, that the presence of graphite was unnecessary. We are influenced by the opinions of others, even when we know or think they are wrong. I emptied the oil out of the second bearing on the shaft and substituted plain water. The results during the first twelve hours seemed to support the contention of the friend. The next day after the machine had stood motionless over night, things did not look so well for the water; it was a lame "second" on account of rust, and was hurriedly removed. I think I shall not recommend clear water as a permanent lubricant.

Deflocculated graphite in water possesses the remarkable power of preventing rust or corrosion of iron or steel. This characteristic will unquestionably make it of great value for some uses, and while, as yet, little has been done to explore the field some work has already been accomplished in using it as a cutting compound in screw cutting, and I have been advised by one large manufacturer that the results obtained showed it to be equal or superior to lard oil when the water was carrying as little as one-half

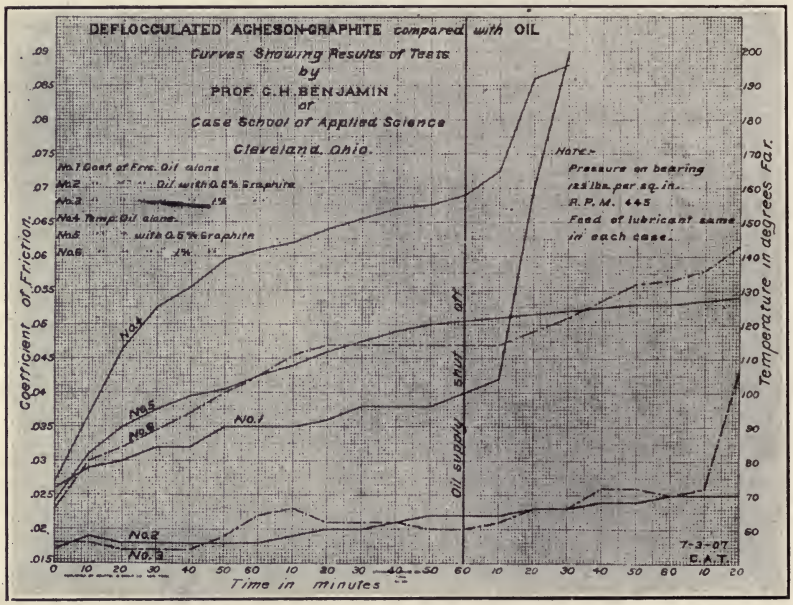
of one per cent. of its weight in graphite. It will readily be understood that while preventing rusting, the high specific heat of the water renders it of great importance, permitting of a high speed of the machinery, and consequently increased output. Another probable application of deflocculated graphite in water will be as lubricant for condensing engine cylinders.

While as I have stated, deflocculated graphite in water is an excellent lubricant for light work, it has the disadvantage of losing its water by evaporation, and I realize that to utilize the possible advantages of deflocculated-graphite it would be necessary to replace the water with oil; therefore, I set before me the task of accomplishing that result. When it is remembered that a removal of the water by evaporation previous to its replacement by oil would cause the contained graphite to assume the condition of hard, flocculated, self-bonded mass, it will be seen that the problem was not simply one of the evaporation of the water and suspending the resultant dry graphite in oil. A very great deal of difficulty and many discouraging conditions were met with in my attempt to cross this apparently bottomless chasm, and I am pleased to say that I eventually succeeded, and I have been successful in suspending the deflocculated graphite in standard oil in a dehydrated condition. The graphite will remain suspended in the manner that it formerly did in the water, and we now have in this article a truly new lubricating body.

A new material having been created, as this would evidently seem to be, a new name is necessary, and I have added the initial letters of Deflocculated Acheson-graphite D-A-G to "Oil" or "Aqua," when the deflocculated graphite is carried in oil or water as the case might be, and have "Oildag" and "Aquadag" respectively.

Professor C. H. Benjamin, formerly of the Case School of Applied Science, Cleveland, Ohio, and now Dean of the Engineering Schools of Purdue University, Lafayette, Indiana, is engaged in making extensive tests to determine the value of deflocculated graphite as a lubricant, and, while these tests are not as yet completed, he has proved that 0.5 per cent. by weight of this graphite in oil greatly reduces the co-efficient of friction and materially extends the life of the oil in which it is suspended as a lubricant. Figure 5 shows some of the results obtained in his tests with spindle oil, and by a study of them we find that comparing the initial co-efficient of friction of plain oil and oil containing one-half, of one per cent. of graphite, the co-efficient

of friction of the oil containing the graphite was but sixty-five per cent. of the plain oil, while after one hundred and twenty minutes, it was but fifty-five per cent., the friction of the oil having increased fifty-four per cent., while with the contained graphite it increased but thirty per cent. After shutting off the supply of the lubricant on the bearing, the co-efficient of friction of the oil alone increased in thirty minutes 125 per cent, whereas the co-efficient of the oil with one-half of one per cent. of graphite increased in eighty minutes but fourteen per cent. In fact, at the end of the



entire run of 200 minutes its co-efficient of friction was less than the initial friction of the plain oil.

Very extensive and careful tests of Oildag have also been made at the works of the General Electric Company, Schenectady, New York, under the supervision of Mr. W. L. R. Emmett, engineer of the Lighting Department, and these tests have been corroborative of those made by Prof. Benjamin. They were, however, not made to include measurements of the co-efficient of friction but of the temperature and the surface speed of the shaft in the bearing. The shaft measured seven and one-half inches in diameter, resting in a bearing twenty-one inches in length, and the test covered both forced lubrication and oil ring lubrication. Not a great deal of advantage was shown in the case of the

forced feed lubrication, the presence of the graphite holding down the temperature but a very little. In the test on the oil ring feed, however, very pronounced advantages were shown in favor of the graphite. The graphite content as used in these tests was 0.35 of one per cent. of the weight of the oil. The comparison of oil and oil and graphite with a pressure of seventy-five to one hundred pounds per square inch of projected area of the bearing showed that with the same pressure and temperature, a shaft can be run from 50 to 100 per cent. faster with the graphite in the oil than with the plain oil.

The world was shocked a short time ago by the appearance in the daily press of an account of the utter annihilation of one of the plants of the DuPont Powder Company. The account informed the world of the sacrifice of the lives of a number of its employes, the maiming and crippling of very many more, and of a property destruction extending over many square miles, and, further, that this was caused by the overheating of a bearing. I believe I am quite within the truth when I state that this frightful catastrophe might have been entirely obviated had that bearing been lubricated with Oildag. A thin film of graphite between two metallic surfaces will prevent their seizing, cutting, or heating from friction. This fact can readily be drawn from the curves of Professor Benjamin's results that I have already shown you, and from the statements I have given you of the results obtained in the works of the General Electric Company, under the supervision of Mr. W. L. R. Emmett.

I have myself been making tests of the efficiency of my product as a lubricant for automobile gasoline engine cylinders, with the result that I have very materially reduced the consumption of oil. A Packard No. 30 automobile that I am operating ran 6,000 miles without the necessity of cleaning the spar plugs, and what is still more remarkable, without the necessity of grinding the valves. It would perhaps be too early to state positively that the use of Oildag in the gas engine valves would eliminate the pitting of the valve seats, but the results that I have so far obtained would rather indicate such a possibility. The surfaces produced on the valve seats are remarkable, being much finer than is possible of attainment by any mechanical finishing, the graphite being incorporated in the body of the metal.

The results that I have obtained in lubricating my automobile have been largely corroborated by others. Thus, Mr.

F. W. Haskell, president of the Carborundum Company, who operates a forty-five horse-power Pierce touring car, has been experimenting with Oildag in cylinder lubrication, and he informs me that whereas his past practice, under the advice of the George N. Pierce company, has been to introduce a charge of five pints of cylinder oil into his crank case for every three hundred miles, he had, after introducing deflocculated graphite in the oil in an amount equal to 0.35 of one per cent., operated the car continuously for six hundred and thirty miles, and upon removing the remainder of the charge, after running that distance, he found that the quantity and quality was of a kind that would have justified him in continuing for a further unknown distance.

Mr. W. R. Densmore, formerly prominently associated with the interests of the Packard Motor Car Company, and now secretary of the Imperial Motor Company—the local representative in the Buffalo territory of the Packard company—has found as the results of his experiments with Oildag in the cylinders that deflocculated graphite to the amount of 0.35 of one per cent. reduced the amount of oil necessary for perfect lubrication to the extent of one-half.

While the possible improvements in the fitting and wear of the various parts of engines and machinery in general is a matter of great importance, unquestionably the greater value of this new product will be found in its reduction of the oil consumption in lubrication. We probably have not fully realized the great consumption of lubricating oils, but this can be readily grasped when we remember that the transportation and manufacturing interests of the world are conducted on or with wheels running in bearings that must be lubricated. This requirement has been met for a number of years by the Standard Oil Company, and it is currently stated that the major part of their business is supplying this particular necessity, and we have but recently been pretty well informed as to the profits derived from it. In offering this new product to the world, my purpose will be to share the resultant savings, which should be a matter of considerable magnitude, with the public. The tests that have been made by the experts I have referred to, indicate that the oil consumption will be reduced over twenty-five per cent. I hope to make Oildag the lubricant of the bearings of the world.

Will the Production of Gold in the World Keep Pace with the Increasing Demands of Commerce and Trade?

BY DR. WALDEMAR LINDGREN, WASHINGTON, D. C.

I assure you that I am not using an empty phrase when I say that I approach this subject with the greatest diffidence. In fact, I feel a great deal like a student who has been given a problem containing five unknown quantities, and only has data to assemble two equations. To a considerable degree this uncertainty and this difficulty is due to the fact that within this apparently innocent question lies concealed another problem, a problem of political economy, and this involves questions concerning which I might say that no two investigators have ever been able to agree. Now if the question had been "Will the production of Coal or Iron keep pace with the development of our industries?" it would have been a good deal easier. Coal we need, and iron we need—we are sure to need—but gold—the political economists are not at all agreed as to whether we need gold or not. There are a good many mining gentlemen who will tell us that gold is not necessary for the increasing business transactions in the business of the world. They will tell us that the gold production has no connection whatever with the progress of the industries. There are, however, a number of the students of political economy who hold a different opinion, and I think on the whole they must be right, although I am not qualified to pass on the subject. They hold that an abundant supply of gold is absolutely necessary under existing conditions, under the standard of values which the nations have adopted for the successful development of industries and trade, and they hold that the increasing production of gold which we have experienced the last ten to twenty years has brought about a depreciation of gold which needs expression in the increase in wages and the increase in the price of commodities.

I will accept that view as probably the correct one, but the question then further arises, at what rate is the development in the industries and trade supposed to progress. The question is, of course, will the production of the gold of the world keep pace with increasing demands of commerce and trade? What are those increasing demands? In other words, at what rate are we going? I venture to say if we

keep going at the pace which we were setting last year, one thousand millions of gold a year would not be sufficient, but I shall assume that it means that the progress shall be normal, gradual and healthy.

Now, I said that I approach the subject with diffidence. It is not on account of the questions of political economy. It is also on account of the fact that every man, like myself, who has tried to predict the world's production of gold, has failed signally. Some fifteen years ago when the production of the world was about $119,000,000 a year, we were generally pessimists, and most of those who tried to predict, their predictions fell far short of the actual results, so that perhaps the result is now in 1906 we are apt to be a little too optimistic. We think a flood of gold is going to overwhelm us as it did in 1859 or 1856 when the gold from California and Australia began to pour into the market.

The question, then, with these preliminary problems eliminated in a way is, what the recourses of the world at the present time are, and what they are likely to be this year and the next year, and possibly hereafter. We have to confine ourselves to that.

I said that the gold production of the world in 1890 amounted to $119,000,000. In 1906 it amounted in round numbers to $403,000,000. That is quite a handsome sum. In fact, it is so large that it does not present any definite idea. It is difficult to attach an idea of value to such an amount of money. It is equivalent to 600,000 tons of gold a year. Now, that again is very well, but it is difficult to understand just exactly what it means. Perhaps I can give a better idea of the quantity of gold by telling you what I saw a few years ago in the Denver mint. There was a safe about 6x5x7, I should say, and it was lined with gold bars on three sides, two deep, and about five feet high. It contained $14,000,000 to $15,000,000 in gold. And incidentally, I assure you, it was a pretty sight.

Now, the gold production of the world would amount to thirty such safes. You can imagine to better effect thirty such safes filled up with those gold bars one at the side of the other.

The first thing we had better do is perhaps to try to find out where this gold comes from. First as to quality, as to source of; second, as to geographical location. According to a rough calculation, I have placed the amount of placer gold in the world annually produced, taking last year, 1906, for an example, at $74,000,000. That is placer gold. The gold contained in copper and lead ores, not mined chiefly

but partly for the gold they contained, would be about $19,000,000. Silver bullion containing a very small amount of gold would contribute about $10,000,000 or $12,000,000. The remainder, or $300,000,000, of gold comes from siliceous quartzose ores.

There is a fact which we must keep in mind. It is not like silver. We cannot rely on having a steady production of gold as a by-product from copper and lead ore. Silver production is steady and does not increase in a startling manner. That is because most of it is a clear by-product. The mining of pure silver ores is comparatively a very small amount. There is a good deal of it in the bed, of course, but compared with the whole it is not of very great importance. So it is to the siliceous quartzose ores that we have to look for the gold supply.

Now, then, looking over the geographical distribution of those $403,000,000 of gold—I can first mention a miscellaneous item, that is about $30,000,000. It comes from South America, Central America, European countries, the Orient, and a few other scattered places, in all amounting to $30,000,000, and there is no great reason for expecting much of a change in the immediate future from those countries. True, South America has always been supposed to be a potential source of gold. Very likely it is, but it is not to be supposed that there are any gold countries proper on the scale of California and Australia containing that metal, but in some way Mexico suddenly has increased her gold production in a short time, so that we may expect South America shall sometime furnish a similar amount. India contributes now about $10,000,000 or $11,000,000 only from one district practically, and that production is rather slightly decreasing by slow degrees so that there is not much to expect from there.

The next item is Russia, and that is an important item. The trouble about Russia is its gold production remains at about the same figure, and has remained for the last ten years. It is about $24,000,000. Russia contains, no doubt, vast amounts of placer gold, but political conditions make it very difficult to work there. This is the consensus of opinion of engineers who have been there and examined their resources. Aside from drawbacks of climate, the frozen ground, etc., the government does not seem to encourage the industry at all. True there are concessions, but they are coupled with so many embarrassing terms that they are very difficult to comply with, so although in fact Russia may vastly increase its gold output—very likely it

will—there is nothing much to be expected from that source in the immediate future.

The next country we come to is Australia. Now that is very important. It produces about one-fourth or one-fifth of the total gold production of the world, and incidentally I call your attention to the remarkable and close analogy and similarity between Victoria, Australia and California, in the quantities produced; in geological structure, form and nature of deposits they are most remarkably similar, but it was Western Australia which yielded the product that caused Australia as a continent to become so prominent of late years in the gold production of the world. But the picture is not altogether so rosy. The different states have shown a decided decrease in the past years, in Western Australia itself, West Cambria especially so and there is no reason to suppose, unless remarkable discoveries appear, that Australia will increase its gold output. More likely it will decrease it. Last year the decrease was $3,000,000. It is predicted there will be a decrease of about $2,000,000 this year—perhaps more. That disposes of Australia.

Now we come to the more interesting feature perhaps to us—North America. While our production in 1906 was $124,000,000—quite a considerable sum—about $14,000,000 of that came from Mexico and that country seems likely to hold its own for quite awhile yet. The production of Mexico comes from two sources; first, that contained in the silver bullion, and second, that contained in the gold mines of El Oro and a few others, but nearly half the production of Mexico hinges on the production of the mines of El Oro.

Next comes the gold production of Canada. That is at present something like $12,000,000, and has shown a decreasing tendency due to persistent decrease in the production of the Klondike. It is true that it seems likely that within a short time because of the numerous quartz mines, which are now being located there, combined with dredging the Klondike will once more regain its former position—maybe not reach such startling figures, but will no doubt produce for many years to come.

The United States last year produced about $94,000,000 and it has increased about $6,000,000 or $7,000,000 or $8,000,000 for the last three or four years. What is the prospect of gold production for the present year? The papers have been predicting the $100,000,000 mark will be reached. I doubt whether it will be reached this year. There are influences at work and have been at work for the last year

which have, I fear, decreased the production. Copper production has decreased in the last few months, and that will decrease it some. The production of the Black Hills has decreased somewhat, and in California the production would hardly offset the troubles they have been having in the Mariposa region.

Alaska has had its share of labor troubles, and on Alaska we have relied to make good this year to reach the $100,000,000 mark. But there is one state worth mentioning, among the gold-producing states, Nevada. Nevada undoubtedly will increase its production this year—just how much I am not in a position to say. You all know and the papers claim, and no doubt a large part of it is true —I think it will produce enough to offset losses in other states which will make our probable gold production this year about the same as last. For the next few years we will be able to maintain a similar production unless as I say, the troubles which are now feared, are coming to the front.

There is one country we have not touched upon yet and that is Africa. The real crux of the gold situation depends on Africa. Africa produces about $134,000,000 gold at the present time. A part of it is from Rhodesia, and a small part from the Gold Coast Colony and Ashante on the Western Coast of Africa, but both those districts in spite of rather doubtful production seem to make good and seem to be in the way of increasing their production for the next few years. That is a point in doubt.

Then we have the Transvaal. The Transvaal produced in 1906 $119,000,000 in gold. The question is, what will it do in the future? The whole problem really hinges on that. For 1907 the figures indicate with considerable certainty that the Rand will produce $136,000,000 this year, consequently there will be an increase of $6,000,000. The increase in production in Africa will probably amount to about $9,000,000.

Now, summing all this, we reach the tentative conclusion—of course entirely tentative—that the production for 1907 will amount to $410,000,000; that is to say, an increase of $8,000,000 or $9,000,000 over the production of 1906.

Now as to the future. In regard to the Transvaal and the Rand, which as I said is a most important item, the future is somewhat shrouded in doubt. I have not the privilege of personal acquaintance with the field but from opinions of the men best qualified to judge, there are several influences at work which make the outlook a little bit doubt-

ful. Kerl, perhaps one of the best writers on the subject, says the following in a recent article: "If more money for further development is not forthcoming, the further development of the Rand will be greatly checked. The present number of stamps which is 8,000, will then not be increased. The whole of the gold field will be apportioned off relative to the present mills and stamps and the ore instead of being worked out at full pressure in thirty years, which will mean an increasing supply, will last at the present rate of exhaustion for an indefinite period."

Now it seems on the face of it that everything should be lovely down there, but unfortunately it is not. They have their labor troubles of the most pronounced and difficult character, and they have difficulty in procuring the necessary capital for their further work. Some of the "out-crop" mines, as they are called, will soon be exhausted and big shafts must be sunk, big hoists erected, and lots of money will be needed, and in the present temper of the investing mining public in England, it seems rather doubtful whether that amount of money will be forthcoming.

There are two finalities really dependent upon the important developments on the Rand. One is that the gold production will be maintained at about the present rate for a number of years is about as far as we can say, and the other is that money will be provided for the development of the Rand industry, that labor troubles will be avoided, and then the production of the world will no doubt be greatly increased during coming years.

I must once more call your attention to the uncertainty involved in new discoveries coming right along. You see what a difference the Nevada gold fields have made. What a difference the Fairbanks discoveries. It is all a very uncertain quantity when it comes to future discoveries. We may not find anything of value for a number of years, and again some stars of gold mining may arise on the horizon increasing our gold supply far beyond our estimates.

There is one more subject on which I would like to touch, and that involves a question in political economy in a way. Students of Political Economy believe that gold depreciates because it is produced in such large quantities, and that finds its expression as I have said in increasing the rate of wages and increasing cost of commodities.

Now I wish to call your attention to a fact. I am not the first one that suggested it. Mr. Roberts, the Director of the Mint suggested it in one of his reports, that if this is true, it is apt to act as a very decided agent or automatic

regulation on the gold output of the world. If wages raise continually because gold is getting cheaper, more plentiful, some of our gold mines have got to close. It was more or less a political discussion until some things happened a few years ago that made it appear that the theory was well founded. Take for instance, what happened in the Angeles camp in California. The big mines were working on big masses of low grade ores and made some profit. This year there was a strike. More wages were demanded and the operators decided they could not pay them. The consequence was, the mines closed down. Consequently the output of California will be much curtailed because of that. Now the same thing is likely to happen, especially on our low grade properties which increase to a great extent the gold production, such as the Treadwell mines in Alaska, the Black Hill mines and others. On the other hand, in opposition to this, stands, of course, the possibilities of cheaper prices, the possibilities of increased labor-saving appliances, and all those products of the ingenuity of man. Just what the sum total of all this will be is of course very difficult to predict.

That, then, would be about all that I could tell. I am sorry it is so little. So that to sum up the prospects, 1907 will show a further increase in the production of the world from $403,000,000 to about $410,000,000. Regarding what will happen after that, the question is very much involved. It seems likely, as I said, that production will be maintained at an increasing rate, but there is also the possibility that we will only be able to maintain present production for a number of years.

Conservation of the Nation's Mineral Resources

BY DR. J. A. HOLMES, WASHINGTON, D. C.

Waste as a National Habit.

The world recognizes Americans as the most wasteful of peoples in the utilization of their resources. Certainly no nation received so rich an inheritance as did the United States in its combination of soil and forest and climate and streams and mineral resources. The nation has literally grown up in luxury.

Out of the very abundance of thes resources we have developed an indifference to economy and the habit of waste. We have destroyed our game for its hides and horns; our forests for their tan bark, or a pittance of the lumber they would yield. Meanwhile with a thoughtless indifference, we have allowed the forest fires to burn more lumber than we have used in the building of homes and in the industries. Meanwhile, through the destruction of the forests about the sources of important streams and the improper cultivation of these sloping lands, the fertile soils are washed away from the fields where they are needed and deposited in the streams and in the harbors of the country from which their continued removal will cost an enormous sum.

We are thus gradually, but surely destroying the beauty and wealth of our scenic and health-giving mountains and the value of our great water resources for power, for irrigation, and for navigation purposes. In spite of our thoughtless waste, this fertile soil and genial climate have furnished food enough for the nation and to spare; but so luxurious are the habits developed by this super-abundant production of food that, as is sometimes said, we waste food enough to supply the wants of another nation as large as our own.

The Waste of the Nation's Mineral Resources.

Water, in some respects the most valuable of all our mineral resources, as a source of power, is being wasted day after day and year after year to the extent of millions of horse-power. As the essential factor in all irrigation work, it is being wasted by use to excess in many instances; but on a much larger scale and to the value of hundreds of millions of dollars it is being allowed to go to waste year after year by not being used at all. And in a number of

localities, the limited supply of artesian water available for irrigation and other purposes is being wasted on a considerable scale by being allowed to flow continuously when not needed, or in excess of actual need.

Other mineral resources are being wasted on as large a scale as is true of water, but their waste is even a more serious matter, for the reason that the supplies are not reproduced, as in the case of water, but when once exhausted, are exhausted permanently. No better illustration of this fact can be found than is seen in the deserted mining camps, deserted after the mines have become exhausted.

In connection with metallurgical processes there is often a waste of materials, which also prove injurious, such as the large quantities of sulphur and arsenic vapors that are turned loose from the chimneys of the modern smelters. This waste is largely preventable, and should be prevented, for the double reason that these materials have a commercial and economic value, and they are destructive of adjacent vegetation. This destruction of vegetation allows the rains to erode the bare land surface and deposit the transported soil into the adjacent streams.

The waste in metal mining and treatment of gold, silver, copper, lead, zinc, iron, and other metallic substances, under old time practices, was frequently as high as from twenty to fifty per cent.; but the modern mining, milling and smelting processes have, of late, been developed along the lines of increased efficiency. Under these more modern practices, waste is now being reduced to from five to usually less than twenty-five per cent.

Modern chemistry and metallurgy are also developing processes for the treatment of low grade ores which formerly were left in the mines or on the dumps, or were used in the construction of walls, or public roads, just as they have developed processes for the profitable re-treatment of the enormous piles of tailings, accumulated under the cruder methods of treatment practiced only a few years since. In the mining and treatment of some of these metalliferous ores, however, there is still great waste, and an opportunity for decided improvement which in time is sure to come, as deposits of new material become scarcer and mining operations more expensive.

In the mining and utilization of *miscellaneous minerals* existing practice is a great improvement over that of the recent past, and the future is full of promise. Thus, in the utilization of the mica deposits, formerly only cut sizes of mica were used; now the smaller scales are being col-

lected, ground and used for a number of purposes. The former waste in the quarry is now being largely used for macadamizing public highways, for mixing with cement and sand in the construction of concrete buildings, or for use in a variety of other ways. The waste piles about some of the coal mines, and other mines of the past, are being taken back into the mines, and new waste materials are being retained in the mines for the building of supporting pillars, and in filling space otherwise left open through the extraction of the mineral deposits; thus greatly diminishing the need for timber and permitting a much larger extraction of valuable material from the mines.

Waste in the Utilization of Fuels is a problem that in an especial manner concerns the general public, for the reason that the fuel supplies are coming to be regarded, like the water and the forests as public utilities. They furnish our heat, light and power; they serve as the basis of industry and of transportation, and are, therefore, absolutely necessary to the welfare of the nation's industries and commerce. But, notwithstanding their vast importance, it is in the mining and utilization of these fuel resources that we practice the greatest waste.

The waste of gas and petroleum illustrate this practice.

Persons now living can recall when the great gas wells were seemingly inexhaustible in Ohio, Indiana, West Virginia and Pennsylvania. They have seen the innumerable gas flames pointing skyward day and night. In many of those fields, this gas supply was wasted in a manner well-nigh criminal, and the exhaustion has been so complete that there is no ground for belief that other supplies of gas will be discovered in many of those special regions.

Petroleum in the past has, in like manner, been wasted, both in enormous overflows and the burning of material. In the early days of petroleum there was also an enormous waste through the failure to save the gasoline and other bi-products, which now have great value. Here, however, as in the case of the metals, the modern improved practice is doing much to lessen this enormous waste. This problem is one of especial importance to the Pacific Coast states, owing to the absence of adequate coal supplies.

Coal is now the world's greatest fuel. Wood has been used extensively in the past, especially for domestic purposes. Gas and petroleum continue to have extensive local use, and in power and light developments, water power will play an important part in some portions of the country. Alcohol and the solar energy may contribute their mite to the na-

tion's power, but the world's great centers and industries of today, and, as far as we definitely know, of the future, must look to coal as their main source of heat, power and light.

Notwithstanding its recognized importance, its mining and use are subjected to large waste. In the mining operations at the present time, nearly one-half of our total coal supply is left under ground, partly as pillars to support the roof; partly as coal of inferior quality, only the best part of the coal from the beds being removed in many cases, and partly due to the fact that the workings out of lower beds of coal first, in some cases breaks and renders impracticable the subsequent mining of the adjacent higher coal beds. Of the coal actually used for power development, usually not more than five per cent. is converted into actual work, the remainder being consumed in the making of steam and smoke, and in overcoming the friction and inertia of the engine, shafting, etc. Of the coal used in railway operations—which includes nearly one hundred million tons, or nearly one-fourth of the total supply of the country—not more than five per cent. is transformed into actual work of pulling the trains. Of the coal used in the development of electric lights, usually less than one-fifth, and often less than one-seventh, of one per cent. is actually converted into light; the remaining ninety-nine and four-fifths, or six-sevenths, per cent. being consumed in the various preliminary formations of energy.

This waste is appalling, and every possible means should be adopted for reducing it to a minimum, in order that our fuel resources may suffice for the future as well as for the present needs of the nation.

What Our Coal Represents.

In the *plant life* of the earth our coal fields represent vast areas of vegetable matter, accumulated during the past periods in the earth's history, later and gradually transformed into coal. Every foot of the thickness of this coal may be considered the equivalent of many feet of the original vegetation. Of the *sun's light and heat* our coal represents enormous quantities transformed and stored in this vegetation, and further concentrated in the coal. It is the earth's great storage battery of solar energy. In time this coal represents the unmeasured ages of the past, the thousands and millions of years before man came into existence, during which this solar energy was being stored and concentrated in different parts of the earth's crust. In the *nation's welfare*

it represents the basis of the heat, power and light upon which the nation's comfort and the nation's industries and the nation's commerce depend.

How the Duration of Our Coal Supply Can Be Extended.

During the past year the country produced and used more than 400,000,000 tons of coal; during the ten years preceding the consumption was nearly three billion tons—which approximates the aggregate consumption of the seventy years preceding. (It is estimated that by 1950 the population of the country will aggregate over 200,000,000.) It is expected that the rate of per capita consumption of coal for domestic, for manufacturing, and for transportation purposes will continue to increase largely, as this is in accord with the logical development of the country.

These considerations lead to the conclusion that this rate of increase in our coal exhaustion is not likely to diminish greatly, and might at times become larger, unless we may find more efficient methods of mining and using coal. If this increasing rate does continue, it is estimated the nation will have used the larger and more available part of its coal supply before the end of the next century. At that time there will, of course, still be much coal under ground, but it will be low in grade, or much higher in price, owing to its greater depth; mining will be more expensive and more dangerous.

In considering the possibilities of extending the life of our coal supplies, so as to meet the needs of the future as well as those of the present, we must therefore reckon with the continuance of these rapidly growing needs of the country, and our possibilities of success in meeting these on a rational basis will be along the following lines:

(1) The prevention of waste in mining. The coal left in the mines as pillars to support the roof, together with that left under ground because of its being inferior, or low grade in quality, will range from less than ten to more than seventy-five per cent. of the total, these extreme figures representing unusual conditions. Add to these the loss arising from the breaking up of closely overlying beds of coal owing to the previous removal of the lower beds and the caving in of the overlying strata, and we have a total waste which will aggregate on the average but little, if any less than fifty per cent. of the possible total available supply. It is believed that an increasingly large part of this waste will be found preventable.

(2) We must use coal with greater efficiency. The small percentage of the heat units in coal that are actually converted into work or light, as stated above, indicates the urgent need of improvement along these lines. The investigation now being conducted by the Technologic Branch of the U. S. Geological Survey, indicates the possibility of increasing these fuel efficiencies by two or three fold, and suggests still greater possibilities which will soon be tested. These investigations also point to the extensive future use of dirty low grade coals now left underground or thrown away. The future along these lines is full of promise, but the solution of these problems calls for extended further investigation.

(3) We should be looking out for possible substitutes for high grade coals. There will be, in the near future, a larger use of running waters for power and light development, and such developments should be encouraged.

There will also continue a diminishing development of heat and power through the use of wood; and the planting of new forests should everywhere meet with favor. In the New England, Atlantic and some of the middle northern states, there will be some utilization of the peat beds for similar purposes, and investigations should be made to discover the most efficient ways of utilizing these deposits.

A limited future use of alcohol made from wood and farm products for heat and power purposes, seems certain, and it is to be hoped, but not certain, that cheaper methods may reduce its cost to come within reach of commercial practice, say twelve cents or fifteen cents per gallon.

Petroleum and natural gas will long continue as large local, but in a measure, temporary contributors to the comforts and industries of the nation, and our supplies of these should be efficiently utilized. It is occasionally suggested that the heat of the sun may be stored from day to day in sufficient quantities for continuous power development; but the suggestion has, as yet, too indefinite a basis to permit of its serious consideration in the present connection, though this is worthy of serious investigation.

These considerations are all important, but at the present time the sum of all these possible substitutes in the nation's supply of heat and power and light, cannot now be expected to seriously lessen the rate of increase in the nation's enormous demand for fuel; and we must revert again with renewed emphasis, to the necessity of lessening the waste, and increasing efficiencies in the utilization of our coal supply.

How Can These Reforms Be Brought About?

(1) Let us find out all the facts in the case. The investigation now under way by the government should be extended until every phase of these important problems has been carefully inquired into and definite facts have been obtained.

(2) This information should be placed before the people of the country in such form as to be readily understood.

Both the producers and users of fuel can be expected to co-operate in remedying the existing evils as fast as commercial conditions will permit; but should legislative measures prove necessary at any time, the reliable data thus obtained will serve as a guarantee that such legislation will be wisely directed.

Why the Fuel Resources Should Be Conserved.

(1) Their supply is limited, and, considered in connection with the life of the nation, the early exhaustion is certain, unless the greatest care be exercised.

(2) The exhaustion of mineral resources is a permanent exhaustion. One year's wheat crop, when consumed, is replaced by that of the succeeding year. The forest resources of one period, when exhausted, under favorable conditions, may be replaced by a succeeding forest within a few decades or centuries. A water supply of one day, or of one period, under favorable conditions, may be continued indefinitely by nature's repeating processes, but when a deposit of coal, or oil, or nature's gas, or iron ore, has been exhausted, this exhaustion, as far as we are concerned, is permanent.

(3) The mineral resources of the country belong to the future, as well as to the present generation of men. They should be used, but not wasted. The creation of these deposits required thousands or millions of years. Their present, so-called owners, had no part in this creation of resources, and have no real rights to them beyond present actual needs.

(4) Let us not forget that these mineral fuels, which we call our own, represent in concentrated form, a storage battery of the sun's heat and light, accumulated during countless ages that passed before the human race came into existence. Let not the men of the present generation commit the unpardonable sin of wasting the necessary birthright of the generations yet unborn. This nation must have a great future as well as a great present.

(5) The fuel supplies of the country will be sufficient for both present and future needs, if we stop their waste and practice increasing efficiency in their utilization. There can be no suggestion looking to the curtailment of present needs. And these needs will increase in proportion as the nation grows in population, and in the extent and diversity of its industries. And while the present generation has a right to use the fuel which it actually needs, it is bound by every principle of right and justice, not to waste this precious heritage.

(6) The future ascendency of American industries will depend largely on our manufacturers being able to secure cheap fuel. The value and cost of labor will never be reduced in the United States to what they are in foreign countries; but this fact renders all the more essential, in the struggle for industrial and commercial supremacy, that the manufacturers of this country be able to obtain fuel supplies cheaper than they are to be had in other countries.

We cannot continue this wasteful consumption of our fuel resources, and at the same time perpetuate the supply of cheap fuels. The only solution of the problem is that we must learn to use our fuels more efficiently; and we must stop this enormous waste.

The people of the United States consumed during the past year about 415,000,000 tons of coal besides large quantities of oil and gas and wood. The total cost of this fuel in the furnaces was not less than $2,000,000. The future growing scarcity of wood, gas and oil, and the increasing cost of mining the coal as the surface beds are exhausted and the mines become deeper and more dangerous, will naturally increase the aggregate expenditure for fuel, even faster than the tonnage increases. But the welfare of the nation demands not only that the future has a coal supply, but that the cost of this supply be kept as low as possible.

(7) The United States need not expect to draw future coal supplies from other countries, except for limited use along our Pacific coast; as no other country can spare from its own reserves coal enough to meet any appreciable part of our growing needs.

(8) In every civilized country, the conservation of fuels and other great resources of public utilities, is properly coming to be regarded as a national problem, because in every country these materials serve as a basis of national welfare. The individual citizen looks to the present. He sees little beyond his individual interest of today. The nation while helping the citizen today, must safe-guard the

welfare of the citizen of tomorrow, by a judicious conservation of these resources, which, in reality, belong not to the individual, but in a higher sense, to the nation.

The Fuel Problems in the Trans-Mississippi States.

In this great Trans-Mississippi region, seven states and one territory contain practically no coal. But there are one territory and twelve states that together contain 260,000 square miles of coal fields, or twice that area embraced in the coal fields east of the Mississippi. And although these more eastern fields now produce more than five and a half times as much coal as do the Trans-Mississippi fields, yet the production of the latter is in its infancy and may be expected to increase largely.

Many of the western coal fields are at a double disadvantage in supplying the needs of a growing nation, owing to (1) the absence of high grade coking coals that would serve as a basis of iron and steel industries and (2) the large portion of these far western coal fields in which the coal is lignitic or high ash or otherwise inferior in quality.

But in a number of these Trans-Mississippi states as in the splendid young commonwealth of Oklahoma, there are ample supplies of coals of good quality for general purposes; and the time is near at hand when we shall see in them a growth of varied manufacturing industries as remarkable as has been their development in mining and agriculture.

And even in the more western states, where the low grade and lignitic coals are more abundant, such investigations as are now being conducted by the government, promise a future efficient use of these coals, for power development which will avoid the cost of their transportation by locating power plants at the mines and transmitting the developed electric power to manufacturing centers on the lines of transportation. For the full development of the greater West the growth of manufacture must now follow in the wake of mining and agricultural industries, and this they are certain to do if the power supply proves adequate.

The Trans-Continental lines must be increased, double-tracked, and over the mountains they must be electrified, so that their full capacity may be used in transporting articles of commerce, instead of in carrying fuel with which to feed their locomotives.

For this greater development, abundant and cheap power are essential. Every stream of water must be utilized to its full capacity, for irrigation, for power and for

navigation. Every coal field and every oil field must be made to render its most efficient service. Not only should there be no fuel wasted, but every variety of fuel should be used for the purpose for which it is best adapted and most needed. For, otherwise, in this West, where the fuel supply is inadequate, even for the present needs, all unnecessary waste is unbusiness-like and criminal. And even in the states where we boast of "exhaustless resources," the continued wastefulness of a few generations will render impossible the greater future to which the nation is entitled.

The doctrine that self preservation is the first law of nature is not only as applicable to the nation as it is to the citizen, but the brave and patriotic individual has ever been willing in time of war to give up his life, if need be, in order that the nation might live.

We are now dealing with problems that have to do with the life of the nation in time of peace. These are problems, however, which deserve and need, for their proper solution the highest type of patriotism, American business sense and statesmanship.

Lead and Zinc Resources of Missouri

BY E. R. BUCKLEY, Ph.D., DIRECTOR MISSOURI BUREAU OF GEOLOGY AND MINES.

The world's production of spelter in 1906 amounted to 775,871 tons. Of this amount the United States produced 224,770 tons, or 29 per cent. of the total. Of the total production in the United States the Ozark region, comprising parts of Missouri, Kansas, Arkansas and Indian Territory, furnished 136,051 tons, or 60.6 per cent. Missouri alone produced 58 per cent., or nearly 17 per cent. of the world's output.

In 1906 the United States produced 347,695 tons of pig lead. During the same year the Ozark region produced 113,107 tons, or 32.5 per cent. of the total. Of this amount Missouri produced 111,075 tons, or 31.9 per cent.

In the production of zinc Missouri ranks first; in the production of lead Missouri ranks second, being surpassed only by Idaho. In the combined production of lead and zinc the output of Missouri is greater than that of Idaho, the next state in production, by 123,733 tons. In other words the combined output of lead and zinc from Missouri is more than double that of Idaho, and nearly equals the combined output of Idaho, Colorado and Utah, the three states ranking next to Missouri in production.

In 1906 and 1907 there were in the neighborhood of 800 shafts being operated in the Southwestern Missouri Lead and Zinc District. In the Southeastern or Disseminated Lead District there are in the neighborhood of fifty shafts, of which forty are in almost continuous operation. The shafts are of large dimensions, two or three compartment, and the mines which they connect will soon be supplying mills having a combined daily capacity of 10,000 tons of ore.

Beyond the limits of these well known districts, skirting the Ozark region to the north and south, are numerous mines and prospects which have been operated occasionally during the last forty years. Some of these, as the Virginia and Bellew in Franklin County, the Renault Mines in Washington County, the Fortuna mines in Moniteau County, and the Valle's mines in Jefferson County, have been rich and productive.

In addition to the lead and zinc mines the Ozark region and the St. Francois Mountains have produced millions of tons of iron ore. The mines are still being operated. This region is the greatest producer of barite in the United States. Copper has been and is being produced in this region and an attempt is being made to refine the nickel and cobalt matte obtained in the smelting of the lead ores of the Madison County area.

Not only does the Ozark region excel in the production of lead and zinc, but she also excels in the quality of the ores and metals produced therefrom. The zinc blende mined in this region hovers constantly about the 60 per cent. mark, while the galena seldom assays less than 80 per cent. metallic lead. The Missouri soft pig lead is known the world over as being of superior quality.

The lead and zinc mines of the Ozark region are surrounded by areas rich in mineral fuels. The marvelously productive gas belt of Kansas and the extensive coal fields of Illinois are the nearest fuel regions to the lead and zinc mining districts, for which reason the ores mined in Missouri are smelted chiefly in the neighboring states of Kansas and Illinois.

If an apology be needed for entering into a somewhat detailed discussion of the geology of and genesis of the ores of this region, I believe it will be found in the foregoing brief statement of the importance of the area.

The Geology of the Ozark Region.

In the southeastern part of the state of Missouri there are areas of ancient Pre-Cambrian igneous rocks, chiefly granite, rhyolite (porphyry) and diabase. These rocks form hills and ridges known as the St. Francois Mountains. The highest of these hills has an elevation of 1,800 feet above sea level, which is about 900 feet above the general level of the country in which they occur.

These rocks contain small percentages of the metals, gold, silver, lead, zinc, copper, nickel, cobalt and iron, as shown by chemical analysis. Occasional veins of galena and zinc blende occur in these rocks but thus far they have not been successfully exploited. Several quartz veins and diabase dikes have been prospected for gold, silver and other metals and although they show small percentages, the results have not been especially encouraging. It appears that there has been very little secondary concentration, which is so important a factor in producing ore bodies of commercial importance.

The practically unaltered igneous rocks contain small percentages of lead and zinc and it is believed that the original source of all the lead and zinc minerals of our lead and zinc mining districts is the igneous rocks which once formed a part of the hills now known as the St. Francois mountains.

The Ozark region is a dissected plateau occupying a greater part of the southern half of Missouri and portions of Kansas, Indian Territory and Arkansas. The St. Francois mountains are located on the eastern flank of this uplift, the name being applied only to the hills of pre-Cambrian, igneous rocks. A greater portion of the Ozark region is occupied with formations belonging to the Cambrian and Ordovician series. Flanking the region on all sides are formations belonging to the Silurian, Devonian and Carboniferous. Small isolated areas of Mississippian and Pennsylvanian strata are irregularly scattered over the Ozark plateau. The Cambrian and Ordovician formations consist chiefly of dolomitic limestone, sandstone and chert. The Silurian consists chiefly of limestone, with a little shale; the Devonian is mainly limestone and shale; the Mississippian is chiefly limestone, cherty in places with some shale and a little sandstone; the lower portion of the Pennsylvanian is chiefly shale and sandstone, while the upper portion is chiefly limestone and shale.

The different formations in this portion of the state were not laid down in an unbroken succession. Some of them are separated by well marked unconformities. The best defined and most important of these unconformities occur at the base of the LaMotte sandstone which rests upon the pre-Cambrian igneous rocks; at the base of the Mississippian, which rests upon several of the older Silurian, Ordovician and Cambrian formations, and at the base of the Pennsylvanian which rests on the Mississippian and other older formations of the Ozark region .

As a result of the uplift of the Ozark region, the beds have been in some places slightly folded, faulted and everywhere prominently jointed. The faulting in this region occurs chiefly in the eastern portion of the Ozarks and in close proximity to the St. Francois Mountains. There is some faulting in other portions of the region, but it is not conspicuous and seldom associated with deposits of lead and zinc ore.

The following is a geological section of this region showing the horizons in which the lead and zinc ores chiefly occur in this state:

QUATERNARY	Alluvium		
	Iowan Loess		
	Unconformity		
TERTIARY-LAFAYETTE Gravel, Sand and Clay.			
	Unconformity		
PENNSYLVANIAN	Missourian		Occasional crystal of zinc blende
	Des Moines		Zinc Blende and galena, chiefly in isolated areas.
	Unconformity.		
MISSISSIPPIAN	Chester	Birdsville	
		Tribune	
		Cypress	
	St. Louis	Ste. Genevieve	
		St. Louis	Occasional crystal of zinc blende
	Spergen		
	Warsaw		
	Keokuk Burlington	Also called "Boone"	Ore bearing formation of the southwest Mo. lead and zinc district.
	Chemung or Kinderhook	Chouteau	
		Hannibal	
		Louisiana	Occasional zinc blende crystals
DEVONIAN	Sulphur Sp'gs	Bushberg	
		Glen Park	
		Unnamed shale	
	Grand Tower, (Hamilton and Onondaga)		
	Clear Creek (Oriskany)		
SILURIAN	Bailey (Lower Helderburg)		
	Niagara (Bainbridge)		Occasional crystal of zinc blende.
	Girardeau (Cape Girardeau)		

ORDOVICIAN	Hudson River Shale (Thebes)		
	Kimmswick [Receptaculites]		
	Plattin [Trenton]		
	Joachim		
	St. Peters		
	Unconformity		
UPPER CAMBRIAN	Jefferson City	Some lead and zinc ore A number of mines. Moniteau Co.	
	Roubidoux	Some lead and zinc ore. Small mines in Central Ozark region	
	Gasconade	Some lead and zinc mines in Central Ozark region	
	Unconformity		
	Proctor		
	Eminence		
	Potosi	Lead and zinc. Washington and Jefferson counties	
	Unconformity		
	Elvins	Doe Run	Some zinc crystals
		Derby	Some galena crystals
		Davis	
MIDDLE CAMBRIAN	Bonneterre	Formation in which the Disseminated Ore occurs. St. Francois and Madison counties	
	Lamotte	A little galena near the top	
	Unconformity		
HURONIAN	Pilot Knob		
	Unconformity.		
LAURENTIAN	Diabase	Some galena and zinc blende	
	Granite	Veins of galena	
	Rhyolite	Traces of galena by analysis	

Origin of the Lead and Zinc Ores of Southwest (Joplin) District.

For a number of years the origin of the lead and zinc ores of this district has been the basis of a widespread discussion by Economic Geologists and Mining Engineers. The geologists of the U. S. Geological Survey have contended that these ore deposits were the result of a first concentration through an artesian circulation and a secondary concentration or enrichment through downward circulation.

This theory was originally based upon the supposed widespread occurrence of faults and fault breccias associated with the ore bodies through which it was possible for the water circulating through the Cambro-Ordovician formations below to reach the surface. According to this theory the immediate source of the lead and zinc minerals was thought to be the Cambro-Ordovician formations which constitute a major portion of the Ozark region.

As a result of the investigations of the Bureau of Geology and Mines of this state, it was recognized that between the Mississippian and Pennsylvanian series, there existed an unconformity co-extensive with the areas examined. It became clearly evident that those who had mapped extensive faults in this district had in some manner been mistaken. The faults mapped in the Aurora, Joplin and Granby areas are clearly planes of discordant bedding due to the unconformity between the Mississippian and Pennsylvanian series. In some cases there is evidence of movement between the Pennsylvanian and Mississippian series within or adjacent to the so-called breccias at the base of the Pennsylvanian. A detailed examination revealed the fact that these movements were small, although frequently of sufficient intensity to develop slickensides. Later investigations of the United States Geological Survey have confirmed our observations that faults of sufficient magnitude to be considered in connection with "an artesian circulation" theory of the origin of the ore deposits do not exist in this district. The greatest faults recognized in the Southwestern and Central Ozark districts are in no way connected with the deposits of lead and zinc ores. The greatest faults positively recognized in this district do not have a displacement of over 25 feet.

It follows as a corollary that there are no fault breccias in this district. The so-called breccias are in part basal conglomerates and in part a result of solution. The different types of breccias in this district are so intimately associated as to make a separation or classification a matter of some difficulty and greater uncertainty. The absence of faults

and fault breccias argues that very little of the water circulating through the deeply underlying Cambro-Ordovician formations reaches the superficial zone in which the ores occur.

Analyses made in the laboratory of the Bureau of Geology and Mines and elsewhere indicate that the waters from the Cambro-Ordovician series obtained from deep wells, do not contain an appreciable quantity of zinc. On the other hand, the mine waters which represent chiefly the downward circulation, near the surface, contain a considerable quantity of both lead and zinc, chiefly the latter. Some of the wells from which water was obtained for analysis are not cased and consequently the traces of lead and zinc detected may have been due to the seepage of surface waters into the wells. Mr. George Waring of Webb City has made repeated analyses of the mine waters from the upper superficial zone of 150 to 200 feet and finds that they contain from 0.4 to 2.5 grams per liter of zinc. It is also interesting to note that the quantity of magnesia in the water from the deep wells is much less than that obtained from the mine waters. If, as contended, the original source of the magnesia, lead, zinc and iron were the deep-seated ground waters, represented by an artesian circulation, it is remarkable that these waters at the present time do not contain measurable quantities of the metals other than magnesium.

The practical absence of lead and zinc in the waters from deep wells, and the absence of brecciated or fault zones which might provide avenues of communication between the Cambro-Ordovician and the surface argue against the direct derivation of the lead and zinc from the magnesian limestones of the Cambro-Ordovician series by an artesian circulation.

All the evidence which we have been able to gather indicates that the ore bodies from the first to the Nth concentration are the result of converging, downward circulating waters, the oxidizing portions of which carried the metallic salts and the reducing portions the organic matter which provided the condition necessary for precipitation. It is believed that the early concentration of the zinc blende was contemporaneous with a deposition of at least a part of the black flint. Both were deposited after the Mississippian-Pennsylvanian erosion interval. The organic matter which gives color to the flint was derived from the bituminous shales, being carried into the broken residual flint beds and the flint conglomerate by downward circulating waters, which probably also carried silica either in suspension or in

solution. When the precipitation of the silica took place it evidently carried down with it very finely pulverulent carbonaceous or asphaltic material with both of which the shales were impregnated. The bituminous and asphaltic materials which now impregnate the flint "breccias" and the Mississippian limestone were also derived from the overlying bituminous shales of the Pennsylvanian, being carried downward in advance of the erosion which removed these rocks, either by gravity alone or by gravity assisted by water. Contemporaneous downward circulating waters carried lead and zinc salts which were precipitated with the silica and carbonaceous matter, forming what is known as the disseminated black flint ore.

Since a part of the black flint and the dolomitic spar were contemporaneous deposits, it is very probable that some of the zinc blende associated with the spar belongs to an early stage in the process of concentration.

The evidence at hand goes to show that the lead and zinc were probably derived from the overlying Pennsylvanian shales and limestone being carried downward as they were disintegrated and eroded. There are numerous deposits of lead and zinc in the southern part of the state where one can scarcely account for their presence except through the disintegration and decomposition of the Pennsylvania shales and limestones. In Miller County alone there are eight or ten isolated areas of Pennsylvanian shale in which galena or zinc blende, sometimes both, are found. These minerals either occur along the contact between the shale and the underlying magnesian limestone or filling, jointing and bedding planes within the shale. There are many similar occurrences of zinc blende and galena in the areas of Carboniferous shale and coal in Moniteau, Cooper and other counties in the central part of the state.

The ground water passing through these isolated areas of Pennsylvanian shales and coal has had no special avenues of communication with the deep underground circulation. The ore bodies do not extend beyond the influence of the solutions passing downward or laterally through the coal pockets. Every condition leads one to believe that these lead and zinc minerals have been brought to their present position by downward circulating waters.

Everywhere through the Pennsylvanian strata there are seams and crystals of iron sulphide, and were we to make careful chemical analyses of the shale and coal tributary to this district it is thought that there would be found

as great a quantity of lead and zinc as has been found in the unaltered dolomities of the Cambro-Ordovician.

Some of the lead and zinc may have been originally deposited with the limestone in which the ore bodies now occur, but analyses, although they may show the presence of lead and zinc, are not a demonstration that these metals were introduced at the time the sediments were laid down. The samples of limestone analyzed may be from a locality distant from any known ore body, and the rock may contain no particles of galena or blende of sufficient size to be detected with the naked eye or with a hand lens, yet these specimens may contain lead and zinc introduced since the rock was formed.

Neither the size of the lead or zinc individuals nor the locality from which the specimens are collected can be used as evidence that the zinc blende or galena were original constituents of the country rock in which the ore bodies now occur.

Galena and zinc blende occur everywhere throughout the Mississippian and Cambro-Ordovician series in Missouri, although there are comparatively few areas in which these minerals appear to have been sufficiently concentrated to constitute workable ore bodies. If one were to have before him a map of the Cambro-Ordovician and Mississippian of Missouri, upon which were located all mines and prospects from which galena and zinc blende have been obtained, he would certainly doubt very much the ability of any one to select samples which he could state positively contained galena or blende which were deposited at the time the sediments were laid down in the ocean.

Under certain conditions the stream waters entering the ocean during any of the geological periods might have carried lead and zinc in solution. Given proper conditions for the reduction and precipitation of these metallic salts, the sediments being laid down at the bottom of the ocean into which these waters flowed would certainly contain minute quantities of lead and zinc.

In the geological history of this state we find no conditions more favorable to the deposition of the metallic salts contained in the ocean than those which existed during the Pennsylvanian period. Everywhere there must have been conditions simulating those by virtue of which these metals are now being concentrated within the Mississippian formation. The occurrence of galena, blende, pyrite and narcasite —the latter two in great quantities—within the Pennsylvanian, in many parts of the state, is strong evidence that

the metals were thrown down abundantly in some portions of the Pennsylvanian sea. It is a noticeable fact that pyrite is most abundant in the coal and shale where they occur near what is supposed to have been the shore line. It is more than probable that the oxidizing waters from the land area, at that time, precipitated the metallic salts, which they had gathered in their journey, before traveling very far from the shore. This would tend to localize, within the Pennsylvanian, the original deposits. Later, in the Pennsylvania sea, when the reducing conditions became more general or the land area was completely submerged, the distribution of the metallic salts would become more general, and when the source of supply was cut off their introduction would cease.

We do not presume to point out the original source of the lead and zinc in the oceanic waters of the Pennsylvanian era, although it appears highly probable that the crystalline rocks, the Mississippian, Devonian, Silurian and the Cambro-Ordovician have all contributed in so far as they supplied sediments to the then existing ocean. As pointed out by Van Hise, Winslow and others, were we to trace these metallic minerals to their ultimate source, we would find them to have originated in the igneous rocks. From the time these metals were abstracted from the igneous rocks to the time they were held in solution by the waters of the Pennsylvanian sea, they may have been several times, in part, at least, precipitated with the oceanic sediments and re-dissolved with the weathering of the land surface. If one should judge the opinions held by others from their published reports, he would be led to infer that the Cambro-Ordovician sea was the last great receiver of the lead and zinc minerals brought from the land by streams. This does not seem reasonable since we know that the Mississippi river is now carrying and depositing lead and zinc with the sediments being deposited in the Gulf of Mexico. In addition to this it is known that younger formations supplied equally as favorable, and sometimes more favorable conditions for precipitation of metallic salts from the oceanic waters.

If .002 of one per cent. of zinc and lead deposited from the waters of the Cambro-Ordovician sea is considered sufficient to account for the lead and zinc deposits of the Ozark region, very much less will be required by the Pennsylvanian, since, through the almost complete removal of the beds of this series from the area in which the ore bodies occur, all the lead and zinc which they at one time contained

must have been transferred to other places. In the case of the Cambro-Ordovician, these series have only been partly removed and the greater part of this was accomplished by the streams which contributed sediments to the Pennsylvanian sea. On the other hand, the extremely favorable conditions for precipitation in the Pennsylvanian sea would lead one to suppose that the probability of a localization or concentration of the original precipitates would be many times greater than in the Cambro-Ordovician sea.

In a consideration of the formation of the workable deposits of lead and zinc ore, the starting point must be the last time the lead and zinc was held in solution by the waters of the ocean. In the case of the Southwestern Ozark district, it is thought to have been the Pennsylvanian sea. We believe that the concentration from this formation into the Mississippian has resulted from solution and redeposition, as a result of weathering, in a manner somewhat analagous to the concentration of minerals by the mechanical process.

Not only has there been a concentration of the lead and zinc, but as striking, also, has been the concentration of silica, dolomite, calcite and pyrite. Evidently, in all cases, there has been a gradual movement of these minerals, including the lead and zinc minerals, downward, pari-passu with the degradation of the land. That this movement is still in progress is shown by the growth of lead and zinc minerals in mines that have been abandoned and flooded with water. Instances of this have been recited in the reports of the Missouri Bureau of Geology and Mines.

It must be constantly borne in mind that any lead or zinc contained in a formation which is being decomposed and removed from the surface, will be disposed of eventually in two ways, (1) by removal in streams to the ocean or (2) by removal to greater depths and redeposited, in localities favorable to the reduction of these salts, within the underlying formations. The percentage of the metals which are disposed of by re-concentration below the zone where abstraction by solution is going on will depend upon the extent of the reducing conditions between the point where the waters leave the zone of oxidation and where they issue from the ground again in the form of springs.

In the district under consideration the percentage removed by surface streams must be relatively small owing to the persistence in depth of the bituminous and asphaltic materials in many of the openings of the "breccias," joints,

bedding planes and solution cavities, along which the ground waters travel.

The entire process of ore deposition in this district has been one of enrichment, below the level of ground water, brought about through the migration of the materials downward. The process has been one of constant but interrupted concentration, the interruptions probably being due to changes in the level of the ground waters resulting from successive periods of elevation and subsidence. In this our conclusions agree, essentially, with those which Mr. W. P. Blake, announced for the origin of the Wisconsin lead and zinc deposits. He says: "The evidence is strongly in favor of the view of the long continued decomposition, downward flow and recomposition of not only the ores of zinc, but lead and of the pyrite from the upper formations to the lower, as the general water level of the region subsided and as the upper formations by long continued exposure through geologic ages were gradually decomposed in place."

Above the level of the ground water, and in many cases far below, a process of abstraction is going on, as a result of which the sulphide minerals are, in part, taken into solution and in part altered to the carbonate and silicate. The carbonate and silicate are in many places precipitated as such from the underground waters, replacing the limestone and calcite crystals forming stalactites in caves and caverns, and lining small openings within the flint. Casts of crinoids and brachiopods lined with rosettes of calamine are frequently observed.

It is noticeable that the removal of the sulphides, carbonates and silicates from the zone of weathering to deeper levels has in many places lagged behind the surface weathering. Especially is this true of the galena and carbonate minerals, which, in the Aurora, Granby and other areas, have been found in their greatest richness near the surface, often at the "grass roots."

As an example of the depth at which the galena occurs with respect to the zinc blende, it may be cited that at least three-fourths of the galena mined in the Granby area has been obtained within sixty or seventy feet of the surface, while most of the zinc blende occurs below this depth, down to 200 feet. This in itself, in view of the fact that the Mississippian has been eroded very little since the Pennsylvanian strata were laid down, is evidence that there has been very little of the so-called secondary concentration of the galena. It also shows that such as has been secondarily concentrated has not traveled very far. Runs of galena are

sometimes found below blende, although the history of the district shows that the greatest deposits of blende are in the deeper workings, while the richest galena horizon is near the surface. This condition may be due in part to the greater stability of the lead ores within the zone of weathering, but chiefly, we believe, to the fact that it was the chief horizon of the early concentration of the galena from the convergent downward circulation.

The foregoing brief discussion of the origin of the lead and zinc ores is believed to be applicable to those deposits occurring in the Mississippian limestone, and would include the areas in Jasper, Newton and Lawrence counties, Missouri; the Quapaw and Miami areas in the Indian Territory, and the Galena-Empire camp in Kansas.

The Chemistry of the deposition of the ores of this district may be found in the report of the Missouri Bureau of Geology and Mines on "The Geology of the Granby Area." Space does not permit including it in this brief summary.

Estimates of Costs of Mining Operations in the Joplin District.

During the last few years our office has had many inquiries as to the cost of mining in the Joplin district, but owing to various circumstances we have never been in position to give very satisfactory answers to such questions.

Owing to the great diversity in physical conditions, equipment and efficiency of management, there is a wide range in the cost of operating mines and mills. In some instances the rock is hard, in others it is soft. In some localities there is a heavy flow of underground water, in others the flow is very light. In some places the ore is close to the surface, in others it is deep. Some mines require considerable timbering, both in the shaft and in the workings, others require practically none. Some mines can be operated most successfully with a mill of large capacity, others with a mill of small capacity. Some have efficient management, in others the management is inefficient. Thus it may be seen that the various elements entering into any estimates of cost may cause them to vary widely.

With a full realization that any general estimate of costs in this district may be misleading, I am submitting the following table in which the estimates are remarkable for their uniformity. These estimates have been made by men of broad experience in mining in the Joplin district and if used with judgment, ought to furnish a very valuable guide to those who are unfamiliar with the costs of mining in this region.

Estimates of Costs in Mining Operations of Joplin District.

No.	Average cost per foot for sinking shaft 200 ft. Single compartment	Average cost of timbering per foot	Cost of equipping shaft including buildings, hoist, cable, boilers, engines, etc.	Approx. cost of erecting a 100 ton mill complete	Percentage of mineral an ore should contain to pay a royalty of 15 per cent.	Per cent of the galena and blende usually extracted from the ore	Average cost of churn drilling per foot	Average cost of cutting a drift 6x8 ft. in hard ground
1	$10-$25	$2.00	$15,000		3	80	90c	$12.00
2	$5-$30			$9,000 to $10,000	3 to 6	80	90c	
3	About $10	5x7 shaft $1.50	$3.000	$12,000	4	98	90c to $1.00	$5.00
4	Average $10		$2,000	$10,000	5	80	85c to 90c	$8.00
5	$18	$1.50	$2,000	$12,000	4	57	80c	$20.00
6	$12	$1.00	$800	$8,000 to $20,000	3	90	90c	$8.00
7	$12 to $22		$1,000	$8,000 to $9,000	3		90c 50c by owner	$10.00
8	$5 to $40		$400-$4,000	$8,000	4		80c to $1.00	$4.00
9	$10 to $20	$2.00	$2,500	$12,000	3 up	68	$1,00	$10.00
10	$10 hard and dry $15 to $40 hard and wet	5x7 shaft $2.50 to $5.00	$12,000		3	75	70c-80c by owner	$4.00 to $6.00
11	$5.00 in dry shale, $12.50 in dry limestone	$5.00 for drifts	$1,100	$9,000	2.6	75	40c to 60c by owner	$3.00 with compressed air furnished

In reviewing the above table, attention should be directed to the several estimates in particular. The average cost of sinking a shaft 5x7 feet is given as a little over $15. However, it is thought that if one were to secure information covering the cost of sinking shafts in which correct methods were employed, he would find that the cost has not exceeded $10 per foot in hard ground. In loose ground with a heavy flow of water, the cost may reach as high as $40 per foot. There are shafts in the district in the sinking of

which labor has cost only $1.50 a foot to a depth of 75 feet. Others 140 feet or more in depth have cost up to $70 per foot. These are probably due chiefly to mismanagement or accident.

The cost of timbering a shaft is usually included in the cost of sinking. Under ordinary conditions the cost does not exceed $2 per foot. The variations in the character of the ground passed through controls the costs. Sometimes a set every six feet is sufficient, and then again one has to drive piling ahead, lag the sides and insert the sets much closer.

The cost of equipping a shaft is usually included in that of the erection of the mill. At least the two are usually so dovetailed as to make an estimate of either considerable of an approximation. The equipment of a shaft often passes through various evolutionary stages from a simple hand hoist to a steam hoist with standard head frame, etc. The size of buckets, cable, cars, etc., also influence the cost. The estimates given in the table represent the cost of equipping a mine of a size sufficient to operate a 100 or 200-ton mill. From these estimates one would conclude that the average equipment costs about $2,500.

The cost of erecting a 100-ton mill complete with power plant (Joplin type), depends somewhat upon the character of the ore to be broken. If it is hard the power plant will need to be of greater capacity than if it is soft. The source of supply of water will also effect the cost. If a pond is required as a reservoir, this will be an added expense. There are other factors which it is unnecessary to mention here. The estimates given in the table illustrate the effects of these varying conditions, upon the cost. It is thought that $9,000 will represent the average cost of a new, modern 100-ton mill complete. Good second-hand mills can usually be purchased at a cost of from $2,000 to $3,000. Such a mill may be moved and put into satisfactory operation, by contract, for $1,500. This makes the cost of a second-hand mill $3,500 to $4,500.

The estimates of the percentage of mineral (zinc blende), which an ore must carry in order to be worked profitably, while paying a royalty of 15 per cent., are very close. I am inclined to believe, however, that in most cases this refers to percentage of blende obtained from the ore. There are very few operators in the district who know the percentage of zinc blende in the ore as it comes from their mines. They do not consider the losses in milling sufficient to war-

rant the installation of a sampler to check the work of the mill. The companies know approximately the number of tons of ore hoisted and the number of tons of concentrates obtained therefrom. From these they make an estimate of the amount of blende carried by the ore. The highest estimate is 5 per cent., and it is thought that this is in some instances too high, although as an average it is closer than 3 per cent. I have in mind a property which in April, 1906, extracting as low as 2.37 per cent. mineral (184,660 lbs. of zinc blende at $41.25 per ton and 36,070 lbs. of galena at $74.10 per ton), and paying a 15 per cent. royalty, made a net profit of $264. Many of the richer mines of the district pay royalties of from 20 to 25 per cent., in which cases the percentage of zinc blende in the ore must be considerably greater, perhaps as high as 8 or 10 per cent.

I believe that it is a safe proposition to say that, under present conditions, an ore body of ordinary size and under normal conditions must contain at least 3 per cent. of zinc blende to be worked at a profit and pay a royalty of 15 per cent., with 60 per cent. zinc at $45 and lead at $80 per ton.

The percentage of extraction by the Joplin type of mill has never received the attention in this district which it deserves. Very few operators determine the percentage of zinc blende that leaves the mill for the tailing pile. However, it is commonly known that the "tailing mill" and sludge mill operators obtain a good revenue from re-working the chat piles and sludge. Many of the tailing piles worked over by these mills, contain from 2 to 3 per cent. of zinc blende. Assays of some tailings in very good practice have shown 1.85 per cent. zinc blende. Basing our estimate upon the quantity of zinc blende extracted by the mill and upon the percentage shown by analyses to be in the tailings, it is thought that 60 to 70 per cent is a fair estimate.

There is very little difference in the cost of churn drilling, the prices ranging from 80 cents to $1 by contract. In case a company desires to operate its own drills, the cost of 200-foot holes ought not to exceed 50 cents per foot, as an average.

The cost of cutting a drift 6x8 feet in hard ground will vary with the amount of water to handle, the facilities for disposing of the waste and numerous other conditions. The average may, perhaps, be taken as $10.

Annual Address of the President

BY HON. JOHN H. RICHARDS, BOISE, IDAHO.

My Friends:—Missouri is always producing something good, judging from what was told us last evening. It not only produced the men we heard speak here last night, but, it has also given us Dr. Buckley. (Applause.) He has been one of the most energetic and untiring workers for this Congress. It has been largely due to his sacrifices for years, his careful interest in this work, and his comprehensive grasp of its meaning expressed in the by-laws and articles of incorporation, in the preparation of which he had a large part, that the future work of this Congress has been so clearly defined. Therefore, we feel that we are under a debt of gratitude to Missouri for having given us Dr. Buckley.

This occasion as I understand it, is purely a business one. The thoughts I desire to suggest for your consideration tonight are to call your attention to the work of the Congress, its aims and purposes. We feel that we have made some progress. I am sure we have the most self-sacrificing board of directors of any class of men with whom I have ever come in contact. They are so self-sacrificing and generous that they are willing to do all the work and give me all the credit. A gentleman from Texas asked me, "How is it that you have taken hold of this organization and brought order out of chaos so that it is now doing its work so smoothly?" I replied, "Because I have been so fortunate as to gather around me men who are willing to do things and let me stand still and look wise."

I want to say to you that it is the mining of this country that makes it possible to have a great agricultural country and set the wheels of civilization and progress in motion. We should not attempt to separate these two great forces of agriculture and mining. When you see these great deposits of coal that are capable of producing millions of tons per annum, such as you have in this Middle West; when you see the direction given to multutudes of men and the instrumentalities by which this production can be made and direct the mighty transportation forces, you must realize that these things take men. These men come from the mining sections of the world. (Applause.) Do not misunderstand me, I do not want to belittle any

industry; but, if you take from the great active forces of this nation today, the great iron industry that makes your transportation lines possible, makes possible the great manufacturing of this country, and take from it also the coal that impels our nation's mechanical activities, and take from it also the great mental capacity, including the comprehensive grasp of the present and future, and what have you left in this country that makes for progress and the higher civilization?

You must be aware that these great active forces come from the mining sections of the country, and they are forces that should be considered in giving direction to our nation's progress, but when I go down to your National Capital, as I did last week, on a tour of investigation I do not find a single bureau or department in the great government at Washington by which the mining industry is recognized as an industry in this country. I think it is about time that the mining men of our nation spoke loud enough to be heard at the Capital at Washington. (Applause.)

The mining men are interested in the great forests of this country, and if the things had been done fifty years ago in relation to our forests that we are undertaking to do today, and if the things that we are undertaking to do today in relation to our great coal deposits had been done fifty years ago to protect them in the interests of the general welfare, the blight of corruption and dishonor would not have rested on the fair name of this government as it has been uncovered in the land fraud scandals of the West. This is true, because in that event the government would have looked far enough ahead to have cared for these things in the interests of the general welfare, the purpose for which our government was organized.

To place before you the work of this Congress and what it is trying to do, the board of directors have instructed me to call your attention to the plan of organization and what we are trying to accomplish through this organization. The basis of it all is intelligent co-operation. I have discovered during the years I have been in the West, that no man can live to himself alone and develop into a true manhood. We must to a certain extent, be our brother's keeper. We must learn this great lesson in all the great undertakings of life, if we would truly progress. If a man lives to himself alone, he is the man that believes that only the dollar is necessary to make him a great man. I tell you that when you feel the experience of being even a little bit unselfish and look to the needs of your neighbor so as to reach

the great heart of humanity, you will find that there is a higher view than the possession of mere dollars.

On this basis we come here to ask that you encourage this work of intelligent co-operation on the part of the people of this country. We do not believe that we should go to the extremes to promote any one industry, but that as a great people we should promote all as a harmonious whole. We first need intelligent co-operation among individuals. You must realize that no individual can successfully perform all of the steps in the manufacture of his own shoes. Suppose every individual undertook to do that, what kind of a country would this be? That is not intelligent co-operation. No individual can successfully and properly perform all the steps in converting the raw material into the clothes he wears. It needs co-operation on the part of individuals, if we would bring out of those individuals the higher qualities which would enable them to achieve. It is only through intelligent co-operation that we can truly progress; it can never be done through individual selfishness. The miser is a fair specimen of the individual who undertakes to live to himself alone, and yet, as you and I see him there is no beggar that walks the street that is so poor as a man who has nothing but money. (Applause.) Under this idea communities must likewise co-operate.

In talking with some of your great coal operators in the cities of Chicago, Springfield, Indianapolis and Pittsburg recently about their joining us in this co-operation, they wanted to know where this organization originated and what was its fundamental idea. I replied that it originated in the West, and its fundamental idea was largely educational. They looked at me in apparent amazement, as if wondering how any good thing could come out of Nazareth. I am sure many good things are coming out of the the West, and the East will secure a blessing by understanding them. Don't you know that many of your brightest, keenest, most progressive young men go to the West, and they are the men that make the West what it is today. Out there we get closer to nature than we do to the dollar, and our hearts expand when we come in contact with those great mountains, those great canyons, and those great valleys, and we come back to the East to try to impress upon the men of these great prairies that co-operation with the West will help develop this entire country and its manhood.

We also need co-operation between the states. No state can live to itself alone in this country under our form of government. They must co-operate. Is it not perfectly clear that if one community can raise potatoes to much better advantage than another, and another community can raise grain or cotton to much better advantage than another, that it is better for each community to raise those things best adapted to its conditions and which can be produced most profitably, and then to interchange these commodities, and this interchange makes commerce and both communities are blessed, and that is my idea of commerce. True commerce is that interchange which benefits both the seller and the buyer. It is not commerce when it blesses one only. So I say these states must co-operate. In addition to this, the states, the individual and the community must co-operate with the Federal Government.

I undertake to say that in the hour of our nation's birth, when we said: "We, the people of the United States, in order to form a more perfect union" (and let me impress you with the thought that there is no union that is enduring except a union for good), "and to establish justice," I think we realize today that this the great cry of the nation at this hour—that we may establish justice—simple ordinary justice. This would promote the general welfare. We also formed this country "to provide for the common defense, insure domestic tranquillity, and secure the blessings of liberty." This was all done for the general welfare. In the light of these things the sentiment that "private interests" are too sacred to be regulated by law in the interests of the general welfare, is not wholesome.

There is no band of men in this country that are so anxious that capital should prosper, that men should make money from their business ventures, as the members of this Congress, and we also want to give the other fellow a chance. In other words, we want all to stand equal before the law and have an equal opportunity under the law. (Applause.) Therefore, we want this great government to co-operate with us as they are co-operating with agriculture.

We believe that if our government had co-operated with the West and planted upon their books years ago, statutes adapted to the conditions to which they were intended to apply, there would not have arisen the great questions of land frauds and the prosecution of United States Senators and that sort of thing in the West, that is going on today. They undertook to apply to that country the same laws that applied to Ohio and Indiana and this country here. They

did not meet Western conditions. It is because we have not co-operated intelligently that these things have arisen. A statute should be the highest formal expression of the wisdom of a great people, and it should always be interpreted in the light of the conditions to which it was intended to apply. Necessity must be the basis of all law. But we find vast tracts of timber land, the most marvelous timber that the earth has produced, passing into the hands of the few, contrary to law. The laws are not of a character that would permit a corporation with plenty of capital to acquire sufficient timber honestly to justify large expenditure, to meet even local needs. The same is true of our coal lands. Why should not the law permit a company which has sufficient means to develop a coal mine on a scale to meet the conditions surrounding that coal section, to secure that coal honestly? As the law will not permit this, they have undertaken to get it in some other way, and they have gotten it to the dishonor of our country. It is conditions that produce these results, and not the dishonesty of the men at heart.

I undertake to say that if the present forestry policy had been put into operation twenty-five or fifty years ago, that the general welfare of the West would have been vastly promoted. The conditions there are such that we get our water supply through the great storage of banks of snow in those forests on the mountain sides and in the canyons, which melts out gently in the summer, and through the co-operation of communities the highest form of agriculture is promoted. They are using those great mountain lakes as reservoirs for power to help lift a part of the burden of toil from the shoulders of men; they are using those rapid flowing mountain streams as a means of bringing the resurrection morn to the parched lips of the valleys and the withered breasts of the plains that lie beneath them. While they own these water rights jointly, they are yet held in severalty so far as their application to the land is concerned. A man cannot under the conditions there existing look out for his own interests, without at the same time caring for the interests of his neighbor. They must work together. In this way they are producing better men and better results and better conditions than they produced under the old individual, selfish system. These Western men are not dishonest at heart, but they come West from this great East to do things, and they are going to do them in some way, and they do it.

Now, there is a mighty waste going on in our coal mines, in our fuel, and this should be stopped. The Government should co-operate with the miner so that there may not be that mighty waste. The fuel question should be carefully studied, analyzed and understood, so as to get the best results from it. Who can do that better than the Government of the United States, just as they are doing it for the farmer. Why not? The mining industry of this country today produces in raw material about two billions of dollars, but when you add to that the articles manufactured from that raw material, mining stands on an equality with the agricultural interests of this country.

Individuals in this country seem to think that when they have acquired title to those great natural bodies, such as coal deposits, given to the American people by nature, that they own them absolutely and have the right to waste them. That proposition the American Mining Congress denies. We do not believe that any man has the right to acquire those great forests given by nature to the people of this country and waste them. (Applause.) We do not believe that any individual or any corporation even after acquiring legal title to great coal beds, has any right to waste those deposits. There is an element even in spite of this legal title that belongs to the American people, and that is that these deposits shall be wisely used and wisely conserved for the future. These deposits lay at the feet of the red man for ages, wholly useless to him, because he did not have the intelligence to use them. But the white man came and is making better use of them. The use of these bounties should be governed by intelligence, and not by ignorance. No man has a right to waste the natural wealth that has been given humanity by nature for the general welfare. I believe there is an equality in all nature's bounties which belongs to the American people, and that is that every man shall use those things so that it will bring out of them the greatest good to the American people as well as to the individual, but he has no right to waste them. Wastefulness in business does not make a good business man. But to learn how to use nature's forces, use them wisely, develops the man, and that is what these forces are for. These great deposits were not given to us to waste. While they may amount to nothing in themselves, yet they amount to almost infinite value when we take into consideration that they were given to us to develop humanity through a right use of them and to bring out the manhood and the womanhood of this country, and this

right use develops in us the capacity to achieve greater things through a right understanding, and that is what they are for, and that is why I say the people of this country have an interest in the conservative use of nature's forces.

When we look across this country and see the great shore lines and the rivers and the lakes for commerce, when we see the fertile soil pregnant with vitality when guided by intelligence, when we see the great forces of the coal bodies, the mighty forces embraced in our zinc, lead, copper and iron deposits, we find there the things, the right use of which makes the nation mighty, and when we see the great mountains, when we see all the mighty forces for good, and all that can be accomplished with them, we believe through this right use of it all, we can be a blessing to all the world. I believe a nation that can produce an Abraham Lincoln is capable of producing anything almost. There are no limitations on that quality of production, and that character of manhood adds a more true and lasting wealth to our nation than all the gold and silver hidden in those great mountains.

We must intelligently co-operate to learn how to use these forces to bring out of men that greatest good. We have infinite capacity if we will only learn how to develop that capacity, and use it, and in that kind of development you will learn how to enjoy. The miser does not enjoy anything. He fears everything. There is not a spark of development in him that brings out one noble impulse. So I say that we want to learn how to use these forces in co-operation with our neighbor, and in that way we are both blessed.

I think it is one of the most valuable assets of my life that in this work for the Congress I have come in contact with just such men as sit here before you. Their faces tell what they are, and whose friendships will endure as long as life endures, and no money could compensate for the loss of their confidence and friendship. I say that if you take hold of these things and help us develop them in this nation, you will find there are things in this character of work that have a value absolutely beyond price from a dollar and cents standpoint.

Let me give you an example of what I mean by intelligent co-operation and what that co-operation is doing. Take the Agricultural Department of our country. We all have to have bread to eat, and we all have to procure that from agriculture, from the cultivation of the fields and from

horticulture, from cultivation of the garden. Out in our country in those little communities where a man has all he can do to farm well twenty acres, where his rainfall is governed by human intelligence, where farming becomes scientific, where he applies the water to the plant just when it needs it most, and he sees there a perfect development, that kind of horticulture or agriculture makes a better kind of man than the careless farming such as I see in the State of Missouri. I am not criticizing you, but I am calling attention to the carelessness that does not bring out the best in a man. We asked the Government to help the farmer, and it has created the Agricultural Department, and that Department is spending annually $10,000,000 to help the farmers of this country. That is a grand work, a splendid one. But they are not doing enough in that direction: With that character of co-operation by which they investigate in each state through their experimental stations and the Agricultural Colleges, they are finding out what can be done best by intelligence in those states, and through that we are developing better farmers because they are better men. Intelligence applied to farming brings results just as well as intelligence applied to the products of the mine or any other industry or undertaking. The Agricultural Department has nine bureaus in which this scientific work is going on. I will read them to you. First is that of Animal Industry. I don't know of anything to help develop a man into a better man, than to teach him how to raise animals properly. Way back in the past, our ancestors lived by the destruction of animal life, but they learned after that a little care devoted to animal life produced better results than cruelty and slaughter and murder, and as we have gone along down the ages we find that when intelligence, kindness, love and affection are devoted to our animal life that that animal life responds in kind. You take the little broncho of the Western plains, vicious little brute because he had vicious treatment. He could not develop into a big, noble horse, because he had no kind of treatment that would bring out the best in his nature. As I said last night, kindness and love are what the world demands and is crying for at this hour in every experience of life from the vegetable to the animal kingdom of this country. If you want to bring out the best that is in a horse, treat him kindly. Educate him, don't break him—educate him. Man was created to have dominion over the earth, and he will never have dominion through war and cruelty, but through kindness and intelligence. That is the way to get dominion and come into our rightful heritage.

The next is the Plant Bureau or industry. You will find that the strawberry vine will respond in wonderful degrees to kindness and affectionate care. It is affection that brought forth those plants, not cruelty, not murder. If you want to beautify and adorn the earth, let love shine out in everything you do, and you will find that everything will respond in kind to you.

We all hope the time will come when we will not need to learn war any more. Why, "The drying up of a single tear has more of honest fame than shedding seas of gore."

The next is Food, and you know how much the Government has helped you on the beef question and other things that pertain to pure food. A man that has impure food cannot have pure thoughts. "Blessed are the pure in heart, for they shall see Good." A corrupt man never sees Good. That is what we are searching for, is Good, and that is all. We must learn how to search for it in that direction. Ideas rule the world—nations and individuals—therefore let us get right ideas and put them into practice. The Golden Rule put into practice today would bring the millennium. What we need is common honesty in our dealings with our neighbor. That is what we are trying to do, but we have to go a long way around.

The next is the insect pest. That has been a wonderful service to the farmer in making a success of his business. It does more—it helps to make the man better. A man that can grow a good field of corn is better than the man that grows a poor one.

The Weather Bureau. That is a great service to the whole country. Then we have the question of soil, where they analyze the soil, and find what kind of soil can produce the best crop and give the best results, and when you study those soils and understand them, you will have a high regard for the soil, and the soil will respond in kind that you devote to it. If kindness and intelligence is applied to the soil, that soil will respond to that kind of treatment. If you are a careless, cruel, narrow man, your soil will respond just that way, and so will everything else in nature.

We can find in this world just what we hunt for. If you want trouble you will find it anywhere. If you want success, you cannot fail, if you will hunt success along true lines. It is just as certain as a mathematical problem. I might quote a little Scripture, to show that I am somewhat familiar with the Good Book. Many of us have a great deal of trouble fretting and worrying and wasting our energy over things that never happen. What did the Great Master tell us? We are fretting about what kind of clothes we

are going to have, and the kind of homes we are going to have, and we want wealth and comfort and we fret about it. He said, "Fret not thyself, saying what shall we eat or what shall we drink, or wherewithal shall we be clothed. Seek you first the Kingdom of Good and His righteousness (or right thinking) and all these things shall be added unto you." It is the same as twice two is four. When you undertake to solve a problem in mathematics, follow the rule. Seek the truth and follow it, and you cannot help getting correct results. The same way with any work we are doing. We are trying to get intelligent co-operation. If we get this on the part of the Government, success is a certainty.

Now we have another bureau called the Road Bureau, and we have met with a splendid example in this country on good roads. In all my travels in the West and Middle West, I have not found as good roads as you have here. I think you are better for it. You make your neighbor better by your good roads. You reach every man here tonight thinking about your roads and he will bear this in mind and when he goes home he will help to get good roads there. Thus we co-operate along all lines, and think better of each other for it.

Then we have experimental stations to help experiment on all these things. They have searched the world over to find new seeds, new grasses, new fruits and new methods to help the farmer produce a greater quantity of the product and better quality. In the degree a man develops in quality he will produce a higher quality of grazing or horticultural products. Only to that extent can he do it.

That is what the Government is doing for the farmer with these nine bureaus. Now this work that we are undertaking, you can see from what I have said so far, is largely educational. This is one of the essential things in a government of the people, because its progress depends entirely upon the intelligence and understanding of that people. Therefore it requires education all the time. I find that the miner, the ordinary miner that you talk about, can teach me and you many a good lesson. That is why we invite him in this Congress to co-operate with us as well as the operator, because the operator can be taught many a good lesson by the miner. The operator does not know it all, neither does the miner, but if we get together we will get the benefit of all of the experience and each will be benefitted.

We have agricultural colleges established in each state. I had the pleasure of spending last Sabbath a week ago

in the Agricultural College of Illinois. It is a wonderful institution. It is wonderful what they are doing there to prepare the young man to work upon a higher plane, to bring out the best in Nature, by bringing out the best that is in him.

I think that the mine operator in this Middle West and the East needs educating some along these lines, because I thoroughly believe that if he participates in this effort to get national co-operation, he will find that he is benefited, and I believe that many of them realize that to a large extent, some of them much more than I do, perhaps, because I have talked with them in Chicago, Springfield, Indianapolis and Pittsburg last week, and they are willing to co-operate with us in this great work in the future.

The Agricultural Department is sending out publications for the benefit of the farmers by the millions so that the farmer has something absolutely reliable, written by men who understand, to guide him in his work of agriculture and horticulture. I don't know why the miner should not be helped that way just as well as the farmer, not because one is better than the other, but because both need it. (Applause.)

When we look back over the history of this country as a matter of education, we find it took many gatherings of the people like we have here to-night, it took much discussion and thought to even let the people understand how to found this Government. It has taken many gatherings and much thought and much argument to keep the people educated up to the condition that was necessary to keep this government moving on and progressing, and it will continue to take many gatherings in the future to keep this educational work going on because it is by gathering together and seeing our needs and learning from each other, that we grow.

It is the individuality of the American citizen that makes America great, that makes the American citizen recognized as an individual throughout the world because he dares think for himself, and expresses his thoughts on all occasions, and it is this interchange of ideas that brings out the best things, not for controversy, but to bring out the truth.

I think the public at large has a very false idea of mining. I heard some one say since we have been here that a prospect or a mine was a hole in the ground with a liar at one end of it, or something like that. Now is that your idea of a mine or a prospect? If so, you have not the first glimpse of the wonders of a mine. I have just recently vis-

ited a great mine in my own state, and I went in there two miles from the mouth of the tunnel, and there I saw a great body of galena ore 120 feet thick between the walls. Is that a hole in the ground with a liar at one end of it? It is something more than that. They are handling in that great mine 4,000 tons a day, taking $500,000 annually to buy the timber alone that they use in that mine—and we have many of them. Let the people understand that a mine means a hole in the ground with a liar in it? No. There is no truth in that. We want to learn how to find the truth about mining. (Applause.) Why, don't you know that it is the virtue of mining that makes it possible for the dishonest man to take advantage of individuals? If it were not possible to get such mighty results as we get from mining, it would not be possible to float these fraudulent stocks which are being sold in this country by the dishonest promoter? You may dig a hole in the ground and make millions out of it. That is why the dishonest promoter undertakes to mine that vein in human nature which we call the "get-rich-quick get-something-for-nothing" streak in humanity instead of mining out of the ground. It may be true that distance lends enchantment to the lie, but nearness lends enchantment to the truth at all times. Bring the skeptical man with you if you want him to see the truth.

So I say if we understood mining in its scientific sense, through co-operation with the best minds in our country, and on the part of the Government we would change this theory of mining. I have lived in mining communities now for thirty years. I want to say to you that I have no question that in mining, if a man will pay the same attention to it that he will to merchandising or banking, that he will make a larger percentage of profit than in any business that I know of. (Applause.) It is a mere question of understanding. There is no use in a man going into business and undertaking to succeed at it when he is ignorant of how to succeed. Mining requires skill, courage, judgment, knowledge—and when you have it, and pursue mining intelligently, it is the most certain of returns of any industry with which I am familiar, and I say the American people need to be educated upon the subject of mining.

Why, when you look at your great coal mine, isn't there a chance to win certainly out of these great coal mines if you go at it intelligently, and if we are honest we can always get all the money we want to develop the property? Look at the great iron mines. Is it not safe to say you are getting an honest deal when you go into an iron mine? Take the great steel trust—they never need to look for mil-

lions to develop their great iron industry. It is a good investment. And so with many other branches like copper and lead and zinc. I think we find in Idaho, out in that wild and woolly West, that we can teach you many lessons about how to save out of the ore after you have mined it and crushed it and jigged it, you haven't got it all yet. There is profit to a large extent, even in this community in the portion that is being wasted. You have no right to waste it. It belongs to the public, to the people of this country, and you ought to use scientific methods by which those things are saved, because there is clean profit in it.

Let me give you some idea of the character of the organization of the American Mining Congress, so that you can see as to its plan of organization. It is a corporation not based on capital stock but based on membership, where each member has a right to vote and participate in all matters that pertain to that organization, electing directors, laying its plans, and everything that pertains to it. We have also in connection with that under our by-laws a delegate system, because we believe that many men who are not willing to become members because they may not feel able to attend every session or pay the amount that is necessary to become members, may come occasionally and bring with them some splendid ideas. The delegate helps give us the necessary enthusiasm. He helps to keep us out of a rut, and we find him a very useful element in the Congress. The delegate has the same right in all deliberations of this body at the sessions that the members have except in voting for directors. That is a legal question and only members have the right to vote upon that question.

We have established, because it seems necessary, permanent headquarters. Our records got to be quite voluminous—we needed a place where they could be preserved, because we have addresses and papers of great value which must be stored away for use in the future. It is necessary that we have one place where the officer, the Secretary of the organization, can be communicated with between sessions, so we have that particular place, our headquarters, at Denver, Colorado. The annual session can be held anywhere in the United States. I want to make a suggestion on that because always at these sessions a contest arises for the location of the next session. The directors have the power to locate the session, or, rather, I would say, ratify the action of the delegates and members, because something might arise by which after the session had adjourned, it would be impossible or impracticable to go to the place selected. Some power must be lodged somewhere.

The Board might find it necessary to change the location.

Now, the annual sessions at present are quite important. It may not be out of place to make a suggestion or two. A gentleman in Chicago, I think it was, asked me why we didn't come to the East years ago. "Well," I said, "in the first place, in my judgment you never could have started an organization like this in the East. They are too busy making dollars. But we wanted it started in the West and we just had to make it respectable and respected and we believe that we have done that, and now we are coming East and we are going to educate you, and you will educate us on these great questions. We will co-operate on these lines because something good can come out of the West." That is about as brief an outline as I can make of the plan of the organization.

Don't you know that a great many people still have the idea that one of the purposes of our great Government is war? That is a false idea, and that idea, if the Government cultivates it among the individuals, then the individual thinks that his attitude is to make war on his neighbor instead of working with him. He undertakes always to get the best of him, to get something from him that does not belong to him, and that creates a bad tendency, and we are tending too much toward the idea of war in our industrial progress in this country, instead of co-operation. During the Middle Ages, a nation could not be great unless it was great in war; in the destruction of life, liberty, property and progress. That is what it means. There is nothing so disastrous to progress as war, whether war of individuals, communities, states, corporations or nations. We must learn to overcome this tendency to war, and learn to co-operate. I think it was Jefferson who said in his first inaugural address as defining his idea of this Government: "It should prevent men from injuring one another and leave them otherwise free." That was true at his time, but it is outgrown today. If this government is only going to prevent you and me from injuring each other and leave us otherwise free, then we have lost the precious jewel of all progress. It must help the individual to grow, it must co-operate with the man who is trying to better conditions, it must not only restrain evil, but it must uphold the good tendencies and encourage them. The Government is growing in the right direction, as this Congress and other Congresses of its kind will show. We are trying to uphold men who are trying to do good, discourage evil and strengthen good. The modern idea does not mean war, it does not mean protection merely, it means development. That means bring out of us

those energies which we have, if we can only learn how to use them wisely. We have all within us what is necessary for infinite happiness if we can learn how to bring it out, and in bringing it out of ourselves we bring it out of Nature in the form of blossoms and fruit. It is a wonderful thought. There are no limitations to hinder our progress. It makes a man feel free without limit when he thinks of those things and undertakes to do them. We want development of the individual. We don't want to destroy individual development, but don't you see that you and I can develop better by working together than we can by working singly. Let me supplement what you are capable of with myself, and we will both be the better for it. It is development that we want, in communities and with a nation. I need not go into details with that further. Our Government was organized as a means, not as an end. It is not the end. It is organized to help you to work together and be men and women. It is an instrument by which we are doing that, but it is not the end, any more than war is. We feel that our Government is lacking in one thing. We feel that while it is helping agriculture it should do more in that direction, but it is making it sort of lop-sided or top-heavy by giving so much to one side, and not building up the other side of the Nation's wealth in an industry. We have many departments—the Department of State, War Department, Navy Department, Department of Justice acting through the Attorney General, and those departments are necessary in order to execute the form of Government at all. Then we add to that other departments which are both executive and I might say industrial, that go directly to the welfare of the people, like the Postal Department, Interior Department. Then we have a third which goes directly to the general welfare, like the Department of Agriculture and the Department of Commerce and Labor, and we want a Department of Mining to bring out the mining interests.

Right here let me say to you that for ten years this Congress has been undertaking to get that work started. The Board of Directors sent me down to Washington to see what could be done there. I had the pleasure of meeting first the director of the Geological Survey whom you heard speak since you have met here—a splendid character—earnest, sincere, doing everything in his power to be faithful and true to the great trust that was reposed to his keeping. I found quite a sympathetic nature in him. We did not agree upon all things and it is very good that we did not. The fact that we did not agree shows there is development in both, or one, of us, anyhow. But I tell you he is a big, earn-

est man, in sympathy with the plan of work we are trying to carry on and we can trust him as a friend of this Congress to help carry out the great work we have undertaken. I then had the pleasure of going to see Secretary Garfield, another great, big, strong American man. At first he said "No." Second, he said, "I may be mistaken about this." And, third, he said: "You are entitled to it and I will help you get it." (Applause.) He promised to write me a letter that I might bring to read to you to-night, but owing to the delays in the mails, or something, it has not reached here at this time but may before the Congress adjourns, and I feel very grateful to him for the encouragement he gives. But the first real, direct encouragement I received in Washington was from Senator Heyburn of Idaho and I will ask the Secretary to read the letter at this time.

(Secretary then read the letter.)

Senator Heyburn will do anything in his power to help us in this work. Senator Hemingway of Indiana will also. Mr. Dalzell and others will aid, and I feel we will get a Bureau of Mines—an independent bureau, because, in addition to this I had the pleasure of calling upon the President of the United States. He is a very strong character, and is like a steel trap. He said: "What do you mining men want?" I said: "We want results; we don't care what you name it." He said: "I will recommend a Bureau of Mines in my next message. I have a part of it outlined already. Will that suit you?" I said: "That is all we ask. Good-bye, Mr. Roosevelt." Quick work by a quick man, and that is the way we expect that bill to pass, or else they will hear from us in Washington again.

There are two great basic industries in this country, and only two, from which all the forces that we have to use in our development are derived, and those two are mining and agriculture. They cover it all. They ought to be developed side by side, harmoniously, and not lop-sided. I cannot understand why the American miner is not just as much entitled to encouragement and help as the American farmer. They both need it and must have it. We started out to fight it out on these lines and will do it if it takes twenty-five years. We are going to be heard.

I might go on and tell you the lack of legislation by which the forests have been wasted and by which coal lands have been wasted. The miner goes out into these mountain fastnesses. He finds there the mineral, and behind him comes the men with money, and he sees the forests going into the hands of the few, and with the timber goes the mineral in many cases. He sees the coal lands going into the

hands of the few, and he is up in these great hills and there is nothing left for him—no ore, no timber, no pasture. But he understands the use of dynamite and he uses it. I told the President of these conditions—that they were the conditions that produced the "undesirable citizen" you are talking about, and we want those conditions remedied. I say we should remedy those conditions that make those citizens.

I might go into all those things but I will not do it. The effective work of this Congress depends upon the practical questions that affect us every day, and the character of the men that handle these questions. When you come to the Congress and hear men read papers and discuss things, one man will do you more good in five minutes than the other would in five weeks, because it is in him. He understands it, and is trying to tell you about it. We are trying to bring the people in contact with the practical miner that knows how to do things. We are trying to get a program which will bring out the more practical phases in this work. They will attract attention by the manner in which they are presented.

Now take the question of low grade ores. What a wonderful thing in a community where you have vast bodies of low grade ore and the miner is undertaking to develop a claim, he finds the ore, he gets out a few tons and ships it, and the railroad charges him about five times as much as it is charging the larger shipper, and then it comes to the smelter and what the railroad did not take, the smelter takes, and he has nothing left but dynamite, and he uses it. I am not defending him in that, but I say those conditions bring about those results because a man has no redress. The government does not help him; does not defend his rights. I am acquainted with those conditions in that Western country. There is no better-hearted, more generous, noble, brave manhood in this country than you will find in our Western mining country. (Applause.) They are the young men that came from the East, educated, many of them great big men, but they have rights, and they ought to be helped and encouraged because they will help to make a great nation and a great people. Let me suggest, you will hear a report from the committee investigating smelter rates: We take this position. We want the smelter to prosper and to make money. We want it liberally rewarded but there is a condition in this country where great corporations undertake to render you an important service, and we know nothing about the value of that service at all, and we have to pay just what they arbitrarily say. We have to pay it. There is an element of injustice in that that

the people of the United States will not submit to many hundred years longer. When I render you a service, you are entitled to know something about the value of that service to you and pay accordingly, and when the entire knowledge is on one side and helplessness on the other, somebody should come into the arena and bring out better conditions. There is a controversy going on between the miner and smelter. We are determined, if possible, to bring those two elements together so that they can both prosper in a higher degree than ever before.

Take the question of labor. We meet it out in our country, but I believe as much as I believe anything that the labor unions came forth in this country as a cry for justice. That is what made the labor unions come out as they have, but they must be conducted so that that instrument which was intended to bring justice shall not be converted into an instrument of injustice, as they are doing in many cases. That is one of the works we are going to undertake to do, to bring these elements on a plane that will bless both of them.

I might go on and tell you all the mutual benefits that would come to us from co-operation but I will close with this one thought that sentiment in mining in my judgment is its most valuable asset. I mean that sentiment that enables a promoter when he attempts to interest you and me to join him in a mining venture—that he should possess that sentiment that compels him to do everything in his power to make that a proper venture and not a dishonest one. This can only be surpassed by that other sentiment in mine management by which every employe truly co-operates with the management, and the management with the employe, not only to bring the best out of the mine but the best out of the men, that all may be truly benefited. That is the sentiment that is the most valuable asset in all mining and all industries and out of this character of co-operation you will find will come in this country great American characters, great enough and grand enough to match these great mountains and plains and in whose lives of achievements the whole nation will take pride, and like the life of Lincoln, will add a crowning glory to modern civilization. I thank you. (Applause.)