

From:

March 16, 1966

Mr. L. H. Lehman, Sales Mgr.
Productive Equipment Corp.
2926-28 West Lake Street
Chicago, Illinois 60612

PROCEEDINGS
of the
ILLINOIS MINING INSTITUTE

FOUNDED FEBRUARY, 1892



Golden Anniversary

1942

Summer Meeting
on Board S. S. Golden Eagle

June 5-6-7

and

Annual Meeting
SPRINGFIELD, ILLINOIS

October 23



J. A. JEFFERIS
President, 1942

OFFICERS 1942

PRESIDENT

J. A. JEFFERIS

St. Louis, Missouri

VICE-PRESIDENT

CARL T. HAYDEN

Chicago, Illinois

SECRETARY-TREASURER

B. E. SCHONTHAL

28 East Jackson Boulevard

Chicago, Illinois

EXECUTIVE BOARD

J. G. CRAWFORD **

ROBERT M. MEDILL ***

B. R. GEBHART ***

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G. S. JENKINS*

BYRON SOMERS **

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HOWARD LEWIS **

C. W. WOOSLEY **

* Term expires 1942

** Term expires 1943

*** Term expires 1944

OFFICERS 1943

PRESIDENT

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Chicago, Illinois

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SECRETARY-TREASURER

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28 East Jackson Boulevard
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W. J. JENKINS ***

PROF. H. L. WALKER ***

CARL LEE **

JAMES WHITE ***

HOWARD LEWIS *

C. W. WOOSLEY *

* Term expires 1943

** Term expires 1944

*** Term expires 1945

PAST PRESIDENTS OF ILLINOIS MINING INSTITUTE

FOUNDED FEBRUARY, 1892

- 1892-3 JAMES C. SIMPSON, Gen. Mgr., Consolidated Coal Co., St. Louis, Mo.
1893-4 JAMES C. SIMPSON, Gen. Mgr., Consolidated Coal Co., St. Louis, Mo.
1894-5 WALTON RUTLEDGE, State Mine Inspector, Alton, Ill.
1895 }
1911 } Institute inactive.
1912-3 JOHN P. REESE, Gen. Supt., Superior Coal Co., Gillespie, Ill.
1913-4 THOMAS MOSES, Supt., Bunsen Coal Co., Georgetown, Ill.
1914-5 J. W. STARKS, State Mine Inspector, Georgetown, Ill.
1915-6 WILLIAM BURTON, V. P., Illinois Miners, Springfield, Ill.
1916-7 FRED PFAHLER, Gen. Supt., Superior Coal Co., Gillespie, Ill.
1917-8 PATRICK HOGAN, State Mine Inspector, Carbon, Ill.
1918-9 WILLIAM HALL, Miners Examining Board, Springfield, Ill.
1919-20 WILLIAM HALL, Miners Examining Board, Springfield, Ill.
1920-21 FRANK F. TIRRE, Supt., North Breese Coal & Mining Co., Breese, Ill.
1921-22 PROF. H. H. STOEK, Mining Dept., University of Illinois.
1922-23 JOHN G. MILLHOUSE, State Mine Inspector, Litchfield, Ill.
1923-24 D. D. WILCOX, C. E., Superior Coal Co., Gillespie, Ill.
1924-25 H. E. SMITH, Gen. Supt., Union Fuel Co., Springfield, Ill.
1925-26 E. G. LEWIS, Supt., Chicago-Sandoval Coal Co., Sandoval, Ill.
1926-27 WM. E. KIDD, State Mine Inspector, Peoria, Ill.
1927-28 JAMES S. ANDERSON, Supt., Madison Coal Corp., Glen Carbon, Ill.
1928-29 JOHN E. JONES, Safety Engineer, Old Ben Coal Corp., West Frankfort, Ill.
1929-30 PROF. A. C. CALLEN, University of Illinois, Urbana, Ill.
1930-31 JOSEPH D. ZOOK, Pres., Illinois Coal Operators' Assn., Chicago, Ill.
1931-32 GEO. C. MCFADDEN, Asst. Vice-Pres., Peabody Coal Co., Chicago, Ill.
1932-33 CHAS. F. HAMILTON, Vice-Pres., Pyramid Coal Co., Chicago, Ill.
1933-34 HARRY A. TREADWELL, Gen. Supt., C. W. & F. Coal Co., Benton, Ill.
1934-35 C. J. SANDOE, Vice-Pres., West Virginia Coal Co., St. Louis, Mo.
1935-36 T. J. THOMAS, Pres., Valier Coal Co., Chicago, Ill.
1936-37 W. J. JENKINS, Pres., Consolidated Coal Co., St. Louis, Mo.
1937-38 H. H. TAYLOR, JR., Franklin County Coal Corp., Chicago, Ill.
1938-39 PAUL WEIR, Consulting Mining Engineer, Chicago, Ill.
1939-40 ROY L. ADAMS, Old Ben Coal Corp., West Frankfort, Ill.
1940-41 DR. M. M. LEIGHTON, State Geological Survey, Urbana, Ill.
1941-42 J. A. JEFFERIS, Illinois Terminal Railroad Co., St. Louis, Mo.

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PRESIDENT'S MESSAGE

TO THE OFFICERS AND MEMBERS
OF THE ILLINOIS MINING INSTITUTE:

On this, the Golden Anniversary Year of the founding of the Illinois Mining Institute, it is fitting that I call your attention to the growth of our organization, which was born at Springfield, Illinois on February 18th, 1892, with twenty-seven charter members. The membership has increased, from year to year, until we now have close to one thousand members in good standing, including thirty-one fully paid Life Memberships.

Most of our members, I am happy to say, are just as sincere in their efforts to advance the cause of mining as were those splendid men who took the time and effort to organize and promote our Institute, fifty years ago. If this were not so our organization would surely have perished in early childhood.

The organizers of our Institute have received much deserved recognition and have always been given due credit for the important part they played in the promotion of the coal industry. However, at this time, I wish to pay tribute and to express my appreciation and thanks to those members who have so loyally and diligently carried on the work of our Institute throughout the years that followed. There has been much accomplished through their untiring efforts and we are greatly indebted to them. It was my privilege to have known a great number of these fine gentlemen, many of whom have since passed beyond, as well as those who are with us today, and I can truthfully say I have been abundantly benefitted, in numerous ways, by having known them and feel highly honored in having been permitted to enjoy their personal friendships.

Our Institute is in a very healthy condition, both physically and financially, and I can see no just reason why, with its present membership of high class men, it should not continue to thrive and advance the great cause of mining as it has in the past.

To the Officers and to every member of the Illinois Mining Institute, I again wish to extend my sincere thanks for the loyal way in which you have always supported this organization and to add my personal thanks for the splendid cooperation you have given me, as your President, throughout the past year.

With kindest regards and best wishes to you all,

Very sincerely,

J. A. JEFFERIS,

President, 1941-'42.

Hugh Murray

It was in 1892 that Mr. J. C. Simpson, General Manager of the Consolidated Coal Company, invited many of the leading mining men of the State to a meeting and banquet in Macoupin County, Illinois. A chief reason was the inspection of the most up-to-date mine fan installation. This was a 20 ft. diameter Guibal fan at one of the Consolidated mines.

At the banquet meeting Mr. Simpson proposed that those present should organize the Illinois Mining Institute. The proposal was received with enthusiasm.

In February 1892 a group of these men met in the legislative room in Springfield. Mr. Hugh Murray moved that the mining men of the State proceed with the organization of the Illinois Mining Institute, and this was seconded by Mr. Thomas Stockett, Chief Engineer of the Consolidated Coal Company. The motion was unanimously passed and the Institute organized.

Mr. Murray passed away on June 5, 1942, just fifty years following the organization of the Illinois Mining Institute. He was in his ninety-first year. Mr. Murray was born in Dalmellington in Ayrshire, Scotland. Following work in the coal mines when very young, he studied civil engineering in Glasgow University. He was well known by the great scientist Sir William Thompson, who later became Lord Kelvin.

In the Fall of 1882 he came to America, arriving in Wilmington County, Illinois. The new state mine inspection laws required inspectors. Mr. Murray became a teacher of mining engineering in his spare time. In 1887 the Governor of the State asked him to serve on the State Mining Board. He accepted and served for twelve years as State Mining Engineer member of the Board. Most of his mining work has been in the southern half of the State. He unquestionably was the most enthusiastic advocate of coking of Illinois coals. The coke ovens near Sparta and at Equality are reminders of this effort. During recent years Mr. Murray's mining interests have been of consulting nature and operator of road material.

It is somewhat of a coincidence that Mr. Murray passed away on the day the Institute, he had helped originate, began its Fiftieth Anniversary meeting. Proper respects were paid and the following resolution entered into the minutes:

“THE GOLDEN EAGLE

“Mrs. Hugh Murray
Equality
Illinois

Mississippi River
June 6, 1942

“It is with deep regret and sympathy that we learn of the passing on of your husband who at this, the Fiftieth Anniversary of the Illinois Mining Institute and the twenty-fourth anniversary of the annual meeting upon the Father of Waters, he lies in state in your home in Equality. Mr. Murray was one of the organizers of this Institute in February, 1892. For many

years he has been an Honorary Member. This morning in assembly, prior to the business of the day, we stood in silent attention in respect to his memory and appreciation to the great part he filled in the pioneer work in mining laws, mining regulations and mining records of our state.

“Father Time has depleted the number of us here who knew Mr. Hugh Murray when he gave of his time and talent a half century ago as member and secretary of the State Mining Board. We, the undersigned committee, are three of those who knew him well and honored him. We three are honored in being chosen to prepare this record to be written in the minutes of Hugh’s and our Institute.

“In deepest sympathy and respect,

John E. Jones, Chairman
Thomas Moses
Fred Weissenborn
For the Illinois Mining Institute.”

Coal mining men attending the funeral of Mr. Murray at Equality on June 8th are shown in the following letter from Mr. John E. Jones to Mr. B. E. Schonthal, Secretary:

“West Frankfort, Illinois, June 9, 1942.

“Dear Mr. Schonthal:

“Mr. Thomas Moses and I attended the funeral of Mr. Hugh Murray together yesterday, and we each spoke at the church. Following the address of Rev. Campbell, the Reverend called on me and after a few remarks, including my friendship with Mr. Murray for many years and acquaintance of thirty-seven years, I read the resolution of the Illinois Mining Institute, copy enclosed.

“The Reverend then called upon Mr. Moses, who gave an excellent ten minute address, including review of their early friendship of forty years ago, Mr. Murray’s valuable legislative work for the mining industry and safety for the miners, and his adherence to his principles. This was indeed a fitting address for the occasion that will long be remembered by the family and all others who were present.

“Other coal mining men present were Joe Harris of the Department of Mines and Minerals, Springfield; George Bagwell, State Inspector, Eldorado; Thomas Goldman, County Inspector, Eldorado, and John Taylor, Mine Rescue Superintendent, Eldorado.

“Including many messages of condolence Mrs. Murray received a wire from the Governor of our State.

“Mrs. Murray expressed deep appreciation for your telegram of condolence, the action taken by our Institute for its minutes, and our expression of devotion and friendship.

“Yours very truly,

John E. Jones.”

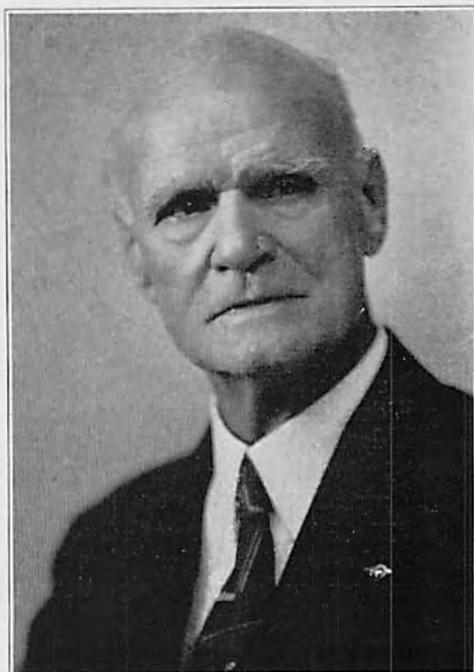


THOMAS R. STOCKETT

One of the two living charter members of the IMI. Mr. Stockett was the first Treasurer of the Institute.

FRED E. WEISSENBORN

Affiliated with the IMI at its first regular meeting after its organization.



SOME RECOLLECTIONS OF OLDER DAYS

ORGANIZATION AND EARLY HISTORY
ILLINOIS MINING INSTITUTE

By FRED E. WEISSENBORN
Illinois Coal Operators' Assn., St. Louis, Mo.

In the year 1891 the law requiring the pit boss in Illinois coal mines to pass an examination of competence to qualify as mine manager was enacted (by this act the pit boss was given the more dignified title of mine manager). No doubt it will be interesting to some of the younger members of the Institute to know that in 1883 the thirty third general assembly passed several amendments to the general mining law, one of which provided for the appointment of state inspectors of coal mines, and defined the method of appointment, duties and districts. There were five divisions made of the coal producing regions of the State, and an inspector provided and paid by the State was assigned for each. Applicants for such appointment had to give evidence of their qualifications for the duties of the office. A Board of Examiners was provided. This Board consisted of two coal operators; Mr. W. H. Emerson, of Fulton County, Mr. John Maule, of St. Clair County, one Mining Engineer; Mr. W. S. Cherry, of Streator, two coal miners, Mr. George Neilson, of Sangamon County and Mr. John Dixon, LaSalle County.

During the first week in September, 1883, the Board met and held an examination for Candidates for State Mine Inspectors. Thirty-two candidates presented themselves, for examination, of this number only four of the candidates made a record satisfactory to the Board.

They were

Walton Rutledge—Alton
Alexander Ronald—Streator
James F. Cuming—Braceville
Robert Winning—Cartersville

Inasmuch as the law required five Inspectors, another examination was held thirty days later. At this examination, nine candidates appeared, of which three passed:

Thomas Hudson—Streator
Wm. Atkinson—Braceville
Thos. Cuming—Gardner

Of the seven gentlemen whose names were presented to the Governor, the following appointments and assignments were made:

Alexander Ronald, Streator—First District
Thomas Hudson, Galva—Second District
James P. Cumming, Peoria—Third District
Walton Rutledge, Alton—Fourth District
Robert Winning, Cartersville—Fifth District

Our Advertisers are our friends and fellow members. Consult them frequently.

These gentlemen upon presenting the necessary Bonds and taking the oath of office, were duly commissioned, furnished with the necessary supplies and instruments, entered at once upon their duties, at a salary of Eighteen Hundred Dollars a year, paying their own expenses.

The first Board of Examiners for mine managers, consisted of the following named gentlemen:—Richard Ramsay, Braceville, George C. Simpson, Springfield, Hugh Murray, Sparta, William Scaife, Coal City, and John F. Goalby, Hornsby. This Board held an examination in the City Hall, East St. Louis, in the month of December 1891 for the purpose of passing upon the qualifications of applicants for certificates of competency as mine managers, during the time the Examining Board was in session, Mr. James C. Simpson, then General Manager of the Consolidated Coal Company, gave a dinner to the Board and several other gentlemen interested in the coal mining industry in Illinois were also present? At this dinner Mr. Simpson suggested organizing a Mining Institute, the object of which should be the gathering together in a permanent association of those engaged in the executive, engineering, and other departments of mining for the purpose of reading, discussing, and publishing papers on subjects germane to that industry and thereby securing whatever mutual advantages might be derived from conferences on the best and safest methods of producing coal. The importance of such an organization fully impressed the gentlemen present, not only because of the then present and prospective magnitude of the interests involved but because it was recognized that the development of the coal resources of the State had advanced from a primitive stage of local and temporary operations, wasteful for the most part, alike of capital and energy and of the coal deposits themselves, and had fully attained the rank of an established industry, demanding scientific and systematic methods, and the greatest efficiency and economy of administration.

At this informal gathering a committee was appointed to draft an outline of organization, which committee consisted of Messrs. Walton Rutledge of Alton, Hugh Murray of Sparta, and Richard Ramsay of Braceville.

At the preliminary meeting held at the State Capitol, Springfield, February 17, 1892, Mr. Richard Ramsay was called to the Chair and Hugh Murray to the Secretary's desk. In a brief statement by the Chairman, he informed the meeting that a former informal gathering of persons interested in this movement a committee had been appointed to draft an outline of organization to be submitted to the present meeting. Mr. Murray was then called upon and presented the following basis of organization, as the suggestion of the committee.

First. That the meeting proceed to organize under the Laws of the State of Illinois what shall be known in all time to come, as the Illinois Mining Institute.

Second. That the following officers be elected, viz; a president, three vice presidents, a treasurer, a secretary, and a council to be composed of the above named officers and five other members.

Third. That the President be empowered to appoint such committees as the work of the Institute may require.

Our Advertisers are selected leaders in their respective lines.

Fourth. That the annual meeting of the Institute be held in February and that meetings be also held in the months of May, August and November; that officers be elected yearly at the February meeting.

Fifth. That the membership fee be fixed at five dollars and the annual dues also be five dollars, to be paid in advance.

The following gentlemen were then placed in nomination and duly elected for permanent offices for the ensuing year: President, James C. Simpson, General Manager, Consolidated Coal Company; Vice Presidents, Walton Rutledge, State Mine Inspector, Fourth District, Hugh Murray, President Valley and Gulf Coal Company, Richard Ramsay, Superintendent, Braceville Coal Company; Treasurer, Thomas R. Stockett, Jr., Engineer Consolidated Coal Company; Secretary, John S. Lord, Springfield.

The President appointed the following members as a committee on Constitution and By-Laws; Walton Rutledge, Hugh Murray, Thomas R. Stockett, Jr., and John S. Lord. On motion by Mr. Murray, which carried, the President was asked to serve with this committee.

We are of the opinion that many of the present members of the Institute will remember the gentlemen who constituted the twenty seven Charter Members. Therefore their names are given below:—

James C. Simpson, St. Louis	John F. Goalby, Hornsby
Walton Rutledge, Alton	Peter Jeffery, Carterville
Richard Ramsay, Braceville	R. H. Zoller, Braidwood
Hugh Murray, Sparta	David J. Loyd, Edinburg
John S. Lord, Springfield	Even John, Spalding
Thomas R. Stockett, Jr., St. Louis	James Sirrat, Peoria
William Scaife, Coal City	John G. Massie, Marissa
George C. Simpson, Springfield	Joseph P. Hebenstreit, Staunton
J. D. Peters, Murphysboro	John L. Dixon, Pana
Robert Lee, Cable	P. M. Mowitt, Dawson
R. D. Fletcher, Streator	Quinton Clark, Braidwood
John Rollo, Gillespie	Thomas Hudson, Galva
James Freer, Peoria	John Vose, Springfield

James Curby, Tallula

The first regular meeting was held at the State Capitol, May 17, 1893.

President James C. Simpson opened the meeting with his address of appreciation and outlined the purpose of the Institute and the benefit which would be derived from the papers and the discussions on same. At the close of his address the report of the committee on Constitution and By-Laws was read and approved.

The Secretary then read the names of fifty six applicants for membership (Fred E. Weissenborn included) who were duly elected.

The President announced that a paper on the water gauge would be read by Mr. Walton Rutledge, Inspector of Mines, Fourth District. (we must confess that previous to 1891 the water gauge, barometer, and thermometer in connection with mine fans was something new to us coal diggers in Illinois). After an intensive discussion covering nine pages of the bulletin, the discussion was suspended until some future meeting.

Mentioning this publication when writing Advertisers puts friendship into business.

The President then announced that Mr. Thomas R. Stockett, Jr. Mining Engineer of Consolidated Coal Company would read a paper on the cleaning of coal as practiced at the Gillespie mine of the Consolidated Coal Company. Mr. Stockett described the use by cuts of the shaking screens and picking tables, and after a lengthy discussion covering twenty two pages of the bulletin, the discussion was suspended. The President then announced that Mr. John Rollo, Supt. of Consolidated Coal Company, would read a paper on fire damp in Illinois mines. After a lengthy discussion, covering twelve pages of the bulletin, the discussion was suspended to be resumed at some future meeting. At the meeting held on February 14th and 15th, 1893 in Springfield, the discussion fire damp was resumed, covering an additional twenty two pages of the bulletin. At this time the President announced it had been suggested that a committee of three be appointed to investigate the surroundings of the Staunton and Clyde mines, the workings of which formed the basis of the discussion of the day. Messrs. Rutledge, Dixon, and Freer, were appointed to act on the committee.

The President then announced Mr. Elmer A. Sperry would read a paper entitled "The Application of Electricity to Mining Operations."

In his paper Mr. Sperry gave a description and showed cuts of electric drilling, chain undercutting machines, and haulage locomotives, which very much resembled the same type of machines in use today. In addition Mr. Sperry described the Legnar undercutting machine, which machine was equipped with two air cylinders, one on each side at the rear end, powered by compressed air, a rotating cutter bar at the front supported by two journal bearings; cutting bits were placed in the revolving bar, except that it was impossible to place cutting bits at the journal bearings, which left a solid pillar of coal at these points, that had to be broken up and dislodged by sheer forward pressure of the journal bearings. When a cutter bit was broken, that would also leave a solid pillar of coal which would make further progress of cutting impossible and the machine had to be withdrawn and other cutter bits inserted. Mr. Sperry also gave a description of a direct blow machine. The outward appearance of this machine is very much like the air punching machine, it was operated with a continuously operating electric motor of about four horse power connected by gearing to a catch or retractor, a longitudinally moving projectile with a pick secured to its outer extremity, surrounded by a driving spring of about one hundred and fifty pounds compression per inch. The initial pressure is given of about five hundred pounds. Retraction then takes place of from six and a half inches to seven and a half inches, at a pressure of one thousand three hundred and seventy five pounds, where upon it released and allowed to make a vigorous forward stroke. This process is repeated from one hundred sixty to two hundred twenty five times per minute. The current required for the operation is between 10 and 10.2 amperes.

Many other papers were read, including a very interesting subject on the system of drainage in long wall mines by Mr. Ramsey. Also a paper on endless rope haulage by Mr. Rutledge.

Our Advertisers make it possible to publish this volume—give them a "break."

SOME RECOLLECTIONS OF OLDER DAYS

By EUGENE McAULIFFE

Union Pacific Coal Co., Omaha, Nebraska

Your always kind Secretary has asked me to prepare some recollections of the Illinois Coal Mining Institute and the Coal Industry which it has so ably represented for a half century. Perhaps it would be more fitting for me to touch on the men who were most active in the Illinois Coal Field when I entered it on January 1, 1908, otherwise my list of splendid fellows would prove too long.

When I came to Chicago, the Dering Coal Company, whose President, Mr. R. R. Hammond, was an old and intimate friend, was in grave financial difficulties. Mr. J. K. (Jack) Dering was Vice-President, a man whose friends were legion. It fell to me to lease the properties located in Indiana and Illinois from the Chicago Title and Trust Company, Receivers, and while Mr. Hammond and Mr. Dering dropped out, Mr. Harry H. Rhodes, General Sales Agent, and Mr. John A. Garcia, Chief Engineer, later General Superintendent, remained with the property.

The operation of the properties brought me very close to "Jack" Garcia, the beginning of a friendship that continued until his death. Mr. Garcia, a mixture of Celtis and Latin blood, was possessed of a most brilliant mind, coupled with a high strung temperament, which doubtless contributed to his early death. All four of the men I found on the Dering property have gone to their reward.

There is another man of my day whose name is yet remembered by the Old Timers, Mr. Richard (Dick) Newsam, an Englishman to whom the reduction of mine accidents was a religion. These were the days of major mine disasters, largely caused by gas and dust explosions. The tragedy at Cherry, Illinois, of November 13, 1909, where a mine fire caused the loss of 259 lives, shocked the nation, much betterment however resulting therefrom. I long ago concluded that permanent reforms come slowly, perhaps that is part of the great plan. Mr. Garcia did valiant work in the introduction of permissible explosives and in the use of the then rather crude mine rescue helmet, and there yet lives on the bank of the storied Potomac near Washington, Dr. George S. Rice, a man of scientific training and unquestioned courage who was, in my day, very active in Safety and Mine Resene work in Illinois. Dr. Rice, later serving as Chief Engineer, U. S. Bureau of Mines, left a deep imprint on the coal mining industry.

Among others whom it was a privilege to know was Ed Rutledge, a living example of self help. Edward T. Bent was another man who passed on, a victim of competition from the thicker seams. Mike Kelly of Danville was a great individualist, and such also was Thos. O'Gara of Saline County. Harry M. Adams, whose mine was in the Springfield, was a kindly, courteous gentleman; and Mr. Silas A. Shaeffer, who wore

Establish your identity—mention this publication when dealing with Advertisers.

a long white beard, yet lingers in our memory; as does Harry N. Taylor, the closest friend of John Mitchell. Harry was known and loved by all the operators in the then Central Competitive Field. J. M. Browning of St. Louis, who came out of general business to mine and sell coal, was a positive character.

In the more than a third of a century that has passed since 1908, sweeping changes have overtaken not only coal, but all industry. With adequate ventilation, rock dusting and the use of water for sprinkling, explosions such as once occurred are now more remote. Mechanization has brought about a higher standard of management and the men who work in and about the mines have learned to give a far heartier measure of cooperation than was the case in the old days. There is yet much to accomplish on both sides and betterment that lasts, as we have said, comes slowly.

It has been a great privilege to be able to look back over the Illinois Coal Field for a half century and to have known so many splendid men. To those who have gone on I say, "Hail and Farewell"; to the living, "God luck, a long useful life, and at last a 'home in the west'."

SOME RECOLLECTIONS OF OLDER DAYS

By FRANK F. TIRRE, St. Louis, Mo.

On this delightful occasion of our 50th, or Golden, anniversary as a Mining Institute, I have been asked to reminisce long enough to give some of my views on coal mining in Illinois "in the early days." This request is not made upon me in the belief that I am the oldest surviving member of the craft but probably due to the fact that I have been an active participant in the Coal Mining Industry in Illinois for the past 40 years, during which time I served on Commissions and Committees, have been President and Secretary of this our valued Institute for seven years, have been Secretary of the Superintendents and Mine Managers' Association, Secretary of the Fifth and Ninth District Coal Operators Association of Illinois. During all of this time I have had contact with the progress of our Industry.

Would that I could paint a picture in oil or water color (as I am wont to do) but that being impossible, allow me to present herewith a brief word picture of some of the methods of coal production, as I recall them, without boring you with statistical and tiresome data.

Ventilation. In those early days for ventilation we used, to a certain extent, a fire place at the bottom of the air shaft or what was known as the "escapement shaft", as a means of causing a draft down the hoisting shaft and through the workings. Under this system work could not progress very far before it was necessary to install fans. Compare that with our present methods and ask yourself, have we progressed?

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Transportation. Many, many years ago dogs were used in the mines in Illinois, but during the early days I am thinking about, the Missouri mule was the principal factor in conveying coal from the face to the shaft bottom, which in itself would not have been so burdensome had we had a roadbed of steel upon which to roll, but 4x4 wooden rails were our track, and you know how they stay in line and how quickly they wear out. It required not a driver, as we know them now, but a real he-man or mule skinner to produce results. Mules for several reasons were generally used: first, because of their size, build and ability to stand up under the abuse they were wont to receive in their vocation; second, the care required to keep them in condition under ground, requiring they be fed with regularity. This was done by giving them enough food and water to carry them over Sunday or holiday without danger of foundering the animal. This saved a trip into the mines on such days. In those days the mules were not hoisted daily, but only when a lengthy shutdown was anticipated, but now the long suffering brute has a life size picture of ultimate liberation in the efficient mine locomotives operated by that mysterious power, electricity. This scientific utilization of power relieves men and animals of much of the day's drudgery, a splendid tribute to the civilization of our time.

Shooting and Cutting Coal by Hand. In those days it had been the custom to allow miners who had "shot short" the night before and would run out of coal before the end of the shift, to shoot down coal at noon, but this method was discontinued due to the fact that the men were obliged to eat and work in the smoke, a humane act properly timed. This change was not made without some objections on the part of some of the men, especially those "old miners of the pick," who had the better use for their picks than to open powder kegs, but who knew the art of cutting both rib and undercutting, and in that manner sometimes were required to shoot at noon in order to have enough coal for the full shift. Not only has this interesting individual passed out of sight but with him the implements of his craft. The coal miner in those days was proud of his ability to swing that pick, and as a rule was given entries to drive, and then too, miners were not paid for coal passing through bar screens, set, two, three and some occasions four inches apart, so the pick miner and thoughtful shooter would get the better per cent of coal to be paid for. Most of the small coal was left in the mines, causing fires from spontaneous combustion. All of this has long since been changed by the adoption of the "mine run bases" and the application of the mechanical undercutting machine, eliminating the skilled pickman, whom it was a privilege and a pleasure to watch in action, yet we welcome the many changes that have overtaken us in the industry and hope for a continuance of them.

Escapement Shaft. In those days the air shafts were equipped with a ladder for escapement purpose, which made it none to easy for men to come out at any time for some slight provocation, curtailing the output, which later developed when it was decreed that all escapement shafts must have stairway or hoisting facility to allow men free exit. The old time operators did not cherish this change, and when my Dad

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was informed by the then state mine inspector (Frank Kirchner) of this change, he (my Dad) asked the inspector, sarcastically, "And what kind of carpet would you suggest for the stairs?" So it will be noted that we had our humorous side while these changes were inaugurated. While we must admit that, in those early days, progress was attained by men of vision for the future of our industry, we must acknowledge some errors were made and costly too, by not having on record correct underground workings when mines were abandoned. Entirely too many lives have been lost, due to miners breaking into old unknown works where the chambers were filled with water and gas. Let us see to it that we have no more of this, by insisting that a correct blue print be recorded in the county seat, on all mines before mines are abandoned or dismantled.

Last But Not Least. In line with the progress made by the mining and production of coal in Illinois, let's not forget or overlook the advancement made during the same period by our Institute. At the beginning our Institute was comprised principally of State and County Inspectors including men from the pits, Superintendents etc., who did not afford the financial support an organization of this nature and scope requires to carry out aims contemplated. Much information of value presented by members was lost, inasmuch as it could not be circulated to members at home where it might be properly digested. The untiring effort of many of our members to secure membership and co-operation from the coal mine Operators and the Advertisers, enabled us to put our Institute upon a pedestal where it justly belongs. Along with many others I am very proud to have had a part in bringing this about, for it is a beautiful piece of industrial accomplishment worthy of approbation.



SOME RECOLLECTIONS OF OLDER DAYS

By THOMAS MOSES, Danville, Ill.

Complying with your request to give you a statement concerning the early days of the Illinois Mining Institute, I submit the following, which is entirely from memory as I have no records to which I can refer:

I became interested in the Mining Institute along about 1905. It was then dormant. Along about 1907 I became associated with some of the Institute's founders and at that time heard a great deal about its objectives and worthiness.

In 1910 or 1911, I'm not sure which, the initial meeting to bring about the rehabilitation of the Institute was held in Urbana at the University. It was the result of interest taken by some of the old members, and it was sponsored by H. Forster Bain and Professor Stock, both of whom were employed by the University. One was State Geologist; the other Professor of Mining. Previous to this time I had been associated with Messrs. Hugh Murray, Richard Newman, Thomas Hudson, Thomas Weeks, Hector McAllister, James Taylor, William Seaife, John Dunlop and David Ross, all of whom had been active in the Institute during its early days.

The impression I received from the above association was that a Mr. Ramsay from the Northern Illinois coal field (whom I never personally knew) was the leader in the early life of the Institute, at least he was held in very high esteem by all who knew him of the men with whom I associated with later.

At the meeting in Urbana I presented a paper entitled "Safety First." I recall only some of the men who attended this meeting. Mr. Bain was Chairman, Mr. Stock was active in assisting in the conducting of the meeting. Some of those present were Messrs. Francis Peabody, Dr. Honold, Moorhead, John P. Reese, Martin Bolt, Edward Bent, Glenn Trear, John Garcia and quite a number of coal mine Managers. The meeting stressed the importance of resurrecting the Institute to activity again, with the result that the next Fall the Institute met at Springfield in the St. Nicholas Hotel for its first regular session in some time. Call for the meeting was responded to enthusiastically by quite a large number of mining men who became interested.

At this meeting there was quite a contest for the office of President between John P. Reese and myself, with Mr. Reese receiving the majority of votes and becoming the first President at this the Reorganization Meeting. Martin Bolt was elected Secretary and remained in that office for the rest of his life, being re-elected each year.

At the next Annual Meeting I was elected President and became the second President after the re-organization. I am sure you have complete records of what has since taken place.

I am very proud of my small contribution to the Institute and regard my membership in it as one of the most pleasant associations with men of the Mining Industry.

Buyer meets Seller in the back of this book.

OUR FIRST BOAT TRIP—WHY? HOW?

By SAM T. JENKINS

Goodman Manufacturing Company, St. Louis, Mo.

Yes, I have been accused of being the "daddy" of the first Illinois Mining Institute boat trip and blamed, by many, for everything that happened or did not happen on that history making event of the Institute. Now I am being further penalized for that offense by being asked by Mr. J. A. Jefferis, President, and Mr. B. E. Schonthal, Secretary & Treasurer, to write an article stating just *why* and *how* I got the idea that prompted me to recommend to the members of the Executive Board that we hold our 1918 Spring meeting on board a quiet, peaceful Mississippi River Steamer.

At the time of the first two river trips, back in 1918 and 1919, Mr. Wm. Hall was President of the Institute, Mr. Martin Bolt was Secretary and I was a member of the Executive Board. It was in early March of 1918 that the Illinois Mining Institute officials held a meeting in the State House at Springfield, Illinois to select a desirable place for our Spring meeting, also to work out a program similar to that of our previous meetings.

I, like many others, had attended the I. M. I. conventions in the past and knew how very disappointed the officers were by the small attendance present to hear the reading and discussion of the many interesting papers that were presented, which were so vital to the mining industry at that particular time. There was little doubt but what the small attendance was partly caused by some of our members keeping late hours the night before, probably visiting with friends or trying to pick up a prize in some bridge or pinochle game and, as a result, enjoying a peaceful snooze in their comfortable hotel room, next morning, instead of attending the forenoon session of the Institute. A number of complaints were made regarding this practice and a number of the more interested members were heard to remark, "I don't think I will attend the next Spring meeting if this is all the attendance we can have." This is what gave me the idea of trying to get our Executive Board to hold our next Spring meeting on board a river steamer. I felt that it would, at least, keep our members together so all could take part in discussing the very interesting papers which it had taken so much time and effort for capable men to prepare for the occasion. In addition, a further treat would be enjoyed by the members in having all of their meals served together in one big dining room on the boat. I knew this would enable them to get better acquainted with their fellow members, instead of their scattering all over town to various eating places and then coming back and complaining of the "high priced, punk meal" they had eaten. I felt that if such a dream could be made to come true, every member would return home richer in knowledge, feeling better acquainted with his fellow workers and, at the same time, would have enjoyed a splendid

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river trip, with plenty of fresh air and sunshine and realize that he had been on a real vacation.

The more thought I gave to "Old Man River," the more I was convinced that we should, at least, give it a tryout. So, without mentioning the idea to anyone, my first move was to go to the office of the Eagle Packet Company, where I met Captain Henry Leyhe for the first time. He gave me all of the information I needed regarding the cost per person for a three day boat trip etc., together with some valuable suggestions relative to a trip of this kind.

My next move was to contact some of the members who had shown little interest during the past few years and explain to them my personal feelings toward holding our Spring meeting on board a river steamer. They seemed very much interested in my plan and promised to give me their full cooperation. I pointed out to them that I would need a lot of help to get the approval of the other Board Members and suggested that they either wire or write to Mr. Martin Bolt immediately, recommending a boat trip. I wanted these communications to reach him before the next meeting of the Executive Board. Although each one gave me his promise to do so, there had not been a single wire or letter received at the time our meeting was called. Right then I found myself out on a limb. At this meeting of the Board, each member was asked to suggest a place for our next meeting. I was the last one to offer a suggestion and, in a half-hearted way, I proposed a river trip. Again I found I had no one to support me in putting it over, particularly so in Mr. Bolt who said, "Now, Jenkins, do you realize that such a trip would cost a lot of money? So, let's forget the trip and proceed with the selection of a place for our meeting, one that will correspond with our pocket-books." Consequently, E. St. Louis was selected and the meeting adjourned. As we all started for home, I still had in my possession all of the data given to me by Captain Leyhe. After my proposition had been so flatly rejected I thought it best to keep this information to myself, for the time being. On my way back to St. Louis I could still picture, in my mind, what a treat it would be for our party, like one big family, sailing along smoothly and peacefully on the old Mississippi with all our worries and difficult problems left in the background for a period of, at least, three days and nights.

Well, after this experience, I felt that I was down but knew I was not out. I promptly got in touch with those same good friends who failed to write to Mr. Bolt, as promised. I told them that the fair city of E. St. Louis had been selected as the place for our Spring meeting. Their reply was almost unanimous, "Well, count me out, I'll not be there." Once more I started in to paint the flowery picture of us cruising down the river and told them we might still be able to make the trip if they would immediately write to Mr. Bolt, insisting on a boat trip and giving their reasons for wanting to make the trip and telling him they would not attend the meeting unless it was held on the boat. This time the boys did not let me down and, believe me, their letters must have carried a lot of dynamite for, within a very few days, I received a letter from Mr. Bolt telling me of the various requests he had received and asking me to get all of the information possible regarding a trip of this kind

Advertising in this volume makes it possible to print it. Patronize our Advertisers.

and to see if we could make arrangements with some boat company for a certain date. All I had to do was to send him, by return mail, the information I already had in my possession. Two or three days later he telephoned me, at the request of President Hall, asking me to attend a special meeting of the Board in Springfield on the following day. At this meeting the most important subject discussed was that of raising funds to defray the expenses of special entertainment, such as a male quartette and a jazz band, also for the purchase of white duck caps and souvenirs for those making the trip. We also needed some money to help doll up the old boat with signs etc. Some pretty hot conversation was indulged in before a decision was reached and, due to the writer talking a little too much and getting his neck out a little too far, President Hall penalized me by making me Chairman of the Committee to engage the boat, make arrangements for all entertainment and, if this was not enough, raise the money with which to pay for all of it.

As Mr. J. A. Jefferis has already stated, in our 1939 Year Book, I refused to act as Chairman of the Arrangements Committee unless all contributions and expenditures would be accounted for and an audit be made afterward of every dollar taken in and spent. Believe it or not, there was a whisper of opposition to this but, through the loyal support of some of those present, particularly President Hall, this stipulation was agreed to. The business of this meeting was concluded and the Committee found they had just about forty-five days in which to find out if their long hours of untiring efforts would make the first I.M.I. boat trip a success or failure. This was one time when Speed and more Speed would have to be the slogan of each Committee member and, through the loyal support of Mr. Hall, Mr. Bolt and the Director of Mines and Minerals, our progress was quite noticeable from the moment we started until the job was completed.

Our first act was to engage a boat, the good old GOLDEN EAGLE of the Eagle Packet Company. Captain Henry Leyhe, his father, and I, reached an understanding in a short time. It may be of interest to our members to mention that during our conversation I impressed on Captain Leyhe that, if our first trip was a success, I felt sure that the Institute would make the river trip an annual affair. I believe they will tell you that we have made good. It was at this time that Captain Leyhe's father, a grand old gentleman, said to his son, "Now, Henry see that good food and plenty of it is served at each meal and see that everything possible is done to make the entire trip pleasant for everyone." All of those who made the first trip know that his orders were carried out in every detail, and we have had that kind of service ever since.

I had guaranteed the Eagle Packet Company a minimum of 75 passengers for our first trip. Late, some one told Captain Leyhe that it would be impossible for us to get that many reservations. Whoever that person was, I considered him a friend in disguise as our Committee was getting worried. Not a single reservation had been made at the time Captain Leyhe telephoned me and voluntarily reduced our guarantee to fifty.

Our Advertisers, who make this volume possible, will appreciate your inquiries.

Now that we had the boat engaged, our next job was to raise funds to defray the expenses. A personal request, by letter, was sent from my office to every manufacturer of mine equipment and supplies, telling them the amount I felt they should contribute and, believe it or not, everyone, with the exception of two, responded promptly with a check for their full allotment. In addition, several Illinois mining companies contributed liberally through the Illinois Mine Inspectors, who were on the Finance Committee and worked hard and did a good job. As a result, in a very short time we had ample funds in the bank to cover all expenditures.

Yes, we had ample funds in the bank but it was only two weeks before the GOLDEN EAGLE was scheduled to sail and the only reservations we had received were those made by the I.M.I. Officers and Committee members. By this time we were actually worried so I decided to send out a special notice to all members to the effect that reservations were coming in so fast that late comers might be compelled to sleep on cots. A few days later they really did begin to pour in and we all felt greatly relieved when the GOLDEN EAGLE sailed away, on schedule time, with 99 passengers, including the 7 paid entertainers.

Our first trip was made up the Mississippi and our first stop was at Quincy, Illinois and our second stop at Keokuk, Iowa. On our return trip we made a stop at Hannibal, Missouri. (Please refer to Mr. Jefferis' letter in the 1939 Year Book as to the grand way in which we were entertained by the Mayor, City Officials and Citizens of each of these hospitable cities and without a dollar's expense to the Institute.)

At our Fall Meeting held in Springfield in 1918, I gave a full report of the receipts and expenditures for our Spring Meeting aboard the grand old GOLDEN EAGLE. After all of the bills had been paid, I presented to our Treasurer a check for \$2,117.21 to which was attached receipted bills for every dollar spent by the Committee, also a list showing the names and address of each contributor, together with the amount contributed by each.

It may be of further interest to the members to know that when our Committee was appointed we were told there were no funds in the Treasury and it would be necessary for us to start from scratch. Judge for yourselves if our first river trip was a success or not. The 1919 Spring Meeting was also held on board the same Steamer and we cruised down the Mississippi to Cairo, Illinois and up the Ohio to Paducah, Kentucky. I might add that, as we neared Paducah, we ran into one of the most severe thunder-storms I have ever experienced.

I hope, by referring to some of the more outstanding happenings on the first two river trips, it will help to remove any confusion from the minds of some of our members as to the date when these first trips were made. Also, at this belated hour, I want to apologize to those making the first trip for not keeping my promise that the trip would be *quiet* and *peaceful* for everyone. I soon found this to be an impossibility, with so many good scouts on board who wanted to turn themselves loose and enjoy every moment of the trip. However, after the first two or three trips, we decided to hold regular programs on the boat, similar to our Fall programs. This served to keep these noisy lads, including myself,

Our Advertisers are our friends and fellow members. Consult them frequently.

quieted down and really made the trips more worth while. In fact, our leading coal operators, manufacturers and professional men started taking more interest in these trips and, as a result, our boat trips have become quite popular with them and the Illinois Mining Institute has become one of the leading, if not the leading, and best conducted Institutes of its kind in the United States.

Not a single request has been made for funds by the Institute since 1918. With the \$2,117.21 left in the treasury as a back-log and the prompt payment of annual dues, together with the increased number of life memberships subscribed for, the Institute was placed in a healthy financial condition and self supporting in every way. So, hats off to those capable, untiring officials who have given largely of their time and efforts toward making these meetings so interesting and profitable for those attending.

Those members who have not made one of these annual river trips, in late years, have really lost out on a grand time as they will now find them not only quiet and peaceful but most interesting as well. They will also find that the 275-pound, jovial Captain "Buck" Leyhe will see that everyone gets his money's worth and, in the evening when time permits, will even join you in a little game of "Raising you two" or "I've just got to see you." Seeing is believing with our good friend Captain "Buck." And, when the boat docks at St. Louis again you will hear that gentle, but husky, voice of his ring out "Goodbye boys; hope to see you next June."

In conclusion, I wish to repeat, the success of our first two boat trips was made possible by the cheerful contributions of the coal operators, manufacturers of mine equipment and mine supplies, together with the hearty cooperation of the Institute Officials, Committees and members as well.

"Ole Man River, you must know sumpin,

You don't say nuthin', you just keep rollin' along."



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THE ANNUAL BOAT TRIPS

By CAPT. W. H. ("BUCK") LEYHE

Eagle Packet Co., St. Louis, Mo.

A fifty year heritage of the Illinois Mining Institute is a testimonial to soundness of purpose, excellent leadership and a cooperative and congenial membership. I consider it quite an honor to be asked to contribute a few lines to the Year Book of such an Institution.

My acquaintance with the Illinois Mining Institute began in 1918, when Mr. Sam Jenkins came to the office of the Eagle Packet Company and made arrangements with my father to take the members of the Institute on a river cruise. This was the beginning of the annual cruises of the organization which have been continued, without interruption, through the succeeding years.

The first trip made by the Institute was to Keokuk, Iowa on board the Steamer GOLDEN EAGLE. If I remember correctly, Mr. Wm. Hall was President and Mr. Sam Jenkins was in charge of arrangements for the cruise. A Mr. Gates was Chairman of the Entertainment Committee and, from what I was told, he must have been a Past Master in that capacity as there was nothing lacking in that line. As I was in charge of other boats at that particular time, I did not get to make the first three trips but our records show that the second cruise was made to Paducah, Kentucky on board the GOLDEN EAGLE and the third cruise was to La Salle, Illinois on board the Steamer PIASA.

The following year I was Master of the Steamer BALD EAGLE, on which the Institute sailed, and I have been Master on each succeeding cruise, using the Steamers GOLDEN EAGLE and NEW CAPE GIRARDEAU. During these twenty-one years I have become closely acquainted with many of the members, whose friendship I value very highly.

It is with considerable pleasure I look forward each year to being Master of the boat on which these cruises are made. It is true that, in the early days, there may have been a few of the members who looked forward to these trips as an excuse to "drown their sorrows," but it is refreshing to note that during the past fifteen years or more there have been very few, if any, who have come aboard with any such intention. On the other hand, they seem to be there for the sole purpose of attending the meetings, renewing acquaintances made in years gone by and enjoying themselves by mixing work with play. During the evenings, after the regular meetings have been held throughout the day, I have had the extreme pleasure of joining some of the members in a little session of "the old army game," or some other pastime, and my association with the members has always been exceedingly cordial and pleasant.

Mentioning this publication when writing Advertisers puts friendship into business.

My brother, Captain Henry, wishes to join me in thanking the Illinois Mining Institute for their long and valued patronage and we sincerely hope that we may be permitted to serve you for many years to come.

Please accept my personal thanks for being allowed the privilege of contributing a few lines to your Golden Anniversary Year Book and for the opportunity to wish continued success to the Illinois Mining Institute and to each of its many members.



HISTORY OF THE DEPARTMENT OF MINES AND MINERALS, STATE OF ILLINOIS

By ROBERT M. MEDILL, Director
Springfield, Ill.

The first discovery of coal on the North American continent was made in what is now the State of Illinois.

One authority gives the honor of this discovery to Father Hennepin in 1669 on the Illinois river near the present site of Ottawa in La Salle county, and another gives the credit to Joliet and Father Marquette in their voyage of exploration in 1673 and the location some place between the present cities of Utica and Ottawa.

Almost a century passed before it was known that coal existed in Pennsylvania and other places in the country.

The beginning of coal mining in Illinois dates back to the first quarter of the nineteenth century. The first record shows of outcroppings being mined along the bluffs bordering the Big Muddy River in Jackson County a few miles below Murphysboro in 1810. In 1832 several flat-boats were loaded with coal and sent to New Orleans. No doubt coal was mined between these two dates, but in a very limited way, as the demand was confined almost exclusively to the blacksmithing trade. Coal mining began in St. Clair County about 1832 and was carried on for domestic purposes in Peoria, Rock Island, La Salle and other points. In 1833, six thousand tons were hauled in wagons from the Belleville district to St. Louis. This year, 1833, marks the beginning of Government records of the production of coal.

When the Constitution of 1848 was adopted, coal mines had not been developed sufficiently to arouse in the public mind the necessity for legislation looking to the health and safety of those engaged in the industry and, therefore, no authority being given in that Constitution, the Legislature was powerless to enact such laws.

The rapid growth of the railroads and the development of manufactories, were the greatest factors in the rapid development of the coal industry. Instead of local demands, which were supplied by wagon haulage, markets located in cities at great distance from the mines could be reached by railway transportation. Shaft mining was begun shortly after the completion of the Illinois Central railroad, 1855, at DuQuoin in Perry County. At this time there was much activity in railroad construction and within ten years the coal fields of Alton, Kingston, Rock Island, Danville, Braidwood and Braceville were developed. Soon great industries sprang up along the lines of these railroads and coal mining soon became one of the leading industries of the State.

The Constitutional Convention of 1870, realizing the need of safeguarding the lives and health of the men employed in the mines, gave the General Assembly authority to pass such laws as they thought necessary for the protection of miners. From then on there have been many

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amendments. In 1883 the State was divided into five inspection districts with a qualification set up for inspectors, their duties and authority. In 1891 the Board of Examiners for mine managers was set up. In 1895 the State was divided into seven districts. Fire bosses and hoisting engineers were required to take examinations. In 1897 the "truckstore" was abolished.

Then in 1899 a general revision of the mining law was enacted. The State Board of Examiners was eliminated, and the Commissioners of Labor appointed the State Mining Board. All mines, regardless of their capacity, had to employ certified mine managers, mine examiners (formerly called Fire Bosses) and hoisting engineers. Traveling expenses were paid the inspectors by the State and the fee system, which had required the owners of mines to pay a fee, varying from \$6.00 to \$10.00, according to the size of the mine and the number of men employed for the inspection.

The Legislature, in 1905, passed the Shot Firers' Law. This law required shot firers to be employed and paid by the Coal Companies in certain specified mines. Provisions were made to divide the State into ten districts with an inspector for each district. In 1907 the Governor was given the power to appoint the Mining Board. At a special session of the Legislature in 1908 a law was passed prohibiting the employment of anyone as a miner who did not have a certificate of competency issued by the Board.

The Legislature called in a special session early in 1910 by Governor Deneen, in response to public sentiment for the relief and remedial legislation in consequence of the Cherry mine fire, which occurred in November of the previous year, passed a bill, which became a law, providing for fire-fighting equipment in coal mines and mine fire-fighting and rescue stations in coal fields. Three rescue stations were established, one in the northern part of the state, at La Salle, one in the central part of the state, at Springfield, and one in the southern part of the state, at Benton.

The Regular session of the General Assembly in 1911 made another general revision of the mining laws, amended several sections of the Mine Fire Rescue Stations law and passed an Act regulating the Character of Black Blasting powder. Twelve inspection districts were established with an inspector for each district.

During the period of 1898-1912, Richard Newsam was the President of the State Mining Board.

From 1913-1917, James Bohlander of Pekin was the President of the Mining Board.

The Fiftieth General Assembly, in 1917, passed what is known as the Civil Administrative Code, consolidating the executive activities of the State under nine departments. All matters relating to the mining of coal and other minerals were placed under the Department of Mines and Minerals. The law became effective on July 1, 1917, and on that day Evan D. John assumed the duties of Director. The department was organized into four divisions:

General Office	Miners' Examination
Inspection	Mine Rescue and First Aid

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In 1919 an additional inspector was provided for and designated as Inspector-At-Large.

From 1919-1920, Joseph C. Thompson was the Director of the Department.

From 1920-1924, Robert M. Medill was the Director of the Department.

In 1921 a law governing the operation of metal mines and providing for an inspector of these mines was passed. This was placed under the jurisdiction of the Department of Mines and Minerals and the division of

Fluorspar Inspection

was created.

From 1924-1926, Martin Bolt was the Director of the Department.

From 1926-1930, A. D. Lewis was the Director of the Department.

Two additional Rescue Stations, one at Belleville and one at Johnson City, were provided for by an act of the Legislature in 1927 and were equipped and in operation within a few months. Sometime previous to this, three additional Rescue Stations had been added, one at Herrin, one at DuQuoin and one at Harrisburg. Sometime between 1925-1926 the station at Harrisburg was moved to Eldorado.

From 1930-1934, John G. Millhouse was the Director of the Department.

From 1934-1941, James McSherry was the Director of the Department.

On March 1, 1939, the station at Harrisburg was moved again to Eldorado. The station at Johnson City was closed on June 30, 1939, an authority given to open a station at Benld.

In January of 1941, Robert M. Medill who had been Director of the Department from 1920-1924 returned again as Director.

The Station at Benld was opened July 1, 1941 and several inspectors of explosives were added owing to a law enacted in the Sixty-First session of the Legislature, placing that work under the jurisdiction of the Department.

The Sixty-Second General Assembly passed laws in relation to the conservation of the oil, gas and coal resources of the State, leaving the Department of Mines and Minerals to carry out the provisions. This had been handled by the department for some time before, but now a new division was formed.

Oil and Gas Conservation

The Rock Dust Law was passed during the 1941 session of the Legislature.

First aid classes at the Mine Rescue Stations have increased greatly since the declaration of war, and continuing for the remainder of the year at the present rate, more certificates will be issued than in any previous year.

HISTORY OF THE DEPARTMENT OF MINING AND METALLURGICAL ENGINEERING AT THE UNIVERSITY OF ILLINOIS

By HAROLD L. WALKER

Professor of Metallurgical Engineering, and Head of the
Department of Mining and Metallurgical Engineering,
Urbana, Illinois

The history of instruction in Mining and Metallurgical Engineering may be said to have begun in March, 1867, with the first meeting of the Board of Trustees of the Illinois Industrial College, as it was then called. At the first meeting, John Milton Gregory was elected Regent (president) of the new university which as yet existed on paper only, and at this first meeting of the Board of Trustees, they appointed a Committee on Course of Study and Faculty.

At the second meeting of the Board of Trustees, held in May, 1867, the report of the Committee on Course of Study and Faculty was adopted. Among other things the report provided for "courses in Mechanical Science and Art, Civil Engineering, Mining Engineering and Metallurgy, and Architecture . . ." It is of interest to note the early vision of the part that the mineral industries were to play in the development of the State of Illinois, although the coal production was considerably less than two million tons at that time.

In spite of the early plans there was little interest in mining engineering education. Up to 1885 the department never had more than six students in any one year, and the average was less than three. Only six students were graduated in mining engineering in that 15-year period. The names of Dr. J. J. Rutledge and James B. Needham are found among the graduates of this period.

Professor S. W. Robinson was listed in the University catalog of 1869-70 and 1870-71 as "Professor of Mechanical Science and Engineering, and Instructor in Mining Engineering." The first announcement of courses in Mining Engineering was made in the catalog of 1870-71. The technical instruction in mining consisted of "Mining Operations" taught by Professor Robinson. The curriculum was much less complete than other engineering curricula and, since members of the staff were essentially interested in other phases of engineering, the courses did not attract much attention from students.

Professor Theodore B. Comstock was appointed as Professor of Mining Engineering and Physics in September, 1885. Professor Comstock offered a well planned and complete four year curriculum in Mining Engineering, and had adequate financial backing from the University. Owing to the lack of student interest in mining engineering, Professor Comstock resigned in 1889. A curriculum in mining engineering was not offered from 1889 until 1891 when Professor W. J. Baldwin was ap-

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pointed as Professor of Mining Engineering. He remained on the staff until August, 1893, when the University discontinued the curriculum because of lack of interest of the students in the subject. In 23 years the highest attendance had been seven students.

The records indicate that the Illinois Mining Industry was not interested in the mining engineer during this period, though the industry was not opposed to the department. Interest was stimulated in mining education and the laws pertaining to the inspection and regulation of mines by the Braidwood disaster. The records also indicate that the mines had shown "a most friendly spirit, and every facility has been provided which has been desired, and we are especially fortunate in having at command the best facilities in all parts of the state."*

The second period of interest in mining instruction begins with Dr. W. F. M. Goss who came to the University as Dean of the College of Engineering in 1907. Dean Goss, in his first annual report, dated May 26, 1908, advised President E. J. James in part, as follows:

"Illinois stands third among the states of the union in the value of its mineral products. Its iron and steel mills make up one of the great manufacturing centers of the world. Smelters for lead, gold, and silver are operated within its borders. Its coal mines alone employ 62,000 people; but there is not a place in our educational system where the workers of this industry can go for guidance. There is no laboratory in the state, nor any corps of men who in a scientific way are studying the problems of the mine. Such fundamental matters as ventilation and the use of powder are but imperfectly understood, and the problems of haulage, hoisting, screening and washing are not being especially studied by those who later on are to be responsible for the operation of the mines of the state. The College of Engineering should as soon as practicable enter this field . . ."

The records indicate that Dean Goss was eager to have the Department of Mining Engineering re-established. He wrote letters to a great number of mining men, asking their opinion on the advisability of re-establishing the Department. All the letters received by Dean Goss in reply were favorable and some were decidedly enthusiastic. Among the representative men who replied to Dean Goss and favored his plan are found the names of James Forester, F. S. Peabody, W. G. Hartshorn, C. I. Pierce, John H. Walker, H. N. Taylor, A. L. Sweet, S. M. Dalzell, Carl Scholz, Walton Rutledge, G. W. Traer, and Richard Newsam. Dean Goss, under date of December 17, 1908, submitted a statement to the president of the appropriations needed for the coming biennium and included an item for \$25,000 to provide instruction and equipment for the establishment and maintenance of a Department of Mining Engineering.

At about this same time there was a movement under way to establish a Mine Rescue Station at the University. The Mine Rescue Station was a cooperative enterprise of the University and the Technologic Branch (later the United States Bureau of Mines) of the United States Geologi-

* T. B. Comstock, Trans. AIME, XV, 589-598.

cal Survey. On March 11, 12, and 13, 1909, an Illinois Fuel Conference was held at the University under the auspices of the College of Engineering, the Engineering Experiment Station, and the United States Geological Survey. These dates were the same as the formal opening of the Rescue Station. Out of this joint meeting and conference came a resolution calling for the establishment by the State Legislature, then in session, of a Department of Mining Engineering. A committee was appointed representing the United Mine Workers, the State Mine Inspectors, the Illinois Coal Operators, and the Illinois Manufacturers' Association. Mr. Gordon Buchanan and Mr. Carl Scholz were appointed to take up the formation of this committee. On March 29, 1909, Mr. Gordon Buchanan, who served as secretary, announced the following personnel of the committee:

Representing the Illinois Miners

John H. Walker
Duncan McDonald
Frank Farrington
Groce Lawrence
Frank J. Hayes

State Mine Inspectors

James Taylor
Thomas Hudson
John Dunlop

Manufacturers and Consumers

Samuel Insull
C. S. Fink
Wm. Butterworth
Edward B. Taylor

Illinois Operators

A. J. Moorshead
Glenn W. Traer
Carl Scholz
Gordon Buchanan

On April 1, 1909, the bill which had been previously prepared was introduced into the Senate by Mr. Hall and into the House by Mr. Dudgeon, becoming Senate Bill 384 and House Bill 538. Through the correspondence and personal efforts of the committee, especially the indefatigable labors of Messrs. Buchanan and Scholz, the bill passed the General Assembly and, on June 8, 1909, was signed by Governor Deneen. The act establishing the Department of Mining Engineering states: "That in addition to offering such courses of instruction as will best train young men for efficient work in the various phases of mining industries, the department shall concern itself with the development and dissemination of scientific facts that will be of value to the mining industry and will conserve life and the resources of the State."

A search was begun for the right man to head the new department. One man seemed to be especially recommended by those who were most active in securing the reestablishment of the department of Mining Engineering. That man was Harry Harkness Stoek, then editor of *Mines and Minerals*, a technical magazine that had been dear to the hearts of mining men for nearly thirty years. Mr. Stoek was appointed Professor of Mining Engineering and Head of the Department on September 21, 1909, and he entered upon his duties in October. Professor Stoek continued as Head of the Department until his sudden death on March 1, 1923.

Dr. Stoek's vision, enthusiasm, and technical ability were responsible for the development of the curriculum, the construction and equipment

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of a fine mining laboratory, the securing of a competent teaching staff, and the maintenance of the highest standards of technical instruction. A bronze tablet by Lorado Taft has been placed in the Engineering Library by his former students, colleagues, and friends to remind coming generations of students of the contributions Dr. Stoek made to mining education.

The legislature had thus provided for a department of mining engineering, and a head of the new department had been secured; however, no provisions had been made for appropriating money for quarters and carrying out instruction. The first Annual Report of Professor Stoek indicates that three sophomores were enrolled in mining engineering and two other students were taking courses. The office of the Head of the Department and one class room were located in the Physics Building. Much time was devoted to securing equipment for laboratories, models of mining equipment, and equipment for illustrative purposes.

During the year 1909-1910 the State Legislature had authorized two mining commissions: The Illinois Mining Investigation Commission to revise the mining laws of the state; and the Mine Rescue Station Commission to establish, equip, and operate three rescue stations. An appropriation of \$75,000 was secured for the rescue stations. The Head of the Department was appointed to each of the commissions by the Governor of the State. The Mine Rescue Commission had just been organized when the Cherry (Illinois) disaster occurred, and considerable time was devoted to this investigation. The Urbana Mine Rescue Station had been established on March 11, 1909, and was under the immediate charge of Mr. R. Y. Williams. Mr. Williams distinguished himself in rescue work, using the then newly-invented oxygen helmets for the first time. Professor Stoek continued to serve on these two commissions until they were included in the Department of Mines and Minerals in 1918.

During the school year 1910-11 the department was scattered about the College of Engineering Campus and had offices, classrooms, and laboratories in the following buildings: Physics, Engineering Hall, New Power Plant, Mechanical Engineering, and Locomotive Testing Laboratory. Upon the request of the President of the University a bill was prepared covering the following items:

1. Provision for the maintenance of the Mining Engineering Department for the ensuing two years.....\$ 30,000
2. A building for the joint use of the State Geological Survey, the laboratories of the United States Bureau of Mines, and the Mining Department..... 200,000
3. An appropriation for cooperative investigations by the State Geological Survey, the United States Bureau of Mines, and the Department of Mining Engineering.... 10,000

The first and third items were subsequently approved but, instead of an appropriation for a separate building, there was appropriated \$25,000 for additional equipment for the department.

A special session of the Legislation in 1910 authorized and made an appropriation for the establishment and operation of the Miners and

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Mechanics Institutes, but the act was declared unconstitutional by the Attorney-General as the subject was not included in the Governor's call for the special session. On May 25, 1911, the Legislature approved Senate Bill 259, authorizing the establishment of the Institutes, but failed to pass an appropriation of \$25,000 to carry on the work. The Forty-eighth General Assembly of the State Legislature, in the general appropriation bill, made an appropriation of \$15,000 per annum for two years for carrying out the provisions of Senate Bill No. 259.

Mr. R. Y. Williams was appointed Director of the Illinois Miners and Mechanics Institutes on January 1, 1914. Two bulletins had been written to govern the policy of instruction and, on April 1, 1914, instruction was begun in Herrin and Harrisburg with 138 and 136 students, respectively. These courses were followed by similar ones in Belleville and Collinsville, and a series of short courses, in weekly units, was in progress on the campus. The Institutes were abandoned on July 1, 1915, when Governor Dunne vetoed the item in the appropriation bill. At the time the Institutes were abandoned there were eighteen night schools being successfully carried on with an enrollment of over a thousand students. The plan was an excellent one and served a much needed service to the mineral industries of Illinois. Similar plans have been made since that time, but they have never materialized and they are much needed. The Miners and Mechanics Institutes were placed under the supervision of the Department of Mines and Minerals in 1917.

In 1911 an appropriation of \$25,000 was made for additional equipment for the department. This fund was utilized in constructing a new Mining Laboratory, which was occupied in the fall of 1912. The laboratory contained approximately 8000 square feet of floor space and provided for sampling and grinding, chemical and physical testing, coal preparation and ore dressing, ventilation, and drilling and blasting. The laboratory housed much of the cooperative research program between the State Geological Survey, U. S. Bureau of Mines, and Mining Engineering Department for the safe and economical operation of the coal mines of the state. In 1914 an addition was approved for the Mining Laboratory but money was never appropriated and the additional wing was never built. However, a small machine shop was added in 1918. As early as 1916 the head of the department recommended the construction of a building to house the offices and laboratories of the department, and this recommendation stated that a total of 70,000 square feet of space would be needed. In 1941 an appropriation of approximately \$7,000 was secured for reconstructing the mineral dressing laboratories, which should be ready for occupancy in the fall of 1942.

During the school years 1909-10, 1910-11, and 1911-12 the offices and laboratories of the department had been scattered over the College of Engineering Campus. In the fall of 1912 the new Transportation Building had been completed, and space was provided for the mining department on the second floor of the new building. Departmental and staff offices, class rooms, drafting rooms, and a museum were housed in the Transportation Building until the fall of 1941. At that time new quarters were established on the third floor of the Ceramics Building

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The building which formerly housed the Department of Mining & Metallurgical Engineering at Urbana.

in space vacated by the State Geological Survey when they moved to the Natural Resources Building.

In 1911 a cooperative investigation between the Department of Mining Engineering, the State Geological Survey, and the U. S. Bureau of Mines was begun. Problems in friability, explosibility, ventilation, storage, washability, chemistry, methods of mining, as well as others were studied. The U. S. Bureau of Mines withdrew from the cooperative agreement on January 1, 1926, but the cooperative work between the Geological Survey and the Mining Department was continued. Over 50 bulletins were published with the results of the investigations, and they have been of great benefit to the mining interests of the state.

The Annual Report of Professor Stoek in 1915 recommended and urged the establishment of a curriculum in Metallurgical Engineering in the Department. An option in Metallurgy, as a part of the curriculum in Mining, was first offered in the fall of 1916. The metallurgical option was elected in the senior year and consisted of courses in process metallurgy, mineral dressing, and metallurgical design. The courses in process metallurgy were taught in the Chemistry Department by Professor D. F. McFarland. The option in metallurgy, with variations in course requirements, was continued until 1934.

The University catalog for the year 1933-34 contains the first announcement of a curriculum in metallurgical engineering. With the

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establishment of a curriculum, all courses in metallurgy were taught within the department. The first degree in metallurgical engineering was granted in the spring of 1935. With the offering of a curriculum in metallurgical engineering, the name of the department, by action of the Board of Trustees on April 11, 1934, was changed to the Department of Mining and Metallurgical Engineering, which continues to the present time.

An appropriation of \$50,000 was secured in 1935 and construction was begun on May 6, 1936 on the Metallurgy Laboratory, which consists of an east addition to the Mining Laboratory. Construction was completed and the building was occupied in the second semester of 1936-37. The building is 42 x 100 feet, two stories high, and has a floor space of approximately 8000 square feet. All courses in metallurgical engineering are taught in this laboratory building, and it contains laboratory facilities for the following: metallography, electro-metallurgy, heat treating, melting of metals, fire assaying, welding, physical testing, and research. The student enrollment has shown a continuous yearly increase since establishment of the curriculum and the laboratory is now rather crowded. Plans are being made for the construction of a new building to house the offices and laboratories of the department of mining and metallurgical engineering. The new building will have provisions for an expanded program of teaching and research in connection with the mineral industries, and all functions of the department will be housed under one roof.

A plan for conferences in coal utilization was inaugurated in 1934. There have been six "Short Course in Coal Utilization" conferences as follows: 1934, 1935, 1936, 1937, 1939, and 1941. The purpose of these short courses has been "to present an educational program of technical and practical information pertaining to coal and its efficient utilization for the benefit of those engaged in mining, preparing, marketing and using coal, as well as for those manufacturing and distributing machinery for the preparation and utilization of coal." These short courses have been well attended with a total enrollment of approximately 1400. The papers presented at the last three short courses have been published as circulars, in bound form, of the University of Illinois Engineering Experiment Station. Copies are available upon application to the Director of the Experiment Station.

The history of the Department of Mining and Metallurgical Engineering has been closely associated with the history of the Illinois Mining Institute, and they have grown with mutual interests. Two members of the departmental staff have been presidents of the Institute, i.e., Professor H. H. Stoek, 1921-22 and Professor A. C. Callen, 1929-30. An expression of their interest of the Institute in the Department of Mining and Metallurgical Engineering is symbolized in the establishment of four scholarships in mining engineering at the University in 1941. These scholarships are known as the Illinois Mining Institute Scholarships in Mining Engineering. The first recipient of one of these scholarships is Mr. Marion Walls of West Frankfort, who has just completed his first year of work. In addition to the above scholarships the Institute has been instrumental in securing eight additional scholarships known as the

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Peabody Coal Company Scholarships in Mining Engineering. These scholarships are to be initiated with the 1942-43 school year and will be administered by the Illinois Institute Committee on Scholarships.

To complete the record I am including a list of the names of known members of this department, their titles, date of employment, and their present address when known.

MEMBERS OF THE STAFF

Department of Mining and Metallurgical Engineering

	<i>Present Address</i>
S. W. Robinson Professor of Mechanical Science and Engineering, and Instructor in Mining Engineering Jan. 1870 to 1878	Deceased October 31, 1910
T. B. Comstock Professor of Mining Engineering and Physics Sept. 1885 to Aug. 1889	Deceased July 25, 1915
W. J. Baldwin Professor of Mining Engineering Sept. 1891 to Aug. 1893	Deceased April 8, 1924
H. H. Stoek Professor of Mining Engineering and Head of the Department Sept. 1909 to March 1923	Deceased March 1, 1923
C. S. Stevenson Instructor in Mining Engineering Sept. 1910 to June 1911	c/o Gardner-Denver Company Toronto, Ontario
F. C. Lincoln Associate in Mining Engineering Assistant Professor of Mining Engineering Sept. 1911 to Aug. 1913	Professor of Mining Engineering, South Dakota School of Mines, Rapid City, South Dakota
S. O. Andros Field Assistant, Cooperative Mines Investigation Associate Assistant Professor of Mining Engineering Nov. 1911 to Aug. 1915	c/o Bellamy-Neff Company Chicago, Illinois
H. H. Lauer Instructor in Mining Engineering Jan. 1912 to June 1913	Construction Engineer Atlas Portland Cement Company, New York, N. Y.
E. A. Holbrook Assistant Professor of Mining Engineering Professor of Mineral Preparation and Utilization Sept. 1913 to Oct. 1917	Dean, Schools of Engineering and Mines, University of Pittsburgh, Pittsburgh, Pa.
L. E. Young Instructor in Mining Engineering Sept. 1913 to June 1914	Consulting Mining Engineer Box 146, Pittsburgh, Pa.

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- | | |
|---|--|
| | <i>Present Address</i> |
| A. C. Callen
Instructor in Mining Engineering
Associate in Mining Engineering
Sept. 1914 to October 1917
Professor of Mining Engineering and Head of
the Department
Sept. 1924 to Aug. 1939 | Dean of Engineering
Lehigh University
Bethlehem, Pa. |
| C. M. Young
Assistant Professor of Mining Research
July 1916 to Aug. 1919 | Professor of Mining and Metal-
lurgical Engineering, University of
Kansas, Lawrence, Kansas |
| R. W. Arms
Instructor in Mining Engineering
Associate in Mining Engineering
Assistant Professor in Mining Engineering
Nov. 1917 to Dec. 1922 | Consulting Engineer
331 E. 58th Street, New York,
New York |
| J. B. Read
Assistant Professor of Mining Engineering
Sept. 1919 to Aug. 1920 | Professor of Mining, Colorado
School of Mines, Golden, Colo. |
| J. R. Fleming
Research Associate in Mining Engineering
Sept. 1919 to Aug. 1921 | Mine Safety Appliances Co.,
1012 W. Stoughton St., Urbana,
Illinois |
| A. E. Drucker
Assistant Professor of Mining Engineering
Feb. 1921 to Oct. 1926 | Dean, School of Mines,
Washington State College,
Pullman, Washington |
| A. J. Hoskin
Research Assistant Professor of Mining
Engineering
Research Associate Professor of Mining
Engineering
Acting Head of the Department
Sept. 1921 to Aug. 1924 | Deceased |
| C. M. Smith
Assistant in Mining Engineering
Instructor in Mining Engineering
Research Associate in Mining Engineering
Research Assistant Professor of Mining
Engineering
Sept. 1921 to June 1923
Sept. 1923 to Oct. 1937 | Editor, Mechanization,
Washington, D. C. |
| T. M. Bains, Jr.
Assistant Professor of Mining Engineering
Jan. 1923 to Aug. 1924 | Associate Professor of Geology,
Oregon State College,
Corvallis, Oregon |
| T. Fraser
Research Assistant Professor of Mining
Engineering
Sept. 1923 to Aug. 1924 | Coal Preparation Engineer
U. S. Bituminous Coal Division,
734 15th St., N.W.,
Washington, D. C. |
| T. M. Marshall
Assistant Professor of Mining Engineering
Sept. 1924 to Aug. 1928 | Superintendent, Central Manitoba
Mining Company, Wadhope,
Manitoba, Canada |

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- | | <i>Present Address</i> |
|---|---|
| N. A. Tolch
Research Assistant in Mining Engineering
Feb. 1926 to Aug. 1926 | Engineer, U. S. Bureau of Mines,
Pittsburgh, Pa. |
| D. R. Mitchell
Instructor in Mining Engineering
Associate in Mining Engineering
Assistant Professor of Mining Engineering
Associate Professor of Mining Engineering
Feb. 1927 to Aug. 1938 | Head, Department of Mining
Engineering, Penn State College,
State College, Pa. |
| H. P. Nicholson
Instructor in Mining Engineering
Associate in Mining Engineering
Assistant Professor of Mining Engineering
Sept. 1928 to date | Champaign, Illinois |
| A. B. Wilder
Assistant Professor of Metallurgical
Engineering
July 1935 to Aug. 1939 | Metallurgical Engineer,
Jones and Laughlin Steel Corp.,
40 Longworth St., Pittsburgh, Pa. |
| J. A. Bottomley
Special Research Assistant,
Engineering Experiment Station
Jan. 1936 to June 1936 | Sahara Coal Company,
Harrisburg, Illinois |
| W. H. Bruckner
Research Associate in Metallurgical
Engineering
Research Assistant Professor of
Metallurgical Engineering
Jan. 1938 to date | Champaign, Illinois |
| H. L. Walker
Assistant Professor of Metallurgical
Engineering
Assistant Professor of Metallurgical
Engineering and Acting Head
of the Department
Associate Professor of Metallurgical
Engineering and Acting Head
of the Department
Professor of Metallurgical Engineering
and Head of the Department
Sept. 1938 to date | Urbana, Illinois |
| R. A. Wilde
Spec. Research Assistant in Metallurgical
Engineering
Sept. 1938 to Aug. 1940 | Battelle Memorial Institute
Columbus, Ohio |
| Earl J. Eckel
Instructor in Metallurgical Engineering
Sept. 1939 to date | Champaign, Illinois |
| John A. Snyder
Instructor in Metallurgical Engineering
Sept. 1939 to Feb. 1, 1941 | Experimental Station
E. I. Du Pont de Nemours & Co.,
Wilmington, Delaware |

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	<i>Present Address</i>
Bernard G. Ricketts Instructor in Metallurgical Engineering Sept. 1939 to date	Champaign, Illinois
J. L. G. Weysser Assistant Professor of Mining Engineering 1939 to date	Urbana, Illinois
G. W. Dickinson Half time Assistant in Mining Engineering Sept. 1940 to Aug. 1941	Resident Engineer Remington Arms Company Denver, Colorado
H. C. Beede Special Research Assistant in Metallurgical Engineering Sept. 1940 to Jan. 1942	Lt., U. S. Coast Artillery 102 E. 80th Street Seattle, Washington
A. C. Forsyth Assistant Professor of Metallurgical Engineering Sept. 1941 to date	Urbana, Illinois
J. Hino Research Assistant in Metallurgical Engineering Sept. 1941 to date	Champaign, Illinois
H. R. Eberle Assistant Professor of Mining Engineering Nov. 1941 to Aug. 1942	Goodman Manufacturing Company Halsted and 48th Place Chicago
John E. Jones, Jr. Half time Assistant in Mining Engineering Nov. 1941 to June 1942	Manager, Jones Mining Company, 212 Mitchell Street, Benton, Illinois



THE HISTORICAL DEVELOPMENT OF THE ILLINOIS COAL INDUSTRY AND THE STATE GEOLOGICAL SURVEY*

By M. M. LEIGHTON and DON CARROLL
State Geological Survey, Urbana, Ill.

Coal mining in Illinois, as a commercial enterprise, dates back to the year 1810, when a drift mine was opened in the bluff bordering the Big Muddy River, several miles below Murphysboro. That pioneer mining locality, known as Mount Carbon, was developed for the purpose of recovering and marketing an excellent grade of blacksmith coal, from a bed that later generations of coal men were to discover was superior in quality to any others occurring in Illinois.

This first mining venture was initiated 137 years after the white man made his first discovery of coal in North America—a discovery that is now definitely credited to Pere Marquette who, in 1673, noted and recorded the presence of an outcropping coal bed near the site of the present town of Utica, in La Salle County, Illinois.

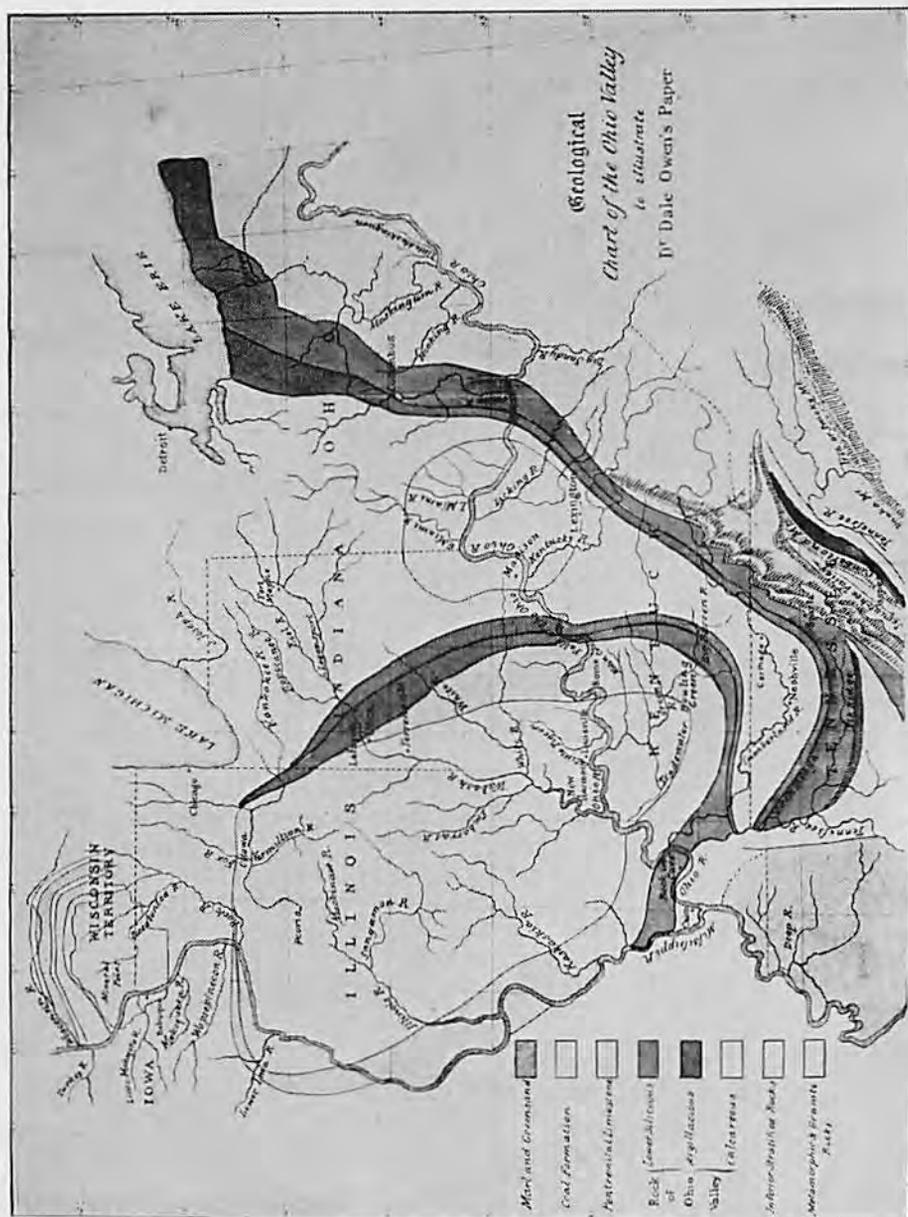
There is no record of any supplementary coal mining activity in Illinois until the year 1830, when a St. Clair County blacksmith began mining the Belleville bed, opposite St. Louis. Apparently a number of drift mines were in operation in that vicinity no more than a year later, for coal was being sold in St. Louis in 1831 at a top price of 12½ cents per bushel. Considerable amounts of coal were undoubtedly being mined by that time in various other parts of the State, although no production figures were collected by the government until 1833. In that year, 6,000 tons were hauled to St. Louis from the Belleville district alone. The U. S. Census Report for 1840 took notice of production in 19 separate counties in Illinois, which produced a grand total of approximately 17,000 tons.

By this time, governmental authorities had begun to take notice of the new science of geology, and the potential value of geological studies for locating and mapping mineral resources. The Federal Land Office, in 1839, commissioned Dr. David Dale Owen to conduct geological studies over a large area of the Middle West—in Ohio, Indiana, Kentucky, western Tennessee, Illinois, Iowa, Missouri, and southern Wisconsin. He and his associates made a systematic study of this large area, and their first report, with maps, was published in 1844. Other reports and maps were published by Owen up to 1852. The studies supplied the first relatively accurate geological information regarding the central interior coal fields, and attracted considerable interest.

Governor French, in a message to the Illinois legislature on January 7, 1851, recommended legislation to establish a geological survey in

* Special acknowledgement is made for source material published in "A Compilation of the Reports of the Mining Industry of Illinois," 1931; by John G. Milhouse, Director, Department of Mines and Minerals.

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The first geological map of the north central states, published by Dr. David Dale Owen in 1844, shows in general the location and extent of the eastern interior coal field, and the areal geology of the surrounding region.

Illinois. "We have unmistakable evidence," he said, "that this state is scarcely excelled in the extent of her mineral riches, and all that seems wanting to render them richly productive is to point attention to them. As some considerable time will be required for a careful and minute geological survey of the whole state, I would respectfully suggest whether its importance would not justify a limited appropriation, to be followed by others thereafter, as the results and prospects of success might render desirable."

A few weeks later a bill was introduced and passed, providing for the appointment of a geologist and outlining his duties. Dr. J. G. Norwood was appointed State Geologist, and began his work in October, 1851. He continued to serve until 1858 but, except for a small, approximately accurate geological map of the state, prepared very little material for publication. His sole contribution in the way of a published report was a brochure of less than 100 pages—mostly coal analyses and diagrams of local geological sections.

In the meantime, the coal industry was expanding rapidly in Illinois, in harmony with the rapid construction of railroads. Before 1850 there were but 59 miles of railroad lines in the State. Ten years later 2,781 miles of track had been completed and was in use. Coal production in Illinois increased from 260,000 tons in 1849, to 728,400 tons in 1860, and reached the million-ton mark by 1864.

The rapid growth of mining activity, and the need for authoritative geological data to guide development, made necessary the continuation of a geological survey. Consequently, Norwood was succeeded as State Geologist by Mr. Amos H. Worthen, who assumed office in March, 1858, and immediately began to carry out the ambitious program of preparing separate detailed reports on the geology and mineral resources of each county in the State. Because of his wide acquaintance and scientific prestige, he was able to secure the services of a number of well trained assistants, and the work went forward rapidly.

Field work was carried on for 12 years until appropriations were discontinued. Funds were provided, however, for the preparation and printing of reports until 1875, by which time reports had been published for all but one county. The eight large volumes ultimately published by Worthen represent a prodigious accomplishment, and these reports are even yet regarded as excellent reference works among American geological literature. Among pioneer geologists, Dr. Worthen was indeed outstanding.

In this period, during and following the Civil War, considerable progress was made in developing our coal resources, and even in making use of machinery in mining operations, since the steam engine was then finding universal application. Some noted Illinois mining districts had their beginning between 1860 and 1890, particularly those that are removed from river transportation facilities. The building of the railroads made this "inland" development possible.

In 1865 coal was found in the digging of a well in Will County. This discovery began mining in the Wilmington district, and operations were soon under way there on a large scale. The Vermilion County field was

opened in 1866, along Grape Creek. The first mine there was a stripping operation. By 1870, commercial coal mining was under way in 37 counties, and the State produced 2,624,163 tons that year. Nearly a third of this total was produced in St. Clair County. Will, Vermilion, Rock Island, Perry, Madison, La Salle, and Jackson counties led the rest of the list. There was as yet no mining in Franklin, Jefferson, or Saline counties, and only minor activity in Williamson County. The Grundy County deposits were opened on a commercial scale in 1874. In 1880 the production of coal in Illinois amounted to some six million tons, produced in 46 counties.

Operators began making yearly reports to the State in 1882. In that year there were 704 mines reporting, of which 207 were "steam shafts," 140 "horse power shafts," 9 were classified as "steam slopes or shafts," and 329 as "other slopes or drifts." Employees numbered 20,300 and the capacity of the mines was rated at about two times the production figure of that year.

The State Coal Report for 1883 contains the first recorded notice of mine improvements, giving specific mention of the enforcement of mining laws pertaining to ventilation and the construction of escapement shafts. During that year, 42 mines completed escapement shafts, and others were in process of construction. The report notes a general disposition to comply with the law. By the end of 1886, there were 310 mines in the State with escapement shafts, and ventilating fans had been installed in 152 of them. The law also required certain safety precautions, such as means of signalling between top and bottom, safety catches and guides on cages, brakes on drums, etc. These requirements were generally met.

The first mention of the use of screens at Illinois mines is to be found in the "Platform and Constitution of the Re-organized Miners of St. Clair and Adjoining Counties," which was published in the *Belleville Democrat* in August, 1875. In this interesting document, the miners specified that "That no coal shall have a screen to exceed one inch between the bars . . .," and "That we demand three cents per bushel for mining, and will take no less." Again, in the Coal Report for 1886, it was reported that screens were in use at 218 mines, and that 80 per cent of the product was screened before being sold. It was stated that "much the largest number of screens have a space between the bars of seven-eighths of an inch, with an average area of sixty square feet. This is regarded as a standard screen, and is used by all of the larger companies."

In 1888 the Coal Report gave, for the first time, figures on the use of undercutting machines, noting their use in 38 mines—approximately one-eighth of the mines then in operation. In 1887 the first electric mine locomotive was completed and put into service under ground. This was of the "Pioneer" type. In 1891 the "Terrapin Back" type was placed in service, to be displaced by the predecessor of the modern locomotive in 1895 and later. In 1900 there were seven mines using motor haulage. Other methods of haulage that year were: Cable (27 mines), horse and mule (512 mines), and hand (374 mines).

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Before 1923 very little progress had been made in mechanical loading practice, and in that year no more than two million tons were thus handled in the entire United States. Rapid application of this method took place in the following years, though, and a 70 per cent increase was recorded by 1925. The first record of the use of these machines in Illinois mines appears in the Coal Report for 1927, when 129 of them were in operation in 21 mines, loading 1,657,858 tons. A year later there were 992 machines in use here in 51 separate mines, and they handled 6,742,154 tons of coal. In 1930 there were 2,238 loading machines in use in the State, and they handled more than half of the 45,776,272 tons mined that year in Illinois shaft mines.

Strip mining, which began in Illinois with the opening of the Grape Creek district, in 1866, has been continuous ever since. With the invention and spectacular improvement of stripping equipment, coal beds lying as much as 60 feet below cover can now be mined by this method in competition with shaft mines. Not until 1923, however, did strip-coal mining in Illinois reach the million-ton mark.

During the 30-year period between 1875 and 1905, there was no geological survey organization in Illinois. Had there been one, it would have been of great aid to the mineral industries of the State, at a time of rapid industrial expansion. So evident was the need for such an organization that a number of prominent Illinoisians formed an influential group to bring about its re-establishment, due mostly to the efforts of Mr. A. Bement, Consulting Engineer, of Chicago, who also sponsored a petition which the Western Society of Engineers prepared at a special meeting in February of 1905, calling for the establishment of a State Geological Survey, and pointing out the need for such an organization. The petition was widely circulated throughout the State.

The public-spirited men comprising the committee included professional geologists, such as Professors T. C. Chamberlin and R. D. Salisbury of the University of Chicago, Professor U. S. Grant of Northwestern University, and Dr. J. A. Udden of Augustana College, Rock Island. Engineers, such as A. Bement and his associates in the Western Society of Engineers, and coal operators led by Francis Peabody, Carl Scholz and others, felt that the mineral industries definitely needed the foundation that only a well-rounded-out geological survey could supply. All these men believed, as has since proved to be the case, that the consequent value to industry would repay many times the necessary expenditure of public funds for the public welfare. It was felt that Illinois should regain its former leadership in the study of fundamental geology and the application of the knowledge thus gained to education and industry alike.

The movement was enthusiastically backed by Governor Charles S. Deneen and President Edmund James, of the University of Illinois, and in 1905 the General Assembly passed an act to establish the present State Geological Survey. Its duties were defined in the act, and funds were appropriated for investigations and publications. Its control and supervision were placed in the hands of a commission comprised of the Governor, the President of the University, and Professor Chamberlin.

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who was doubtless the outstanding geologist of the time. In September of that year the commission chose Dr. H. Foster Bain as Director of the Survey, and he began his work a few weeks later. Highly-trained scientists were secured to make up his staff, and the new Survey immediately inaugurated a sound program of investigations, concentrating its efforts, for the most part, on coal and clay studies.

Close relations were established with the Engineering Experiment Station of the University, at that time under the direction of Professor L. P. Breckenridge. Dr. Edward Bartow, then Director of the State Water Survey, was equally cooperative, as were many other members of the University faculty. The new organization was especially fortunate in having available the services and counsel of Professor S. W. Parr, whose fame as a leading figure in coal research remains undimmed. His wide knowledge of coal, his devotion to research, his sound judgment and fine character made him a valued consultant in the work of the Geological Survey over a period of more than two decades.

The coal industry was expanding rapidly and many problems required investigation and solution. Consequently Dr. Bain directed most of the efforts of the Geological Survey toward studies of the stratigraphy of the "Coal Measures" rocks, the distribution and correlation of the commercial coal beds, the collection of data relating to their origin and mode of deposition, as well as their relationships to associated strata, and studies of the composition and uses of the various coals of the State.

In cooperation with the Engineering Experiment Station, the U. S. Geological Survey and Bureau of Mines, and the State Department of Mines in Springfield, together with various coal companies and mining men, a number of interesting and important technological studies were undertaken. Dr. J. J. Rutledge of the Maryland Department of Mines, and Tom Moses, who later became officially connected with the U. S. Steel Corporation, both spent much time sampling coal beds for the Survey. W. L. Abbott, of the Commonwealth Edison Company, personally studied spontaneous combustion and weathering of coal in storage piles. J. A. Holmes, George S. Rice, and other pioneer safety men of the Bureau of Mines, gave their counsel and established at the University the first Mine Rescue Training Station outside of Pittsburgh.

When Dr. Bain withdrew from the direction of the Geological Survey in 1909, he had in only four years set it on a wise and comprehensive course which it has since followed. He had also established fine relations with State officials and members of the legislature, with educational leaders, technical societies, and with responsible and forward-looking men in the mineral industries. He was succeeded by Frank W. DeWolf, who remained at the head of the Survey until 1923.

Soon after DeWolf took over the administration of the Survey, the inadequate space that had been assigned to it in the Chemistry Building was vacated in favor of more commodious quarters in the adjacent Natural History Building. In 1916, upon the completion of the Ceramics Building, the Survey moved to still larger quarters there, where headquarters were maintained for approximately 25 years.

During the period of DeWolf's term as Chief of the Survey, a notable list of coal studies were carried through to completion, and many con-

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tinuous research projects were begun. Since the "Coal Measures" cover about three-fourths of the State, and our coal beds represent by far the most important mineral resource, the study of the coals was naturally emphasized. The detailed surveys in southern Illinois, begun in 1906, were continued under the direction of George H. Ashley of the U. S. Geological Survey. David White, also of the U. S. Geological Survey, had by this time made considerable progress in his studies of the plant fossils of the Illinois "Coal Measures" strata, and had fixed the top of the Pottsville formation, as well as determining that our widespread coal No. 6 lies at or near the horizon of the Freeport coals of Pennsylvania, near the top of the Allegheny formation. Thus, the Illinois section was now approximately correlated with that of the East.

This work, and other coal investigations that were outlined under Dr. Bain's administration, were extended in larger quantity and more broadly under DeWolf. This program consisted of the routine collection and study of innumerable drill records from the mining companies, the geological mapping of quadrangles in various mining districts, and the mapping of the extent of the coal beds and their structural features. In this early work, the State men engaged included G. H. Cady, T. E. Savage, J. A. Udden, Jon Udden, and E. F. Lines. Federal men assigned to cooperate with the State under supervision of George H. Ashley, and later of David White, included E. W. Shaw, Henry Hinds, and Wallace Lee. During this period the assistance of Mr. A. Bement, Consulting Engineer of Chicago, was particularly helpful.

These activities increased with the establishment of the Illinois Mining Investigation under a cooperative agreement with the Department of Mining Engineering of the University and the U. S. Bureau of Mines. The legislature made special appropriations for work of the State agencies, and the Federal Department made substantial allotments. As a result, a group of geologists, mining engineers, and chemists carried on a systematic investigation which lasted some ten years and resulted in many fine researches and publications. This work was based on topographic maps, where possible, but could not await their slow preparation, and therefore land maps were compiled for the entire coal field, in various units. The results included an inventory of coal resources, studies of mining practices with special reference to safety and efficiency, and determination of chemical and physical characteristics as affecting usability of Illinois coal for ordinary purposes, and for coking and for gas manufacture. During this period, especially close cooperation was extended by University representatives, including Professor Stoek of the Department of Mining Engineering, Professor Parr of the Department of Applied Chemistry, and Dean Richards of the Engineering Experiment Station, as well as with Joseph A. Holmes and Van H. Manning, directors of the U. S. Bureau of Mines, and with officers and inspectors of the State Mining Department. The notable series of publications included 17 bulletins by the Survey, 15 by the Engineering Experiment Station, and 9 bulletins and 7 technical papers by the U. S. Bureau of Mines. The Survey employees chiefly engaged in this work were F. H. Kay, Assistant State Geologist, in charge; K. D. White, G. H. Cady,

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geologists; L. E. Young, mining engineer; J. M. Lindgren, chemist; W. A. Dunkley, chemist and gas engineer. In all of the Survey's coal investigations, it had the support and cooperation of the officers and members of the coal operators' associations, and of the mining engineers and of fuel and gas experts in company employ. The contribution to the knowledge of Illinois coals, to their safe and effective mining and preparation, and their improved utilization was of considerable industrial importance to the State.



Three men have headed the State Geological Survey since it was established in 1905. Dr. H. Foster Bain (center) served from 1905 to 1909. Professor Frank W. De Wolf (left) succeeded Bain and held the office until 1923. Since that date Dr. M. M. Leighton (right) has been chief, and can look back on two decades of accomplishment.

In 1923, Dr. M. M. Leighton became Chief of the Geological Survey. Under his direction it has expanded greatly in personnel, physical plant, facilities for research, and concept of maximum service to the State. His sponsorship of this program has made the Illinois Geological Survey outstanding in its field and has won the support of the mineral industries.

In 1930 the Geological Survey celebrated its 25th anniversary with a program that attracted a large attendance of geologists, and coal and other mineral specialists from many states. The program emphasized not only what had been accomplished in the preceding quarter-century, but what should be done in the future. This meeting inspired the formation of the Illinois Mineral Industries Committee, state-wide in scope and embracing the interests of the mineral industries, scientific organizations, engineering and business interests. Its first chairman was the late Joseph D. Zook, who at that time was president of the Mining Institute. Through his influence the Institute transmitted to State officials a resolution requesting expansion of the research program of the Geological Survey. T. J. Thomas later served in a like capacity as chairman of the Mineral Industries Committee. The enthusiastic interest and aid of W. D. Jenkins and Glenn A. Shafer are also gratefully acknowledged as

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Headquarters of the State Geological Survey are located in the new Natural Resources Building, on the south campus of the University of Illinois, Urbana.

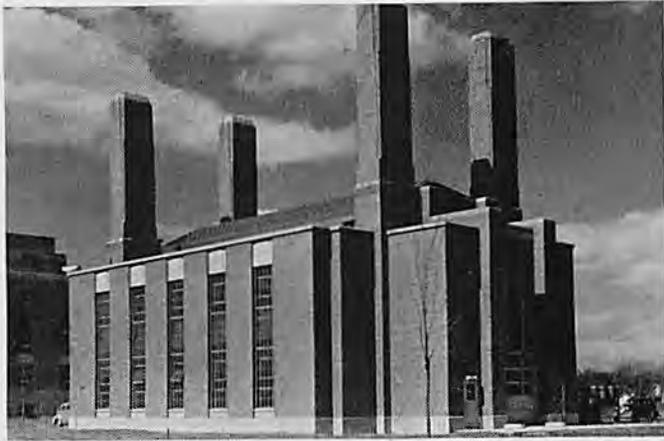
especially outstanding, as well as many other individual members of the Mining Institute. From the deliberations of these men there developed a broad realization of the true importance of the mineral resources of Illinois. As a result, a broad, long-term program of mineral research was planned and inaugurated within a few months. A number of specialists were appointed to the Survey staff, and the new program was given a trial in temporary "pilot plant" quarters provided by the University.

By 1937 the wisdom of carrying on this expanded program of mineral research had become unquestionably established, and appropriations were made by the General Assembly, with Governor Horner's approval, to provide adequate facilities and permanent new quarters for the continuation of the work.

The new Natural Resources Building was completed in the summer of 1940, with spacious offices and service rooms, and ideally designed laboratories that have been equipped with up-to-the-minute apparatus and facilities for an intensive and flexible program of research along many lines—in subsurface studies, in chemical analysis and research, in physics and engineering, in x-ray, spectographic and microscopic investigations, in mineral separation, beneficiation and utilization, and in mineral economies.

A supplementary building, the Geological Survey Research Laboratory, was also constructed in 1940 and 1941, alongside the new University Power Plant. This smaller building was planned to provide quarters for investigations requiring large-size equipment or equipment that needs to

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Geological Survey investigations requiring the use of large-scale equipment, or equipment that produces dust or smoke, are carried on in the new Research Laboratory, near the University Power and Heating Plant.

be isolated for reasons of safety or cleanliness. In this building are carried on the Survey's investigations of coal briquetting, stoker coals, cleaning and preparation, coking and by-product possibilities.

The present program of coal research is planned so as to benefit both producers and consumers of Illinois coal. Problems of utilization, of marketing, of meeting rigid coal specifications, of combustion, storage, smoke elimination, preparation, processing, and even the mining of the coal itself, are all being studied assiduously. Special attention is called to the studies of banded ingredients of Illinois coal—studies that have already effected improvement in the quality and performance of stoker coals marketed by Illinois producers, and that promise to furnish the basis for still more important developments in the future.

From the first, the State Geological Survey has been intimately concerned and identified with the discovery and development of the mineral resources of Illinois. Naturally, coal has received a lion's share of scientific attention. Petroleum is undoubtedly second in importance, followed by a variety of valuable stone deposits, clays and shale, sand and gravel, silica sand, flourspar, lead and zinc ores, tripoli, molding sand, and fuller's earth. All these natural substances are under continual investigation, and the possibilities for their further improvement and usefulness are being demonstrated through research.

Publication of the results of these studies, plus the policy of the Geological Survey to promote and encourage consultations and discussions with men in the industries, has resulted in making directly available to these men the benefits and suggestions that are born in the laboratory. Their reactions and suggestions, in turn, have proved valuable guides in planning and pursuing the researches themselves. The scientist and producer have thus come to recognize common interests and goals and are hence working in unison for the sound development of our resources.

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THE following articles are reprinted from the first publication of the Illinois Mining Institute, issued in 1892. They will give the reader an idea of some of the early struggles and the development since that time.

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(Reprinted from 1893 Journal of the Illinois Mining Institute)

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THE WATER GAUGE

By WALTON RUTLEDGE

Inspector of Mines, Fourth District of Illinois

In addressing this paper to the Institute, the design is more especially to bring out a discussion, and attract the attention of the younger members of the Institute to one of the most useful instruments used in and around our mines, namely: The Water Gauge. As the aim of the Institute is the dissemination of theoretical and practical knowledge among its members, and as I have had some experience with the water gauge as applied at the mines of this State, I propose in this paper to mention some of its uses and effects when applied to fan ventilation, furnace ventilation, and other conditions. It is not necessary to give a detailed description of the gauge, as its construction is known to all of the members of the Institute. The water gauge is simply a pressure gauge. The difference of the height of the water in the two limbs of the gauge shows an amount of power or force. If placed as a medium between two atmospheres of different densities, the gauge will show a pressure by the difference of the height of the water in the two limbs of the gauge.

If the gauge beset on the door of a building, one limb of the gauge being open to the atmosphere, the other to the air inside of the building, the atmosphere outside being of a temperature of some 15 or 20 degrees lower than the temperature inside of the building, the gauge will show a difference of pressure or force. If the doors of the building were opened, the colder air would rush into the building, and when the temperature inside and outside became equal, the gauge would show no pressure. If the gauge be placed on a stopping erected to hermetically seal off a gob or coal fire in a mine, just so long as there is fire behind the stopping, the gauge will show a decided pressure, owing to the different temperatures of the air in front and behind the stopping. When the water becomes level in the two limbs of the gauge, it may be safely said the fire is out. If the gauge is left on the stopping until the gob or coal is perfectly cool, the gauge will show a pressure on the opposite limb of the gauge, owing to the accumulation of carbonic acid gas behind the stopping, the density of carbonic acid gas being about one-half more than that of air. If the gauge is placed on a stopping put in to wall off fire-damp, (light carburetted hydrogen gas), the gauge will show a decided pressure, because light carburetted hydrogen gas has only about one-half the weight of air. In the last two applications of the gauge, it becomes very useful to the mine manager, as it shows him at a glance the condition of those dangerous parts in a mine.

Ventilation in our mines is caused by a difference of pressure, and this may be produced by the natural heat of the mine, a steam jet, a furnace, or a fan. The water or pressure gauge will show this difference of pressure, which is the force being expended on every unit of surface

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of the area of the air courses, to create the velocity and overcome the resistance to the moving currents of air. Where a furnace is used the water gauge is placed in the mine, on what is called the separation doors, which are placed between the intake and return air currents; these doors are generally made double, that is, one is opened and closed, before the other is opened; this is done to keep up a continuity of the air currents. A pipe is placed through both doors, a water gauge is placed on the pipe, and the water gauge shows a decided pressure owing to the different weights of air in the two shafts. If the mine is in a normal condition, the water gauge will show a certain pressure, with a given volume of air passing. If the airways in the mine become contracted, the water gauge will show a higher pressure, and a less quantity of air passing; the less quantity receives more heat in passing over the fire and consequently becomes lighter. Where the same quantity of fuel is used the units of work in each case will be equal; the lesser quantity multiplied into the higher pressure is equal to the larger quantity multiplied into the lower pressure.

Where the heat of the mine, the steam jet, or the furnace is used, the water gauge is applied at the bottom of the shafts and only shows the pressure spent in moving the air from the bottom of the down-cast shaft and around the workings, and back to the bottom of the up-cast shaft, and does not show the pressure spent in overcoming the resistance of the shafts. As ventilating pressures are very light, they are generally measured in square feet, and a difference of one inch in the two limbs of the water gauge will represent a force of 5.2 pounds pressure on each square foot of the air courses to which the gauge is applied. Also, where ventilation is produced by the heat of the mine, a steam jet, or a furnace, the difference of the weight of air in the two shafts is the force or pressure putting the air current in circulation, and the water gauge shows the degree of that pressure.

In case a fan is used for ventilating a mine, the fan, by its peripheral velocity, creates a difference of pressure at its center; by that difference of pressure a current is created; a water gauge placed on the fan casing, or on the fan drift, or at the top of the up-cast shaft, will show by the difference of the height of the water in the two limbs of the gauge, the amount of force or power created by its peripheral velocity. The water gauge, as applied to the fan, shows the pressure used on the ventilation from the top of the down-cast shaft, in and around the workings, and back to where the gauge is applied. The resistance of the air courses of a mine may overcome the pressure or power created by the centrifugal force of the fan, and no current would be created, but still the peripheral velocity of the fan would show a decided water gauge pressure. All centrifugal fans, as used at our mines, have a certain depressing power, that is, a power to produce the water gauge and the power of yield. Large fans, with the construction of their interior parts so arranged as to reduce the rubbing surface to a minimum, are more adapted to the power of yield. It is very misleading to say that the water gauge as applied to fan ventilation has any connection with the friction or drag of the air passing through a mine, as all centrifugal fans running with

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a uniform speed will give a certain depression, or water gauge, regardless of the quantity of air passing or the condition of the mine. The quantity of air passing through the fan is in proportion to the speed of periphery; the depression, or water gauge, is in proportion to the square of the speed, but not in proportion to the square of the quantity of air passing, an expression we often hear around the mines.

The water gauge as shown by a fan, is the force or power created by its peripheral velocity, and the fan that gives the highest water gauge or pressure, with a given velocity and having its interior construction so arranged that the volume of air can pass through it with the least friction, is, on the face of it, the best fan. Most mine managers claim that where they have a large volume of air passing with a low depression or water gauge, the fan producing the ventilation is of the best make. Such may not be true, as quantity depends on the size of the air courses in the mine, the air currents being properly split, and the length of the air courses. A man may be running at a certain speed passing 50,000 cubic feet of air per minute under one inch of water gauge or depression, but the same air courses may be so enlarged, the air currents so split and shortened, that the volume may become 100,000 cubic feet of air per minute, while the fan is running at the same speed and showing the same water gauge; but more steam power would be required to keep the fan up to the same peripheral speed.

In the case of a fan running with a uniform steam pressure, any falls or contraction of the air courses will cause the speed of the fan to increase, owing to a less quantity of air passing; consequently the water gauge will be higher and a less quantity of air passing. If a stopping is broken, or a door in the mine is left open, the air currents will have a shorter run, a larger quantity will be produced, the speed of the fan will be reduced, and also the pressure shown by the water gauge. This is why the mine examiner always looks to the water gauge before going to examine the mine; if he finds an unusually high water gauge, he knows that the air courses have become contracted; an unusually low water gauge shows the ventilation has been cut off in some part of the mine, and he governs himself accordingly. This is one of the cases very often quoted by mining men that the water gauge at the fan is in proportion to the drag or friction of the mine; but in this case it is only nominally true, for in practice it is found that all fans of exactly similar construction placed upon different mines, would, upon the same speed of periphery, produce practically the same water gauge or pressure, and that a water gauge of one inch might produce 75,000 cubic feet of air per minute upon one mine, and upon another twice that volume.

(Reprinted from 1893 Journal of the Illinois Mining Institute)

COAL CLEANING

By THOMAS R. STOCKETT, JR.

Mining Engineer, Consolidated Coal Company

The history of the coal trade has invariably shown that, as the output increases and competition becomes keener, the consumer asks for and demands, a higher grade of coal, and one that is free from slack and impurities of all kinds, and for such, is not unwilling to pay an increased price. This condition of affairs may be observed in any of the more prominent markets, where many dealers, seeing the advantages to be gained by such a step, have taken the matter into their own hands and have adopted a system of hand-picking and forking when unloading from the cars to the bins or wagons. They have thus been enabled to advertise and guarantee to consumers, under some fancy name or trade-mark, a high grade of coal free from impurities, thereby securing a large trade at an increased price. This not only pays for the extra work entailed in the cleaning, but leaves the dealer a handsome profit as a reward for his foresight and ingenuity, and also insures satisfaction among his customers and a greatly increased trade.

The producer, however, must bear the burden of the loss arising from the impurities thus shown to have been contained in his coal, and this often results in an allowance of one, two, or more tons in a car containing from twenty to twenty-five tons. This loss to the producer is not only the cost of producing this refuse, which is equal to that of producing so much coal, but also the cost of the freight on it, this latter expense being equal to, or exceeding, the cost of producing a ton of good coal. Such a condition of affairs has naturally led many operators to endeavor to devise some satisfactory plan which would not only save them such loss, but also enable them to realize increased profits by raising the grade of their coal to the standard reached by the dealers in preparing it for the domestic market.

These experiences naturally give rise to the questions, can not this cleaning be effected at the producing point, and if so, can it be done reasonably, and by what means can it be accomplished on a sufficiently large scale to make it a success from a financial and commercial standpoint? An affirmative answer to the first of these interrogatories being conceded, experiments to determine the answers to the others have been and are constantly being made.

In the older countries these experiments have extended over a number of years, advancing, step by step, from manual labor to some form of mechanical appliance assisting such labor. A review of the gradual advancements made in this line would doubtless be interesting, but omitting the historical sketch, we find that at the present day the more advanced appliances are the oscillating or shaking screen, the turntable or circular revolving picking table, and the traveling-band picking

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table, or a combination of them. These appliances have reached such a state of perfection, and have become such a necessity, that a coal cleaning apparatus in some form is a necessary adjunct to all well equipped mining plants in those countries.

In the anthracite fields of our own country, a somewhat similar advancement may be noted, the principal system now in vogue being the use of revolving screens for the sizing of the various grades and for freeing them from slack or culm, and flat pieces of slate. Falling from the screen, the coal lands on an inclined chute, down which it passes by the force of gravitation, the impurities being picked out on its descent to the storing bins, by boys or men; at many of the collieries a "jig" assists in the work of washing and cleaning the coal. Within a recent date a new screen, called the "gyrating," invented by Eckley B. Coxe, of Pennsylvania, and working somewhat on the principle of a "hand riddle," has come into prominence and bids fair to be a valuable assistant in this process. These systems of cleaning coal in the anthracite fields are very expensive, requiring large structures called "breakers," towering a hundred or more feet vertically, containing many thousands of feet of lumber and much costly machinery, and an army of employes to operate the same.

That history is repeating itself, and that the march of improvement is Westward, may be verified in our own State. Many of us remember when no effort was made to clean the coal. The markets were such that anything black was salable as coal, and the only attempt at screening was over bars with a small mesh and having a very steep inclination; these in time gave way to screens of wider mesh and flatter pitch, only to be followed by the diamond bar screens, which were considered the "acme of perfection." As competition became greater, even this contrivance did not give satisfaction, and the dealer, to protect himself, resorted to the hand picking and forking before referred to, forcing the producer to face the question squarely.

Many and curious were the schemes and plans suggested. The first actual experiment on a commercial scale that the writer is aware of, was made at the Gillespie mine in this State, and the results obtained were more satisfactory than anticipated. The question here was: How to free a high grade, tender coal of impurities and a large percentage of slack? Taking advantage of the experiments of others in this direction, a combination of the shaking screen and traveling picking table was finally decided upon. To accommodate this new order of things, it was found necessary to raise the tower, tipple and trestles vertically some two feet, and this was accomplished without a cessation of operations. Figures 1 and 2 show a section and plan of this plant which will aid in understanding a description of it.

The coal, on being hoisted from the shaft, is run on to an ordinary "kick-up" dump and dumped into a hopper, from which it passes through a self-regulating door on to a shaking screen, hung at an angle and having an oscillating, or forward and backward motion imparted to it by connecting rods from eccentrics on a main shafting. The bottom, or floor, of this screen, at the upper end, is laid with two feet of flat

steel plates, and the remaining twelve feet, with one-quarter inch steel plates perforated with one and one-quarter inch round holes about three-fourths of an inch apart each way, leaving a margin of two inches on the sides for fastening to the frames. The shaking of the screen imparts a forward motion to the coal and its being hung on an angle, gravitation prevents a backward movement of the coal on the back stroke; thus the coal is constantly on a slow forward sliding motion, and in passing along all slack and fine coal up to pea size is thoroughly separated from the larger sizes.

At the end of the screen the coal passes on to a traveling band or table, moving horizontally and traveling very slowly. On either side of this table, at proper intervals, are stationed boys, watched by a boss or foreman, whose duty it is to pick out all the impurities mixed with the coal as it passes by them, and any pieces of coal with streaks of sulphur, slate or foreign matter adhering to them, are taken off and placed on a conveniently arranged table, where, as time affords, the refuse is removed with a hand pick and the coal returned to the traveling table to pass on with the clean coal. The refuse matter thus obtained is thrown into troughs or shutes leading to a hopper, whence it is transferred to the spoils bank.

At the end of the table the coal passes by an easy descent on to a short screen called a "lip screen" and over this and an apron to the railroad car. The lip screen is the ordinary bar screen of a wide mesh and four feet long, its purpose being to take out all coal smaller than lump and also any slack that may have been made by the pickers in cleaning the coal. By the side of this, some four feet distant, with a passage way between, is another screen and table of similar construction and doing the same work, the oscillating screen, however, moving backward as the other moves forward; this is done to equalize the thrust of the eccentrics and to minimize the jarring of the building and machinery. The slack and small coal falling through the screens is conducted by a shute to a drag chain, whence it is conveyed to the elevators and lifted to a roller screen where it is cleaned and sized. The screenings from the lip screen are conducted direct to the elevators.

The shaking screens are constructed somewhat on the principle of a Pratt truss, and bolted by cross rods very firmly together. They are suspended from the stringers above by iron hangers of increasing length to suit the inclination or angle required, the motion being imparted by eccentrics, as before mentioned, and any tendency to a side movement being prevented by guides set at any convenient point along the screen.

The picking tables are constructed of two lengths of endless roller chain, passing over sprocket wheels three feet in diameter. On this chain are bolted strips of hard wood three inches thick, nine inches wide and four and a half feet long, set closely together. On top of the wood is bolted one-quarter inch iron of the same width and length, but overlapped some three inches, so that the openings may not be over each other, thus preventing the dust or fine particles of coal from getting down to the rollers and clogging or retarding their movement. This overlapping necessitates a bevelling of the upper back edge of the wood strips to admit their passing around the sprockets. The weight of the

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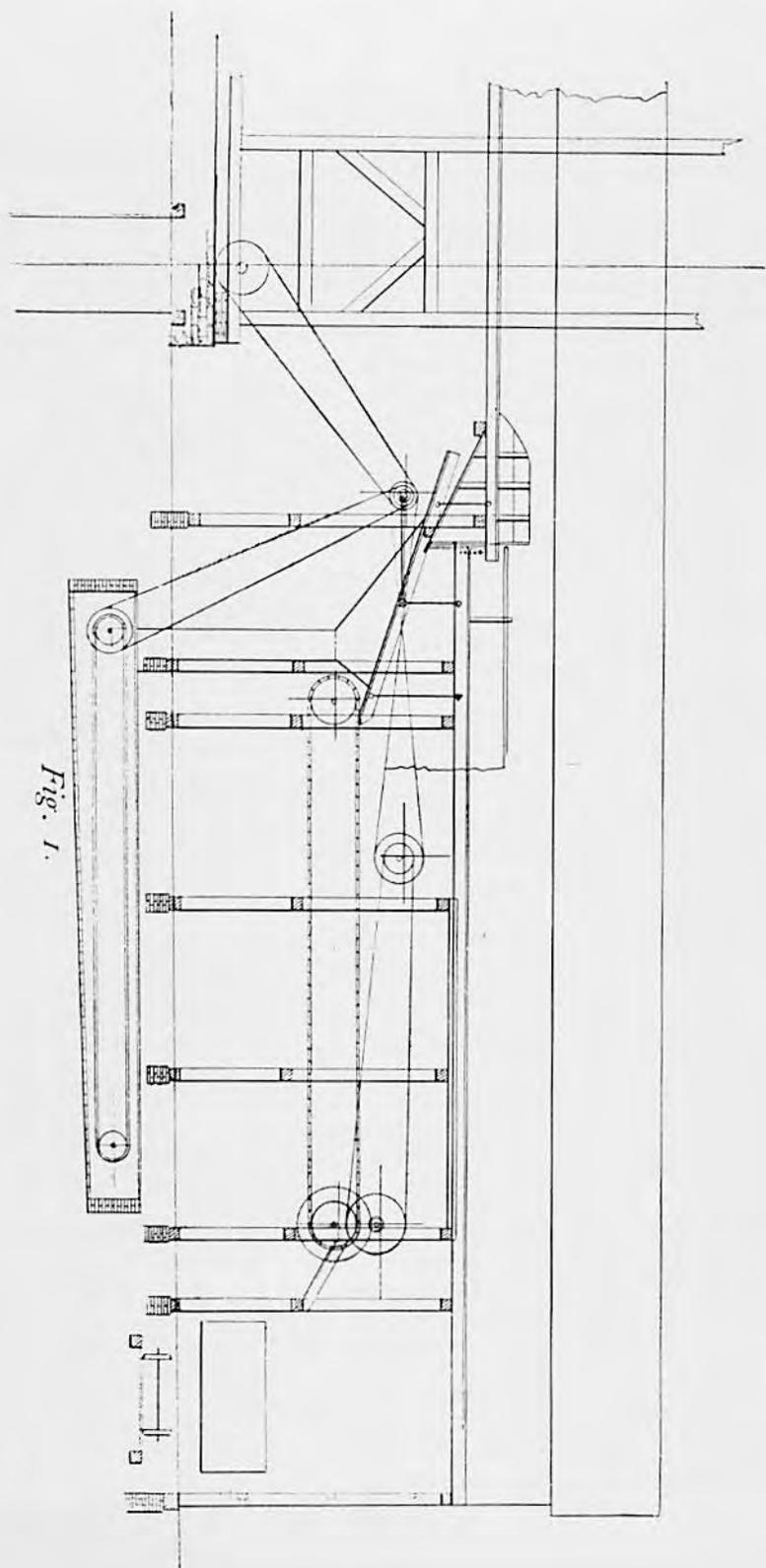


Fig. 1.

table rests on the little rollers in the chain, these rollers being two inches in diameter, with a two-inch face, and revolving on a five-eighth inch steel thimble through which a pin passes. These rollers are set every nine inches and move on a narrow flat strip of iron, resting on a wooden platform the width of the tables, the returning or under portion of the tables sliding on hard-wood slides. "Take-up" or tightening boxes are placed on the journal boxes at the rear, for the taking up of the wear in the chains and keeping the tables smooth and even.

The sides of the tables are pieces of wood six inches high, faced with thin sheet iron and set so as to allow the table to pass along without touching it, thus preventing any coal from falling off the tables. The small cleaning tables for the pickers, of which there are several on each side, are set on a level with the top of these side pieces, intervals, or openings, being left for the pickers, where, by standing on the platform or gangway, they can reach almost across the table.

The self-regulating door on the hopper is so constructed and balanced with a set of levels and weights that it allows the coal to pass on to the screen slowly, distributing it evenly and uniformly, thus insuring the screening of every particle. Upon this one feature of the plant to a large degree depends the success of the whole. The same result may be obtained by a sliding door with a long lever, if operated by a careful man, but the self-regulating door is preferable.

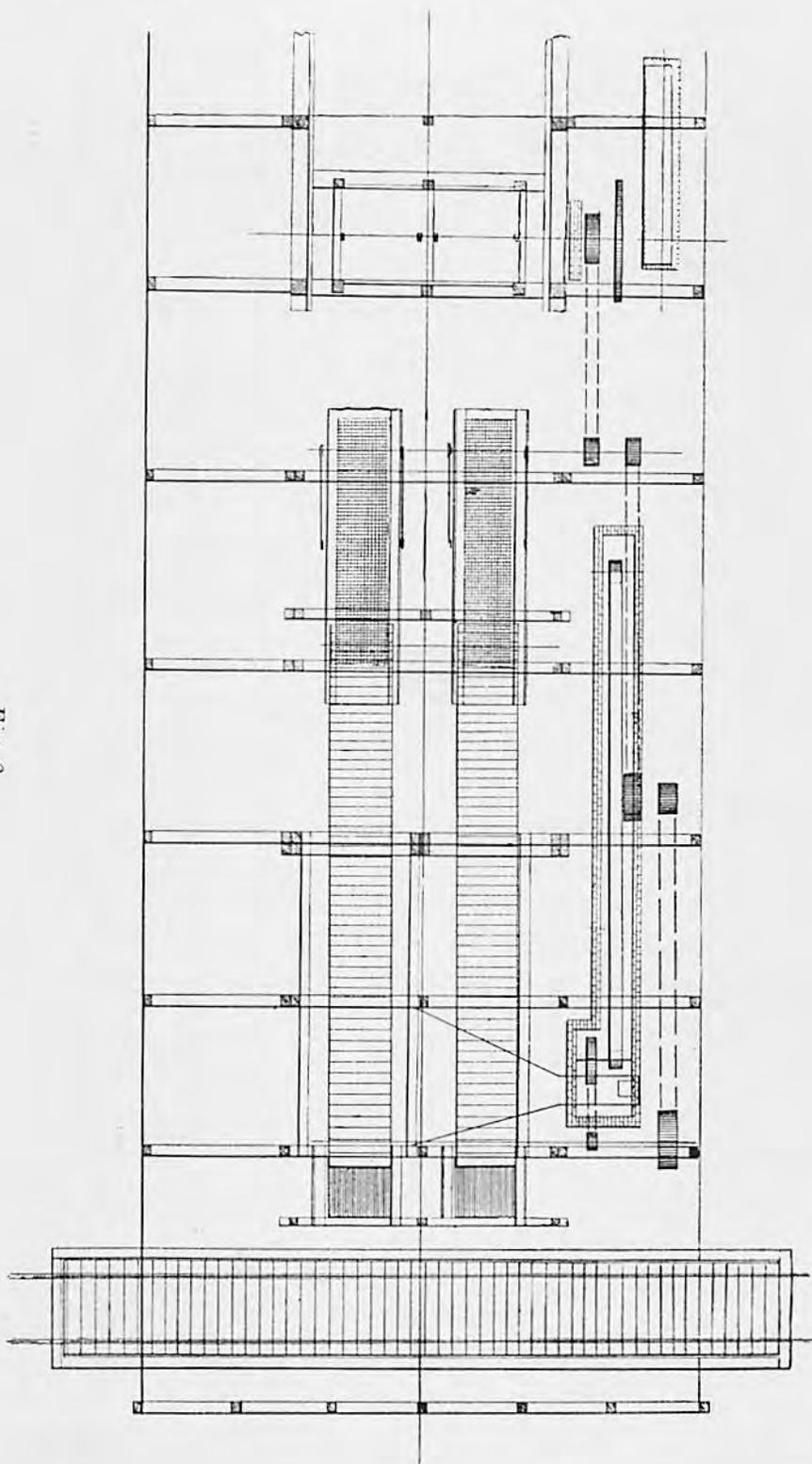
All of this machinery, including the drag chain for the removal of screenings, is run by a 12 x 24 inch single engine, with a 7-foot fly wheel, running at 60 revolutions and developing about 19-horse power. An ingenious contrivance is attached to the governor of the engine with a bell-cord or wire running to several points of the plant, so that in case of an accident or other cause, the machinery may be brought to a standstill in a moment. Records kept of the amount of refuse picked on the tables show it to run from 800 to 2,000 pounds to the railroad ear, not taking into consideration the amount of slack now taken out in excess of that under the old system.

This plant has now been in operation somewhat over two years, and the owners have no cause to regret the innovation. It has resulted in a much larger daily output, an increase in the working days, and an increase in the selling price of the coal, and by no means the least, if lastly, in greater satisfaction among the dealers and consumers. During this period the repairs have been practically nothing, an occasional wearing out of a small gear wheel being the principal item.

Since the installation of the Gillespie plant, several others have been put up, differing somewhat from that one. Where the coal was of a harder nature and naturally cleaner, it was thought that a less elaborate plant would give the desired results, and an oscillating screen and picking table combined was determined upon.

This is nothing more than a long shaking screen, the upper portion of which is covered with perforated steel plates for the screening of the slack and smaller grades of coal, the lower portion being covered with flat sheets over which the large coal, as it passes, is picked of all impurities by boys stationed along the screen, as in the other case they are stationed beside the traveling table. These screens may be con-

Fig. 2



structed of almost any length, the conditions to which they are to be applied governing in that respect; the amount of coal to be passed over the screen, the percentage of impurities contained, and the arrangements for the handling of the small coal and screenings being the determining factors.

Figures 3 and 4 show a section and plan of a plant constructed on this idea, adaptable to a mine of large output, loading both flat and box or stock cars, and where the smaller sizes of coal are also passed over shaking screens and fall directly into the railroad car.

Here three shaking screens are hung side by side, sufficient space being left between each for the platform on which the pickers are stationed. The outer screens are hung on the same inclination and are used for the loading of flat cars, the coal being dumped on each alternately, thus securing ample time for the cleaning; by this arrangement, but one movement of the car is necessary to complete its loading. The center screen is used for the loading of stock cars by the "Ramsay Loader." It is hung on a steeper inclination, for the reason that the entire output, when loading this class of cars, must be passed over one screen, and also to insure the even distribution of the coal in the cars, the "loader" receiving its coal at a speed sufficient to carry it beyond the point of the nose.

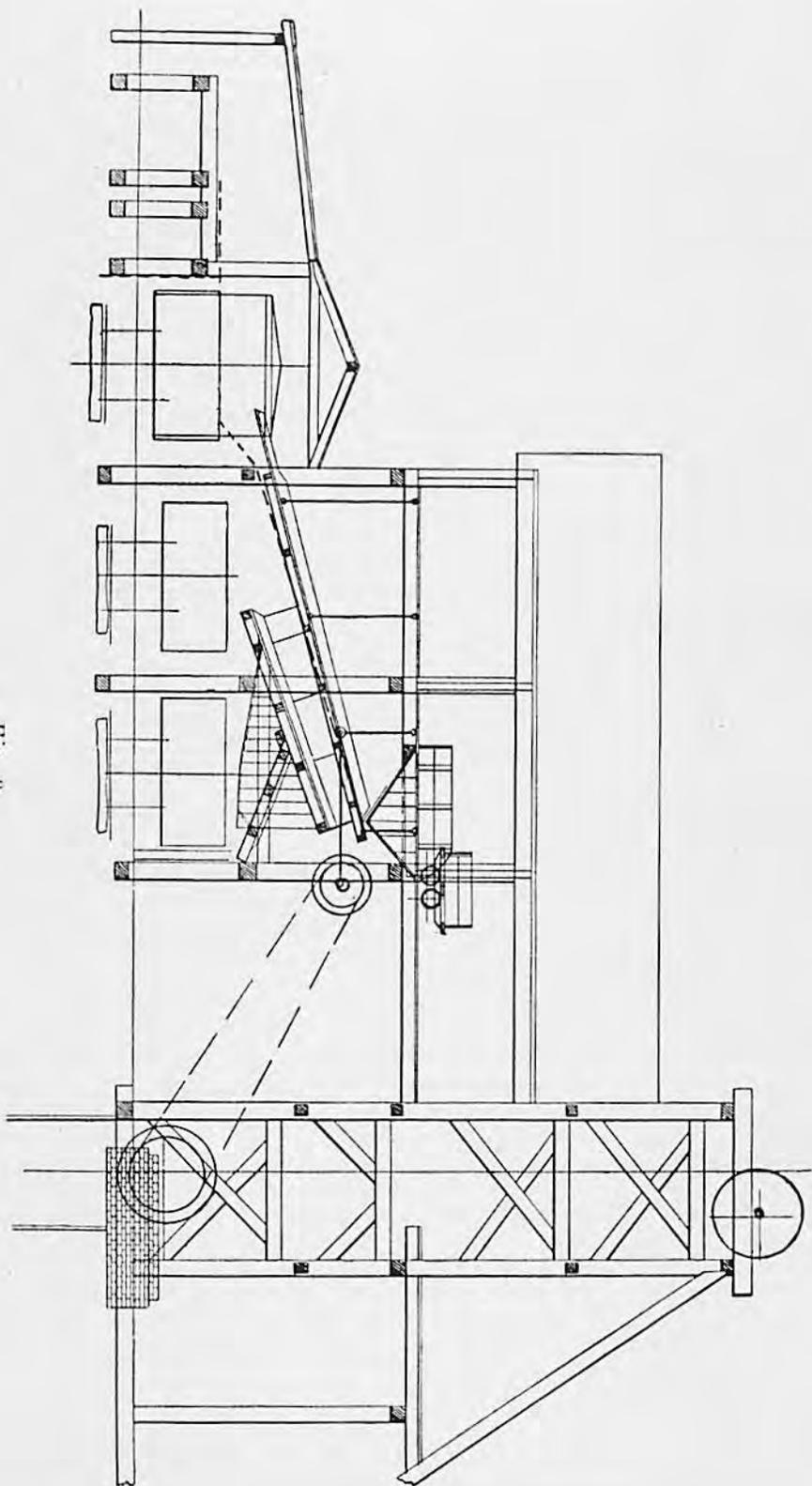
The coal, on being raised from the mine, is dumped into hoppers from which it passes on to the screens, and in its journey to the railroad car all slack and small coal is sifted out on the upper portion and on the lower portion an opportunity is given to pick the refuse matter, the boys being stationed along side on conveniently arranged platforms. The shaking screens are similar in construction to those previously described, being of the same width, but nearly twice as long, the perforated sheets being twelve feet long and containing two-inch round holes, the balance being flat sheets, the motion being imparted to them by eccentrics so staggered on the main shaft that no two of the screens have a similar position.

Directly under the upper or perforated portion of the main screen, is suspended another screen at a steeper inclination and having the same motion as the main screen. This screen is covered with a perforated plate with one and one-quarter inch round holes. The screenings from the main screen fall on to this and that which passes over it is called nut coal, and, falling directly into the car, is ready for shipment. Under this another screen is suspended, covered with a perforated plate with three-fourths inch round holes; this receives the screenings from the nut screen, and that which passes over it is pea coal, which falls into a chute and is conveyed to a storage bin. The final screenings, or the slack, falls directly into the railroad cars, if intended for shipment, or into large boxes if to be wasted on the spoils bank.

This mode of screening the smaller sizes of coal is superior to that of the roller or revolving screen, inasmuch as the churning or grinding process which takes place in the latter is eliminated. The coal retains its sharp corners and edges, which not only adds greatly to its appearance but results in a lower percentage of slack. In addition to these ad-

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Fig. 3



vantages, an opportunity is afforded to station pickers on the cars for the picking of any impurities, should such exist. This entire plant is operated by an 8 x 16 inch single engine with a 7-foot fly wheel, running at 60 revolutions per minute and developing nearly 10 horse power.

Figures 5 and 6 show a section and plan of still another plant differing somewhat from either of the above. At this plant, but one oscillating screen and picking table combined, twenty feet long, is used, as the output does not exceed 400 tons daily. This screen is constructed on the same principle as those previously described, and is operated in like manner. The screenings pass to an elevator and are carried to a roller screen which had previously been in use at this mine. At the lower end of the eight feet of two-inch perforations, is a movable sheet three feet in length, perforated with three-inch round holes, which at certain seasons of the year is used for the making of egg coal. When not in use, it is replaced by a flat sheet of similar length, increasing the picking surface.

It cannot be said that any one plan or system of cleaning coal is suitable for all conditions, for the methods or appliances used at one mine may not be adapted as a whole to another, it being seldom that the same conditions exist at any two mines. The nature of the coal, the percentage of impurities, slack or dirt contained or made, the markets in which the coal is to be sold, and the requirements of the consumer, are all important points to be taken into consideration when the question of a design of a coal cleaner is raised.

For the successful cleaning of a coal containing much refuse and slack, the writer would recommend the oscillating screen and traveling picking table—the former insuring the removal of all slack and fine coal and the latter giving ample opportunity for the picking of all foreign matter, the perfection to which it may be cleaned being a matter of the number of pickers employed. Where the characteristics of the coal are such that it does not contain a large amount of refuse, or the conditions of the markets are not so exacting, the oscillating screen and picking table combined will be found to give excellent results and has the advantage of a much less first cost.

Two points are essential for efficient cleaning, and cannot be too strongly dwelt upon. First, evenness and regularity in passing the coal from the hopper to the screen, which insures every separate piece touching the screen proper and passing on to the table in such shape that any refuse matter may readily be detected; and second, good light, and an abundance of it, which can be secured by the construction of large windows on the sides of, and skylights directly over the tables or screens.

For the screens, plates perforated with round holes are preferred to wire meshing or straight bars, as they present a smoother surface and do not require as steep an inclination to pass the coal, nor can any thin flat pieces of slate pass through the round holes.

The inclination of the screens, the throw of the eccentrics and the number of strokes per minute, the length and speed of the picking tables are all dependent upon the conditions to which it is to be applied, whether the output to be handled be large or small, the coal wet or dry, or containing much or little refuse.

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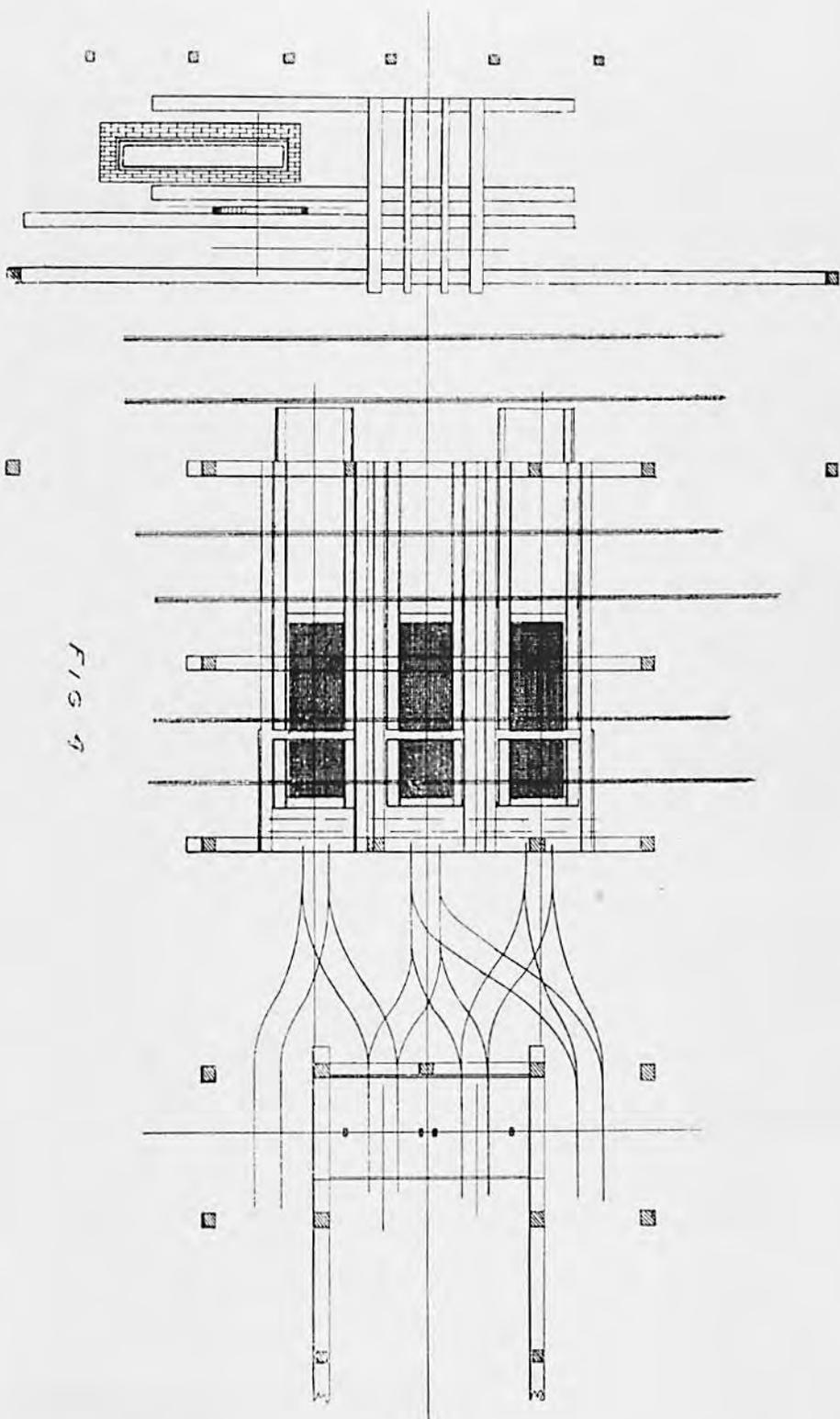


FIG 7

In regard to the labor cost due to the operation of these screens, there are two items of expense to be considered:

1. Cost of its operation in excess of a fixed screen.
2. Cost of men employed to pick impurities in excess of a fixed screen.

The first of these is compulsory and is due to the mechanical operation of the screen, while the second is optional, and may be increased or decreased at will, or it may be eliminated entirely; in other words, this item is governed by the quality or cleanliness of the coal desired.

The discussion of this paper being in order the President submitted the subject to the Institute.

Mr. Ramsey said he had seen these screens work and found them very satisfactory, but would like to ask whether this apparatus had ever been tried with wet coal.

Mr. Stockett replied that he had no personal experience with wet coal, but thought there would be difficulty experienced, provided the screens were set at a steeper inclination and the speed increased somewhat.

Mr. Hebenstreit said his company had used these shakers for some time, and that they worked successfully. For picking the impurities out he had from four to six boys on each shaker and with the speed the shakers run it gives them an opportunity to pick out all sulphur, slate and fireclay, and put the coal in a condition at least fifty per cent better than formerly. Of course, it takes the slack out at the same time. For the lump coal they had a perforated screen twelve feet long and four feet and four inches wide, with a two-inch hole. Then there was a screen attached underneath for the next grade of coal, which is nut, with an inch-and-a-half hole, and then still another screen was connected underneath, with holes an inch and a quarter in diameter, and thus each grade of coal was thoroughly separated and sifted. The nut coal is much cleaner and is in better shape, as this method does not knock off the corners as much as a revolving screen. There is very little extra cost connected with it. As to the screening of wet coal by this process he could not speak from experience, as their mines were dry, but he believed the difficulties arising from that source could be overcome by giving the screens a greater pitch and increasing the speed.

Mr. Ramsay said he made the inquiry in regard to wet coal because he had understood that screens of this kind had been put in where the coal was wet and subsequently had to be removed. He thought the screen mentioned would give satisfactory results in ordinary conditions, and was certain it would not break up the coal as much as the revolving screens.

Mr. Rutledge believed the case referred to by Mr. Ramsay was that of another screen than the one under discussion. It is true that where the coal is wet and the meshes small, these shakers will clog up somewhat,

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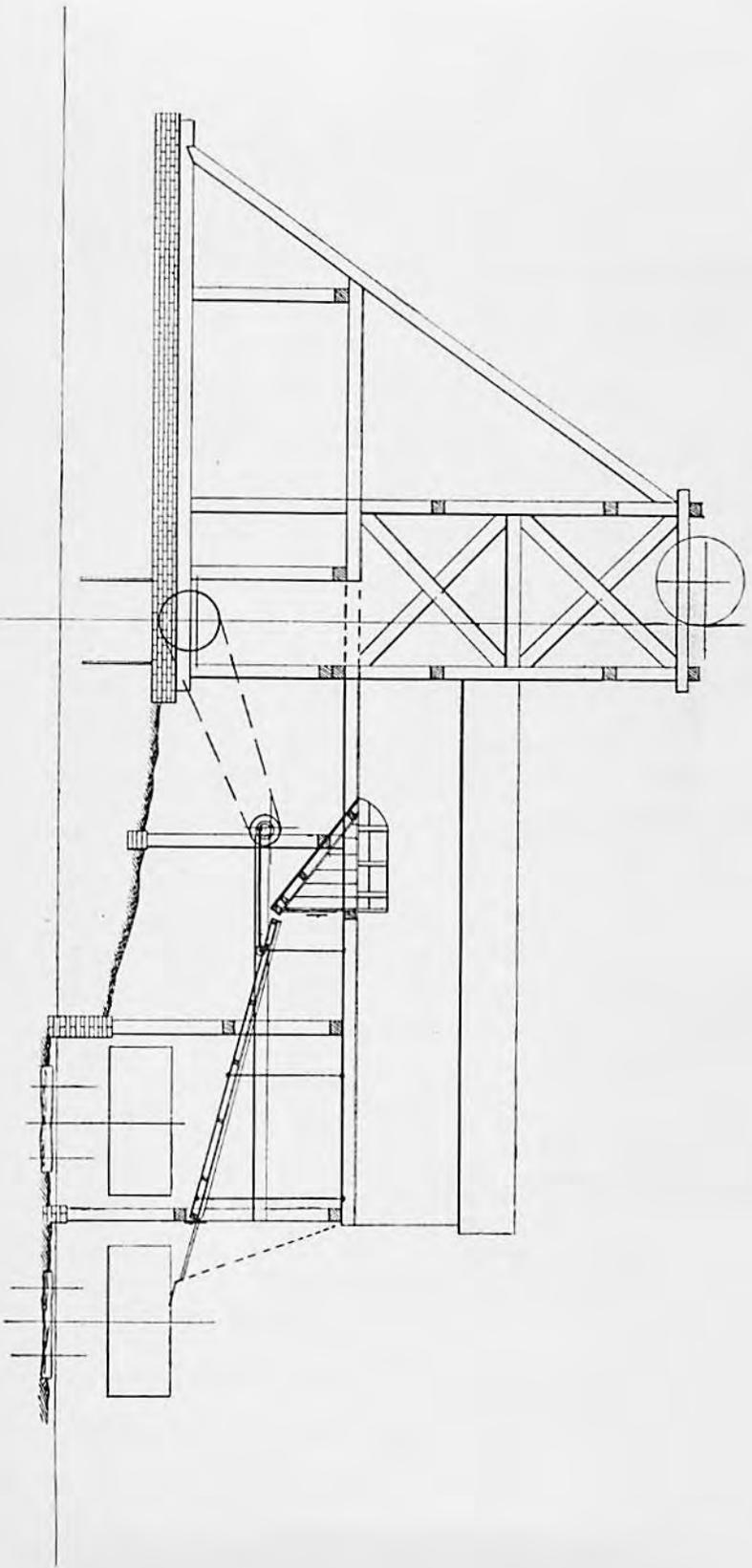


Fig. 5

thus affecting the quality of the nut coal. As it is claimed that it makes better grades of nut and pea coal, his question would be: Does it sell for enough more to pay for the expense of building and running the screen? Though this might be considered rather a delicate question and might not be answered in specific terms, he hoped it might be in a general way. He knew the plan was of great assistance in picking out the impurities, and if it makes grades of coal that pay for the making it ought to be adopted.

Mr. Hebenstreit replied to this that there was no extra cost connected with the grades of nut and pea coal, as no extra men were required on these grades. The main improvement was in the character of the lump coal, which should sustain the greater part of the cost of the improved apparatus, though some of it might properly be distributed to the other grades. As to the result, he found that now they got rid of the nut as fast as it was made, whereas formerly a good many cars would at times accumulate on their tracks. The product had also brought a little better price under the new method of screening.

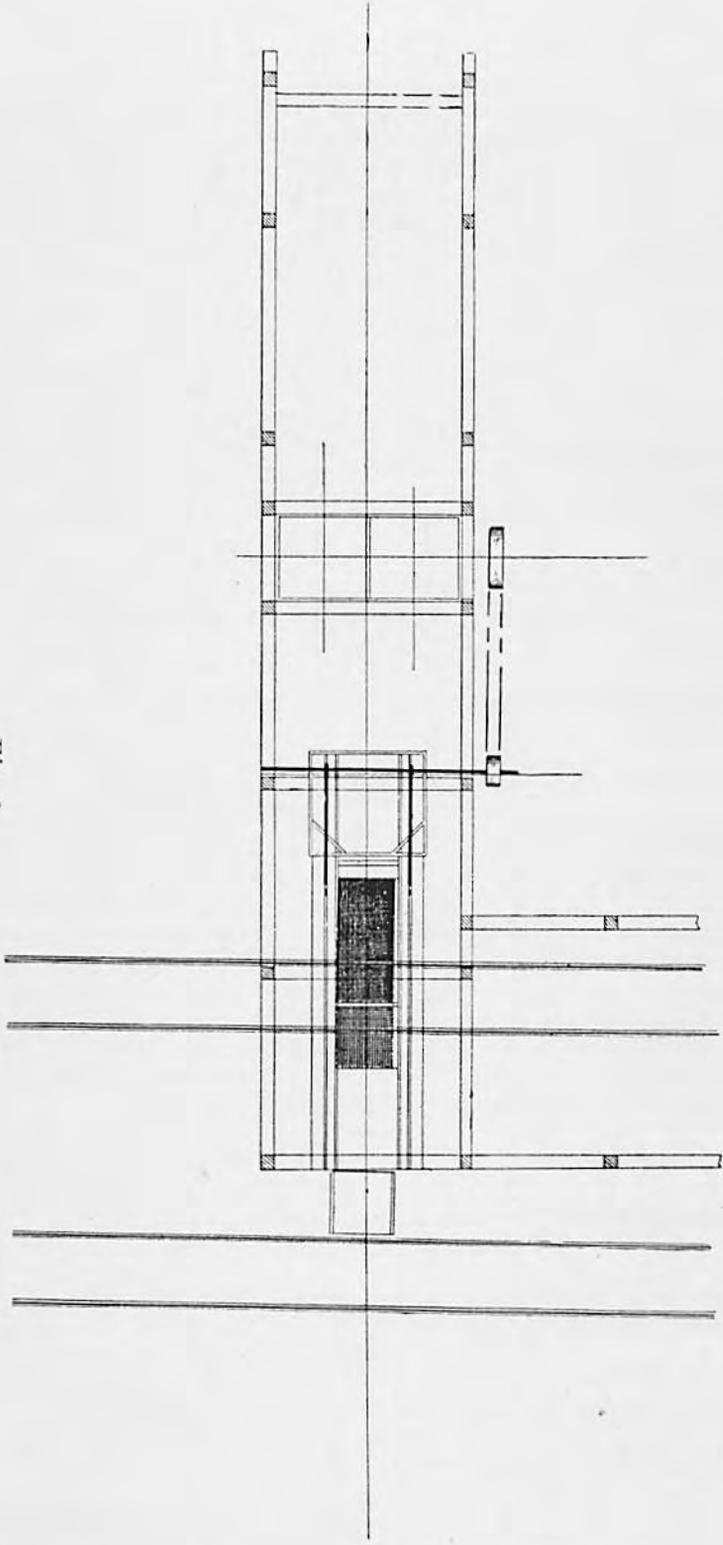
Mr. Rollo said, he happened to be connected with one of the mines in which the shaking screen was first introduced. He had found it much better than the straight bar and stationary screen. It seemed also to shake the wet coal just as well as the dry. Of course, if he were running all day on wet coal the shaking screens might clog up, but as the coal is let down on the shaker gradually and is then shaken down, it lands on a platform, where it is equally distributed and kept in such continual motion that clogging is nearly impossible. There is a space between the tables of probably four feet in which the boys stand and pick everything out. If the impurities were not picked out, and any complaints came back, it was easy to locate the difficulty. The screen is sure to do its duty, but sometimes the boys do not. Before the shakers were put in there were letters of complaint every day, but since then the quality of the coal has very much improved, and they now felt that when a car went to market it had neither slate nor sulphur nor slack mixed with it. The coal they are mining is very soft, but of a very fine quality, and required delicate treatment. He cordially invited all those who were interested in the matter to visit the place and make a thorough examination of the plant.

In reply to inquiries, Mr. Rollo further said that they regularly made the three grades—lump, nut and pea—but at one of their mines occasionally made a size called egg or stove coal.

Mr. Sperry said he had understood Mr. Stockett to say that in a large mine he would recommend a table, and in a smaller one he would dispense with that and use a shaker. He wished to inquire where he would draw the line.

Mr. Stockett replied that that was hardly the form of his statement. He had said that for the successful cleaning of a coal containing much *Mentioning this publication when writing Advertisers puts friendship into business.*

Fig. 6



refuse and slack he would recommend the oscillating screen and traveling picking table, the former insuring the removal of all slack and fine coal, and the latter giving ample opportunity for the picking out of all foreign matter, the perfection to which it may be cleaned being a matter of the number of pickers employed. For a coal naturally cleaner the simpler device would be enough.

Mr. Peters thought that in the handling of wet coal it was still uncertain whether this plan is altogether a success or not. At the mines with which he was connected about one-third of the coal was wet. Recently they had spent a good deal of money for screens, but on account of the wet coal the experiments had proved a failure, and they had now gone back to the stationary wire screen for making nut coal. The coal that goes through that is elevated to the revolving screen and washed. By washing the coal a very good quality of pea coal was made.

Mr. Cooper said that in regard to wet coal he believed the eccentric screen was hardly the thing. At one place within his knowledge, there was some trouble, and a contrivance was attached that struck the screen a blow and that overcame the difficulty.

Mr. Peters.—That would be an indication that the Harrison machine is the best for wet coal.

Mr. Sperry.—At some mines they use a percussion table, and it is allowed to hit a large block on the back movement.

Mr. Kirby said he formerly had some experience with the shaking screens in the Indian Territory. There, about one-half of the coal was wet, and the great trouble with the screen was that all of the coal was delivered right in one place. He asked if that could be remedied in any way.

Mr. Rutledge replied that it could easily be obviated by the feeder which spreads the coal uniformly over the screen. The dumping of the coal all at one place would generally clog any screen.

The President said that as he understood Mr. Stockett's paper it recommends primarily the shaking screen for the purpose of enabling the slack to be more thoroughly taken out of the lump coal, and also at the same time to allow for the picking out of the impurities contained therein. The difficulty generally experienced is that where the coal passes over the screen so rapidly, time is not afforded to get the slack out. In this case the coal strikes two feet of solid plate first. Right after that it passes to a perforated plate and the shaking screen has an oscillating motion and all the fine coal is sifted out, the lump coal passing on. Along side the moving table boys or men are stationed to pick out the impurities, and the coal passes on into the railroad car. All of this apparatus is suspended on one hanger, and the whole thing moves at the same time,

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the lower screens having the same motion as the upper ones. The screenings fall to a lower screen with holes of smaller size, and the coal that passes over that is nut coal, which passes right on down to the railroad car. These screenings in turn fall on to another screen and so on. There is also another place for carrying off the slack into a railroad car.

Mr. Murray thought this discussion had brought out the fact that the shaking screen is the proper apparatus for screening coal. If he understood Mr. Stockett right, the traveling table is considered important in connection with this screen, and the question as to how important depends upon the condition of the coal. It would facilitate the discussion, as to where to draw the line in this regard, if some information could be given as to the relative cost and economy of the operation of the two methods.

Mr. Stockett.—That would depend upon the market in which the coal is to be sold.

Mr. Murray.—Have you any figures to show us the first cost of the two systems?

Mr. Stockett.—That depends greatly upon the mine in which the plant is to be put. In some cases it may be large for either system, while in others it may be small for either.

Mr. Murray.—The cost per ton in handling it would be just about the same?

Mr. Stockett.—That also depends upon the conditions.

Mr. Murray.—The whole thing to be decided upon is the first cost and efficiency and this, it appears, the operator has got to decide for himself.

Mr. Rutledge asked about the cost of cleaning the coal as between the new and the old systems.

Mr. Stockett replied that the cost of the mechanical operation of the oscillating screen would seldom exceed one-half cent per ton. The principal item of the cost of thoroughly removing the slack and impurities will depend upon the increased percentage of fine coal, and this, of course will largely depend upon the thoroughness with which such operation was previously conducted; and this varies so much that he had thought it unnecessary to quote figures of cost on this item. The increased selling price obtainable depends upon the distance of the mine from the market. Where the distance from the market is great, and freight rates high, the dealer or consumer can afford to pay a larger price per ton than where the mine is nearer the market and freight rates are lower. Of course an apparatus of this kind would cost more than the old fashioned stationary screen.

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(Reprinted from 1893 Journal of the Illinois Mining Institute)

MINE INSPECTION IN ILLINOIS

By THOMAS HUDSON

State Inspector of Mines, Second District

The inspection of coal mines in Illinois by State Inspectors is of comparatively recent origin. In 1883, the Thirty-third General Assembly passed, and placed on the statute book, several amendments to the general mining law, one of which provided for the appointment of State Inspectors of coal mines.

This action of the legislature may be attributed to two prime causes, first, the spirit of imitation which seems to pervade all classes of mankind. Government inspection of mines had become a necessity and had been in force for many years in England and on the continent of Europe. Pennsylvania had adopted it in 1870, and Illinois being the second State in the Union in point of tonnage and number of mining employes, was beginning to feel this inherent force of imitation. Many of the miners and several of the more advanced coal operators were in favor of mine inspection, when the flooding of the Diamond Mine in Will county occurred. This catastrophe, by which sixty-nine miners lost their lives, took place in February, 1883, and may be recorded as the second prime cause of the passage of the Mining Act of July in the same year. In September, 1883, the examination of candidates for appointment as State Inspectors of Mines was held. Out of a class of thirty-eight, seven passed the examination successfully, and five of these were commissioned and entered on their duties in the latter part of October.

The feelings of the newly appointed inspectors, on assuming the duties of their office, were considerably mixed. They felt elated at being successful in an examination in which so many had failed, but the exacting nature of the duties imposed on them, and the fear lest they might prove unequal to the task, acted in the nature of a counter-balance, and kept them fully aware of the fact that it was no "primrose path of dalliance" they had to tread. They knew they were placed between the "upper and nether millstones" of contending interests; they had to enforce and execute a law provided for the special purpose of preserving the health and lives of those who labor underground.

To do this it was absolutely necessary that many improvements and additions be made to the various mining plants in the State, and the cost of these improvements must necessarily be borne by the coal operator. To have the law complied with, in regard to those improvements and safety appliances, without appealing to the courts of justice, without the operator charging him with being too exacting, without the miner feeling that he was lax in his duty and not exacting enough, was found to be a most difficult and delicate task.

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The most important and essential, as well as the most costly change found necessary, was the sinking and equipping of escapement shafts, to give the miner a safe and speedy means of exit from the mine in case of damage or destruction to the main shaft or opening. The next in cost and importance was the proper ventilation of the mines, and in a large number of cases important changes had to be made to bring the sanitary conditions up to the standard required by law. To accomplish this, the erection of a large number of ventilating fans and the enlargement of many of the airways was necessary. The fan, as a ventilating motor, was far from being as common nine years ago as it is to-day; and an air-crossing or overcast was an object of curiosity.

In 1884, only eighty-five ventilating fans were in operation at the coal mines of Illinois, to-day there are not less than two hundred and fifty-six in operation. In regard to escapement shafts, or second openings, in 1884 there were two hundred mines at which those very necessary safeguards had not been completed. To-day, it is safe to assume that there are not three per cent of that number of mines in operation contrary to the law governing escapement shafts.

That the State inspection of coal mines in Illinois has not been as successful as its most enthusiastic supporters could wish, is certainly true; that it has been more potent for good, and of more actual benefit to both miner and operator than its most active detractors are willing to admit is equally certain. Much has been done to improve the sanitary condition of mines, but infinitely more has been accomplished in the way of improving and stimulating the mental character of the miner.

In advancing this point it is assumed, and we think fairly, that the Mine Managers' Examination law of 1891 is the natural result of the mine inspectors' examination law of 1883; the second is the logical sequence of the first. That point being admitted, who can correctly estimate the advantages likely to be derived therefrom?

It is true the benefits of education have never been at a discount; the natural law which seems to govern the connection between a sound education and the opportunities it presents, like the law of gravitation, is never suspended; but a barrier seemed to arise between the exertion put forth to obtain that education, and the compensation which the effort and accomplishment ought to command; that is, the coal miners of the past, might, through industry and perseverance, fit himself for a higher and more remunerative position, but he had no assurance that his hopes in that direction would ever be realized.

It is a positive cause for congratulation, therefore, to know that the mine managers' examination law of 1891 most effectively demolished that barrier, and every intelligent coal miner in Illinois to-day, knows that greater possibilities have been opened up to him through this recent mining legislation. Provided he possesses those other natural and acquired qualifications that go to make up the successful mine manager, he can now see his way clear through from the coal face to the cushioned chair of the mine superintendent; he may be laboring at the former to-day, and a few years hence, by industry and diligence, be seated comfortably and officially in the latter.

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The possibility of this change being consummated certainly justifies an honest, earnest effort; the time is propitious, the schoolmaster is abroad in the land; mining schools are organized in nearly all of the principal mining towns of the State; the most advanced mining journal in the country is conducting a series of mining classes by correspondence; and should the Illinois coal miner avail himself of the opportunities offered, his mental, moral and social advancement is certain. That brief and pithy sentence, written by England's eminent philosopher 300 years ago, was never more true than it is to-day: "Knowledge is power."

Changes in the mining law will, from time to time, be necessary. As it stands to-day it is far from perfect; in two of the inspection districts there are over 260 mines, in fact the average number of mines to each district is 184, and it is an absolute impossibility for a mine inspector to give proper attention to such a large number. Many of these mines are small and unimportant, mere holes in a hill-side, in which are employed from one to three miners, from three to five months each year; yet these drift mines, located, as they generally are, in some remote ravine, ten or twelve miles from the nearest railroad station, in which one individual often represent the owner, mine manager, and complete mining force, are, in a legal sense, coal mines, and equally subject to State inspection with the largest, and best equipped collieries in the State. These small drift mines are not subject to the inspection laws in other States and it probably would be better if they were excluded from the operation of the mining laws of Illinois.

Every necessary safe-guard should be thrown around the miner to protect him in his dangerous occupation, but care should be taken that costly and unnecessary restrictions be avoided. The greatest possible amount of safety at the least possible expense should be the motto of the law maker.

This is a competitive age, and our legislators cannot impose uncalled for restraints upon the producers of one of the staple products of Illinois without working serious damage to the very industries they are supposed and expected to encourage and protect.



(Reprinted from 1893 Journal of the Illinois Mining Institute)

ENDLESS ROPE HAULAGE

By WALTON RUTLEDGE

State Inspector of Mines, Fourth District

As it is doubtless one of the main objects of our Illinois mine owners at the present time to secure a cheaper mode of underground haulage, one that will be perfectly safe for the passage to and fro of the employes in the mine, and at the same time permit the trains of coal cars to be run at a speed not to interfere with the air currents; I propose in this paper to discuss the endless rope system of haulage lately introduced into this State.

It has been acknowledged by most of the mining engineers throughout the United States and Europe, that the endless rope system is a practical success under all conditions. Even our great cities are using the endless rope to move its enormous mass of people, and its reliability, simplicity and durability on the surface are demonstrated. This system can be applied with equal success underground. It can be used on either single or double track, and the rope can be taken into all the hauling roads in the mine. As the speed of the trains is slow (not over 300 feet per minute), the same size of track-iron can be used as for mule haulage, and owing to the slow speed, the employes in the mine can at all times get out of the way of the passing trains. By this same slowness of speed the ventilating currents are not interrupted. Most mining men know that with a high-speed system of haulage a slight vacuum is formed behind the trains, which at times reverses the air currents, and in mines giving off fire-damp is liable to draw the gas out of old and abandoned works.

The endless rope system of haulage is in use in this State at the Pana collieries Nos. 1 and 2, at the Capital colliery No. 2, Springfield, and at the mine of the Lincoln Coal Co., Lincoln; also in the States of Pennsylvania, Virginia, West Virginia, Kentucky, Tennessee, Colorado, Indiana and Iowa, and at the Leavenworth colliery, Kansas, where the most extensive system of endless rope haulage in the West is in use. In our Illinois mines the following practice is generally observed in putting in the plant: Two tracks are used on the main hauling entry; the rope on these tracks runs in opposite directions; one track is used for the loaded trains, the other for the empty trains; the rope runs in the center of each track; in the lateral or cross entries, the rope is taken up one entry and out on the other; the rope passes around sheave wheels set in or at the entrance of the cross-cuts near the heads of the cross entries, the rope passing through the cross-cuts. Two stations are made outside of the last working-rooms, one where the empty cars are left on the empty track, the other on the loaded track; the coal is hauled out of the working rooms and entries by mules; at the end of the station

Buyer meets Seller in the back of this book.

nearest to the working faces a cross-cut, or hauling road is made, for cross tracks for the haulage of the loaded cars from the working places to the loaded station, and the empty cars to the working places on the entry opposite the empty station; the grip boy attends to making up the trains.

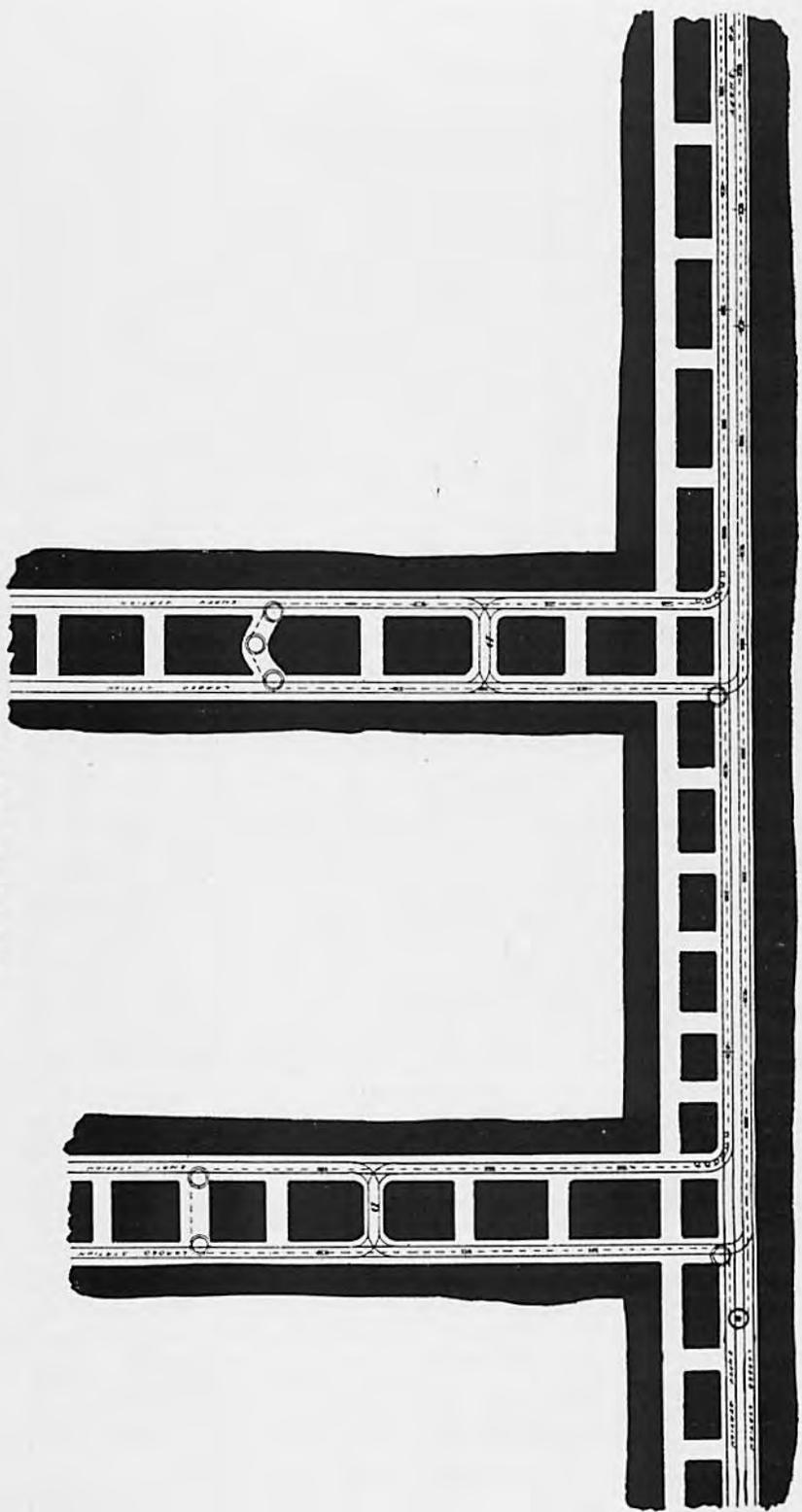
The rope, after passing out of the cross entry, passes along the main entry to the next set of cross entries, up the first cross entry, and out on the next. The hauling of the coal out of the rooms and the making up of the trains, is done in the same manner as in the first set of cross entries. Where the rope leaves the main entry to pass into the first cross entry, and return out of the next cross entry, in the distance between the cross entries there is no rope. If it is necessary for a train to pass the first set of cross entries, to be used in the next set of entries, or any other set of cross entries, the track is so graded at this point that the cars will run by gravity to catch the rope at the next entry. If this cannot be done, a short piece of rope is used to haul the cars from entry to entry.

The engines to propel the rope are double 10 x 20-inch cylinders, geared about 5 to 1, and the engines are usually placed in the mine at about 100 feet from the bottom of the shaft. This is not a good plan; the engines ought to be placed on the surface, as the steam pipes interfere too much with the air currents of the shafts, and too much steam is lost by condensation. Electricity ought to be applied to drive the rope pulleys, and electric lights could also be used at and around the bottom of the shaft. The engines are geared to the driving pulleys, so as to give a steady power for whatever amount of coal it is necessary to haul. The driving pulleys have six grooves, and there are two pulleys directly in front of each other, one of which is run as an idler, and the other is geared direct by a spur wheel to a pinion on the shaft. The rope runs from 200 to 300 feet per minute, the size of the rope is $\frac{7}{8}$ of an inch in diameter, made of steel, 7 wires to the strand. The safest way of connecting ends of rope is to splice them, though a short socket with two rivets in each will do the work equally well, and the joint thus secured will pass around the driving pulleys without any trouble. The grips must always be put at least 25 feet away from the sockets to allow for knocking off the grips, but where the rope is spliced this is not necessary. The advantages of the sockets are that when the rope becomes too long it can be taken up in a few minutes, and the tightener or tension pulley will not have to travel so far as it does when the rope is spliced.

The rope is passed around the six grooves of the driving pulleys, and it is then taken to the center of the track on rollers about 30 feet apart, and at the extreme end it passes around a sheave wheel 6 feet in diameter, then back to the rear of the engines where the ends of the rope are spliced. The empty, or off-going rope passes around a tension wheel which keeps up the tension. This tension wheel is put on a movable frame or truck, and runs on a track. At the end of the track there is a pit sunk, or a strong post set vertical with two sheave wheels, one attached to the bottom of the post, the other to the top; a balance weight is suspended on a chain, the chain passing around the sheaves and attached to the tension truck; or a sheave wheel is set at the top

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PLAN ENDLESS ROPE HAULAGE



of the pit and a balance weight suspended in the pit and attached to the tension truck; this tension wheel is put near to the driving pulleys so as to take up the slack rope as it comes off the pulleys.

The grips are connected to the cars by an iron bar, which is held in the left hand of the driver, and the handle or lever of the grip is held in the right hand; the lever is now thrown back to the left and the open jaws of the grip are slipped over the rope from the opposite side. The lever is then put down slightly to the right so as to start the train of cars without jarring them. When the cars get into motion the lever is pressed down tight, and the train moves on its way to the shaft.

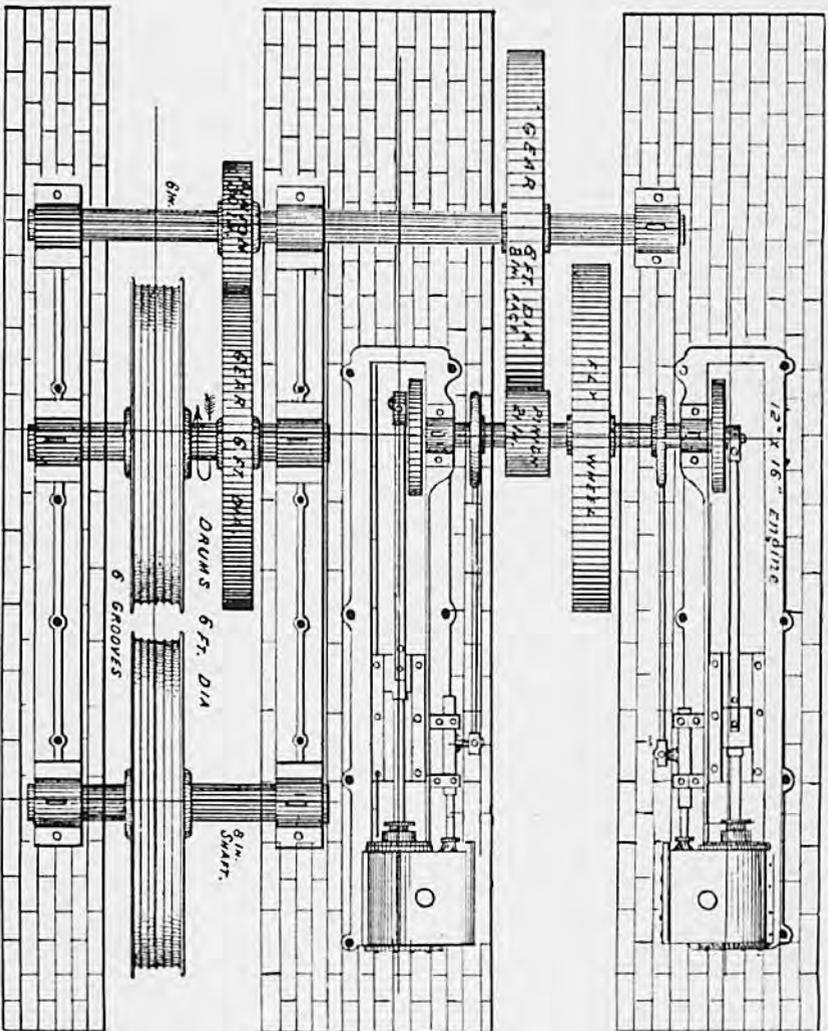
The average number of cars to the train is ten in our mines, and the trains are kept at such a distance on the rope as to insure a steady supply of coal at the bottom of the shaft. The speed of the ropes is slow and steady, which causes the rope to last for years. This system will work on crooked roads as well as it does on straight roads, and on a single track as well as on a double track. On the single track the ropes run in the center of the track, about six inches apart, and when it comes to a turnout the ropes are divided, and one goes on each track. When one train comes on to the turnout, the grip-boy simply takes off the grip and stops the train until the other train passes into the turnout. Where the rails cross the rope there is a latch formed in the rail to let the grip pass. The small sheaves used for the rope to run on are about 6 inches in diameter and $2\frac{1}{2}$ inches wide, with a groove made to fit the rope; they are made to turn on a shaft made of $1\frac{1}{4}$ inch gas pipe; the pipe is secured on wooden bearings. The ends of the pipe are plugged up, the hollow part of the pipe being used as a receptacle for holding oil. With suitable holes in the pipe, the sheave is made to oil itself as it runs. On the curves 6-inch horizontal sheaves are set and put in at such distance as to compensate for the radius of the curve, and carry the rope around it. It is always best to have enough sheaves to pass the rope around it in a true curve. The cable grips will pass around the curve pulleys without pulling the rope off the pulleys. A portable seat is made with two hooks to fasten to the end of the first car for the grip-boy to ride on.

The success of this system depends on having the hauling roads as nearly level as possible, to keep the cars from running on to the grip. Where a slight grade is found, sprags are used by the grip-boy to keep the cars from crowding on to the grip. Under this system no loose coal is found on the hauling roads and, as the trains move slowly and steadily, less expense is required to keep the track in working order. With properly trained grip-boys the cars are started evenly and steadily by allowing the rope to slip through the grip until a proper tension has been secured on the whole train; then the grip is pressed tight down on the rope, and the train moves on.

With the endless rope system no noise or tumult is heard around the bottom of the shaft, made by the mules and drivers, these being employed for the most part near the working faces. There are generally not more than two grip-boys near the shaft at any one time.

The grip used in the endless rope system of haulage in our State, and which greatly conduces to making the system such a success, was

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ENDLESS ROPE ENGINE AND DRIVING GEAR.

designed by J. E. Carr, manager of the Leavenworth Coal Company, Leavenworth, Kansas, and was patented in the United States and Europe. It gives universal satisfaction. The jaws of the grip are lined with a soft metal, so as not to injure the rope, and it can be easily and quickly replaced at a very slight cost when worn out. This grip can haul as high as twenty cars containing one ton of coal each, and will not slip, and can be taken off and put on the cable very easily and quickly. It is made of steel, and will not break nor bend; the jaws of the grip for a $\frac{7}{8}$ -inch cable are six inches long, and all wearing parts are easily taken up at any time; the grip as used in our mines can be adjusted to fit cables from $\frac{3}{4}$ of an inch to one inch in diameter.

The total length of the cable in No. 1 colliery at Pana, Illinois, is 10,000 feet. On May 6, 1892, there were hoisted from this shaft 1,000 tons of coal (gross weight); the total expense for labor in putting the coal on the cage was \$26.25, making a cost of 2-6/10 cents per ton; this includes all labor, grip-boys, engineers, cager and assistants, mule drivers, trappers, roadsman and tracklayer at the working faces. Of course, it is not to be expected that the cost for haulage would be as low as this for every day's run, as the success of the cable and the keeping down of expense depends on the drivers keeping a steady supply of coal at the cable stations, but the expense on a steady run for one month will not exceed three cents per ton.

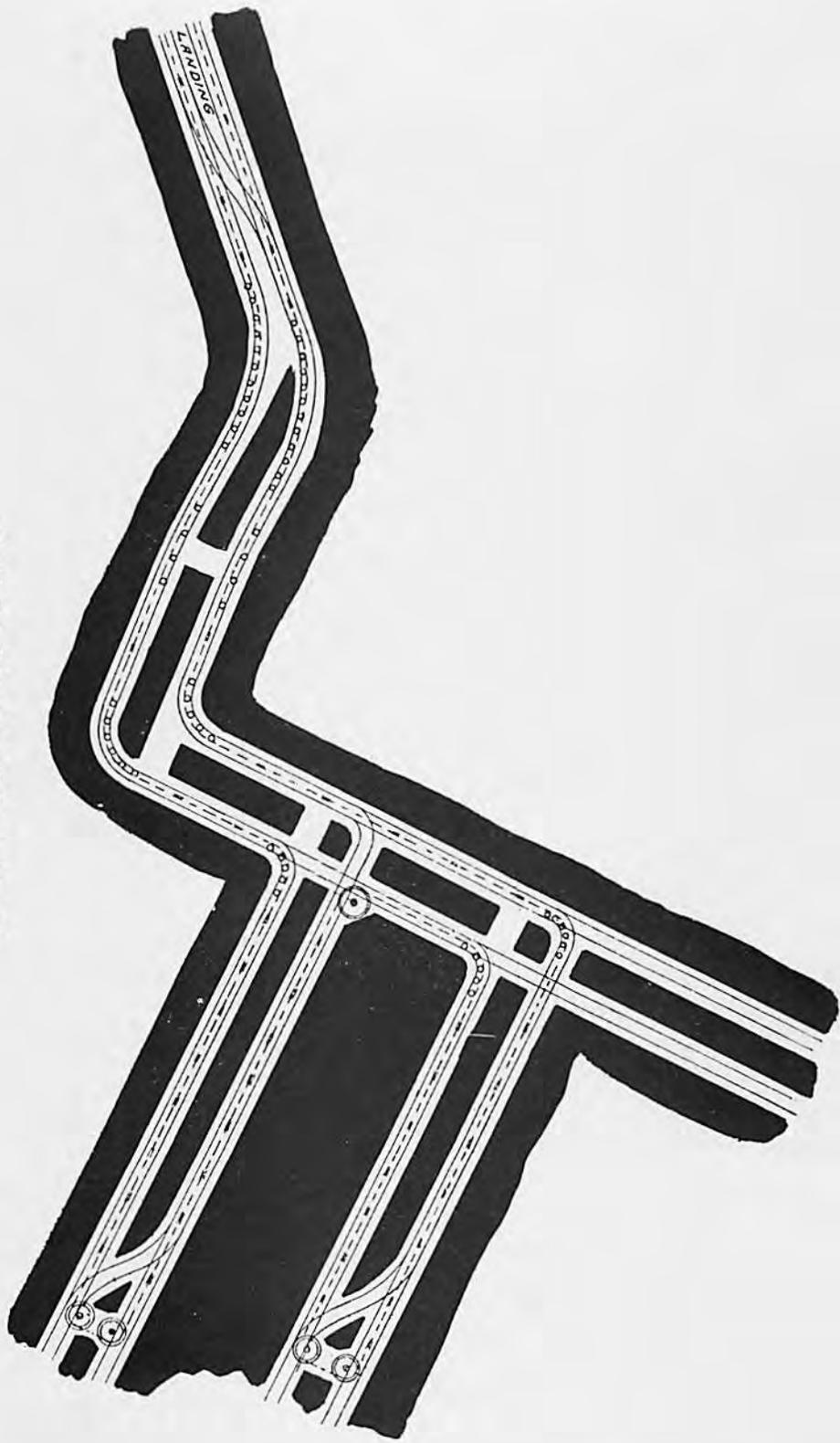
In the Lincoln Coal Company's colliery the total length of cable road is 4,150 feet, and the total length of rope 8,300 feet. The mules haul from the working faces a distance of 4,000 feet to the cable stations. On a basis of 500 tons output per day, the cost is 4-6/10 cents per ton, on the cage, including all labor. If the tonnage were greater the cost would be less. In this mine the great advantage of cable haulage is shown from the fact that a portion of the main road has a grade of 1 in 20, and before the cable was put in a mule was not able to handle over two cars at a trip. Considering the length of the haul by mules from the face to the cable station, the cost of hauling at this place is very low. These cables can supply 2,000 tons of coal at the shaft bottom, providing there are enough men to mine it, and enough mules to haul it from the working faces to the cable stations. Where the cables are supplied with coal to their full capacity the cost per ton will be lower, and where not regularly supplied the cost will be higher. The endless cable rope has been in use in the Lincoln colliery for four years, and has given entire satisfaction, and in the near future the cable will be extended 4,000 feet farther, and near to the present working faces, which will greatly reduce the cost of haulage.

Discussion

Mr. Freer being called on for some account of the plant at Lincoln, said that he considered the haulage equipment at the Lincoln mine second to none in the State. A remarkable thing about this plant was the perfection with which all its parts operated from the first. On the days the company started the rope, the whole system moved off without a hitch or a moment's interruption, as though it had been running always. As a result, the company handled a full complement of coal

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PLAN OF ENDLESS ROPE HAULAGE



on that day, and suffered no diminution of the output on account of the radical changes that had been made. It was expected that in the introduction of such an elaborate plant there would be many hindrances encountered in the correction and readjustment of details, but in this case everything worked perfectly from the first revolution of the pulleys. He believed that, all things considered, this was the cheapest haulage, for the distance, in the State. The cable easily handled from eight to twelve cars at a trip, over grades where the best mules could haul but two. The delivery is uniform and continuous, the rate of speed is graduated so as not to affect the air current nor imperil the lives of the men, and after four years' continuous use the rope is still in service and, with the rest of the plant, in good working condition.

Mr. Sperry said, he had been very much interested in the endless rope system, and had recently spent a number of days with Mr. Carr, at Leavenworth, Kansas, looking over the system there, with a view to the application of electricity to the running of the ropes. He was specially impressed with the enormous amount of detail involved in the construction and operation of the rope system. In making estimates for rope haulage there was the cost of the engines, the cost of the rope, the cost of a certain number of sheaves, and the cost of placing all these things, and various other items, all of which aggregated a large sum, and then there was the constant attention to details and the skill required for its successful operation. He had just heard of a case where 15,000 feet of rope was required at a cost of \$5,500, but the cost of the rope is only the beginning of the battle. Then, when the equipment is finally completed, there is a vast amount of power expended in simply moving the cable, and this must be continuous, whether there was a pound of coal moving or not. In Chicago it was found, in operating the street car systems, that 75 per cent of all the power generated was consumed in moving the cable alone, whether they were carrying any passengers or not.

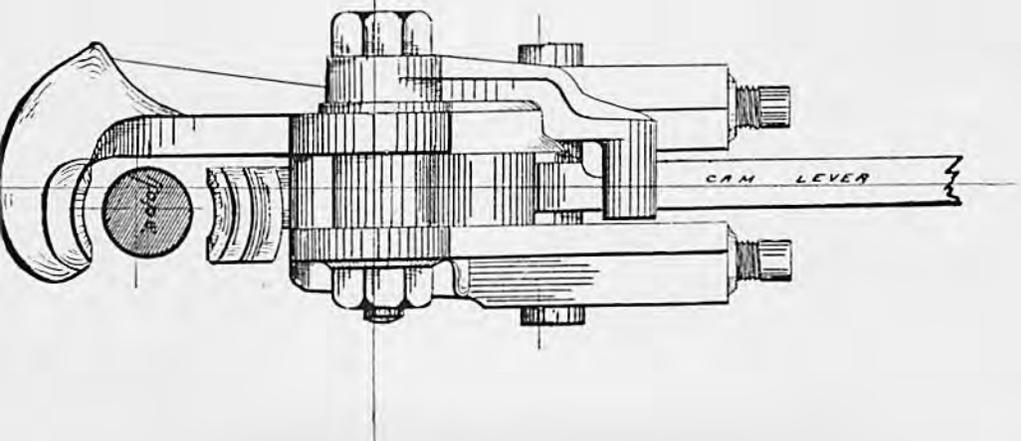
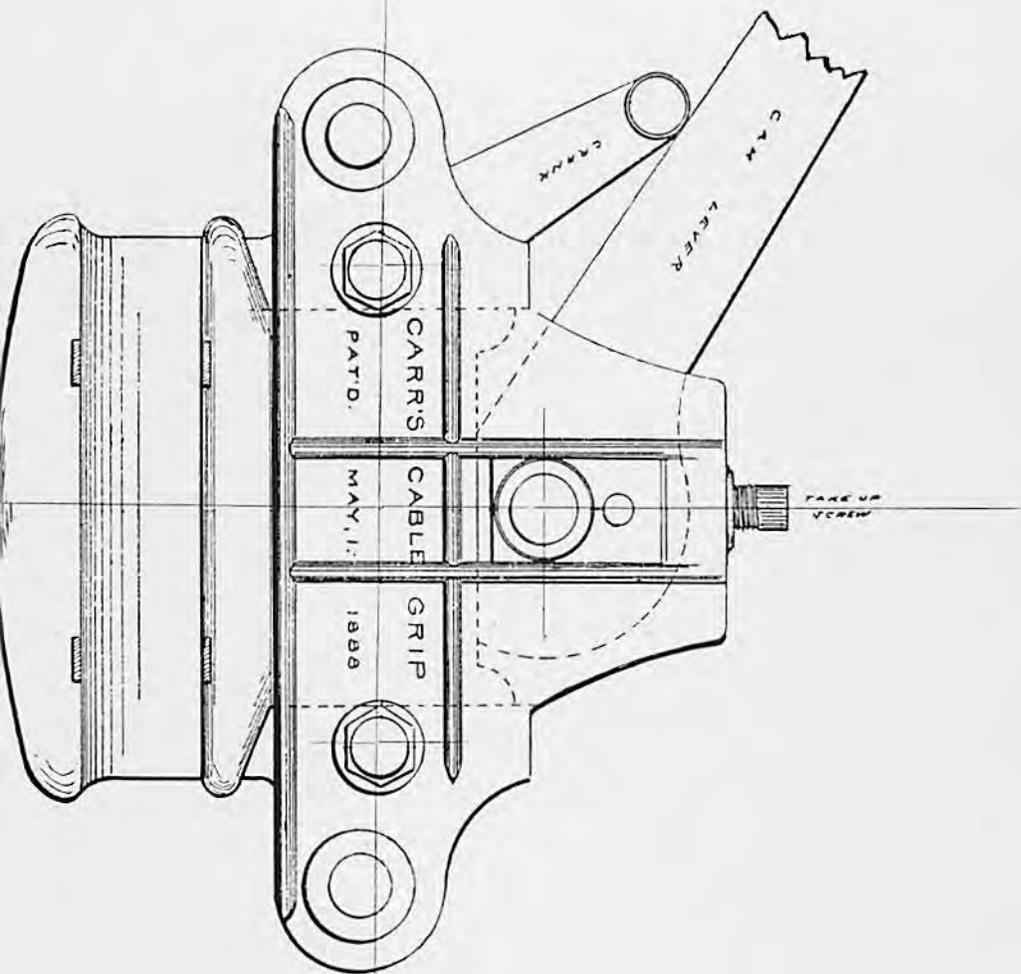
As compared with this system he thought the use of the trolley wire and the electric current for underground haulage promised every advantage. The cable costs many times more than the copper wire, and the sheaves much more than the simple device for supporting the wire. The wire itself, as shown by very delicate tests, does not wear out with use, and the supports cannot get out of order. When a wire has once been put in, that is the end of it, and there is no necessity for a double track. He said the cost of the installation of the electric haulage system would not be more than \$500 a mile, and he estimated that the cost of haulage by that system would be about three-fourths of a cent a mile. The armatures would be put in under almost any guarantee, and they would not wear out nor burn out.

Mr. Cooper.—What is included in the \$500 a mile?

Mr. Sperry.—The work on the entries alone, the copper wire and all the supports necessary to hold it in position.

Mr. Dixon said, that as far as he was concerned, he favored all the systems, the endless rope and the tail rope, and the trolley wire, but he did not want Mr. Sperry nor the advocates of any one system to have

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it all their own way. The members had been told what it costs to put coal on the cage with an endless rope, and by the electric system, and a contrast had been presented between the amount of detail and the relative cost and efficiency of the two. Nothing had been said, however, about the extra amount of room required by the electric system. He begged to say, moreover, that it remained to be demonstrated to his mind that any of the mechanical systems were so much superior to the haulage by mules. At Pana he had put coal on the cage with the mules alone, unaided by any mechanical system, at the rate of 1,200 tons a day, and at a cost of less than two cents a ton.

Mr. Rollo was pleased to see some one come to the defense of the mule, and asked if there was any limit to the number of cars a mule could haul in the Pana mine.

Mr. Dixon replied that the mine was comparatively level, and when the roads were in good condition their best mules could pull four cars containing from 4,500 to 4,700 pounds from the face to the bottom, an average distance of 2,000 feet. With ten mules he had very recently sent to the top over 1,250 tons of coal in one day.

Mr. Murray said, that in making estimates of the cost and maintenance of any system of haulage, it was necessary to take everything into consideration. Unless repairs and depreciation are considered you do not get the cost of your haulage. He was prepared to admit that the equipment for the endless rope involved a larger expenditure than that for the electric plant. This was especially true in the matter of pit-cars, a much larger number of which were required for the rope service than for the electric.

Mr. Sperry said, he had made some further figures on the actual cost of delivering coal by the electric system and found it to be about 1.92 cents per ton per mile, which sum covered all the items of current expense involved in the process.

Mr. Dixon asked what it cost to deliver coal by the electric system at No. 3 mine at Streator, where the system had been in operation some time.

Mr. Sperry replied that before the system was adopted at Streator, the haul by mules was much shorter than at present, but the cost of mule haulage at that time was not far from 4.3 cents per ton, while now, with electric motors hauling a considerably greater distance, the cost was decreased to about 2.4 cents a ton.

Mr. Murray.—Do you refer to tons of merchantable coal or the run of the mine?

Mr. Sperry.—These figures are based on tons of lump coal.

Mr. Dixon said, Mr. Sperry has said that the Chicago Street Railway cable exhausts 75 per cent of its total power in moving the cable itself. He also says that he gets 25 per cent for draw-bar pull. I would like to have him explain this point in relation to his electric locomotive.

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Mr. Sperry replied that the relation of the weight of the locomotive to its draw-bar pull really has little connection with its efficiency. The efficiency of his motor was very high. He had made some experiments to find out what the friction element was. After some very careful tests in finding where the locomotive would start itself, and measuring its acceleration upon a variable grade, he was enabled to determine the friction to be 18 lbs. per ton. The friction of a passenger locomotive is about 15 lbs. per ton; he therefore regarded 18 lbs. in his locomotives as an extremely good result, inasmuch as it had eight drivers and the necessary gearing, whereas the passenger locomotive has only four. The wheels of the electric motor are, moreover, very much smaller, and for a given speed have to turn at a greater velocity. The draw-bar pull, which can be depended upon being 25 per cent of the weight of the car, determines only the efficiency of the adhesion, but the efficiency of the motor would be the amount of power in the form of electrical force delivered to it on the one hand as compared to the amount of draw-bar pull it is possible to get on the other. The motor itself is of quite high efficiency, being somewhere in the ninetieths.

Mr. Dixon said, the locomotive on the rails was not as potent as the stationary engine, and that possibly a still greater efficiency might be obtained through electricity with a stationary power.

Mr. Sperry said, they were installing two stationary motors for the Leavenworth Coal Co. for the purpose of driving their endless ropes, but he thought for pulling a given load at a given speed the efficiency of the electric haulage would be very much greater than this system of endless rope when electrically operated, although as compared with the rope transmission that is now being used to drive these cables, I am convinced that we can show a very superior efficiency both as to power consumed and cost of maintenance.

Mr. Ramsay said, there were two systems of haulage before the Institute—endless rope and electricity. In his opinion the endless rope was a good system, but he thought in one year they would all be converted to electricity. One point of great merit that electricity has over the endless rope is that it is possible to get the mechanical haulage very near the face and keep extending it as the working face advanced, with very little expense, whereas, with the endless rope this can not be done. He would advise Mr. Sperry to go further with his system of haulage and pull the loads out of the rooms and butt entries. By that system we might be able to do away with mules altogether.

Mr. Murray.—Can Mr. Sperry give us the percentage of power that it is possible to utilize in his system?

Mr. Sperry.—The percentage of the power that is applied to the pulley of the dynamo on top which is rendered available as draw-bar pull is closely in the neighborhood of 75 per cent.

Mr. Ramsay said, that as the time for adjournment had been reached, he thought this subject could be profitably continued at our next meeting, and therefore moved that further discussion be postponed until that time. This motion was carried, and the meeting adjourned to the following day.

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(Reprinted from 1893 Journal of the Illinois Mining Institute)

THE ADVANTAGES OF A TECHNICAL EDUCATION

By CHARLES RODENBERG

Division Superintendent, Consolidated Coal Co.

Horace Greeley, while at the height of his fame and influence as a journalist, is said to have made use of the expression: "Of all horned cattle, deliver me from a college graduate!"

This is preeminently a practical age. The sentiment so picturesquely expressed by the great editor is, to some extent, still dominant. The theorist, the scientist, the scholar, have often been compelled to make way for the practical man. Especially has this been true in the occupation of mining where we so frequently find men, who, in early life, were denied the privileges of an education, occupying positions of trust and responsibility and satisfactorily meeting the requirements of their positions. These men are certainly entitled to credit for their advancement, based as it is in the greater number of cases on demonstrated merit and ability. While no one could possibly entertain greater respect and admiration than I for the men, who, through their own exertions, often alone and unaided, have reached places of honor and distinction; yet, in these enlightened times, when the means of an education are so easily accessible, I believe that ignorance may justly be regarded as a crime, and that knowledge gained merely from experience is no longer sufficient.

I am supported in this position by the change in sentiment that is gradually taking place. The necessity for a technical education, of better mental training, is being felt more and more. The handwriting on the wall has made its appearance. A revolution has taken place in the industrial world. Conditions are constantly changing. Methods that were in vogue twenty-five years ago no longer exist. Inventions and discoveries have worked miracles. The possibilities of steam and electricity have not yet been fathomed. We must adapt ourselves to our changed surroundings and keep abreast of the times if we expect to hold our own in the struggle for existence. Competition in every branch of industry is stronger, sharper and more active than ever before. Especially is this the case in the industry in which we are interested. Only that man who has the ability, tact and education required to recognize, appropriate and employ the best and most advanced methods of mining will prove successful. The legislature appreciated this fact, hence the law requiring a higher standard of efficiency on the part of our mine managers. The gentlemen who were instrumental in organizing this Mining Institute, which gives us an opportunity for the calm and intelligent interchange of opinions, also recognized this necessity.

The cost of books has in recent years been greatly reduced. The works of the ablest authors of the present and past, men who have made the consideration of the problems which confront us in mines, their life work, can now be purchased for almost nothing. A very respectable

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library can be had for fifty dollars. Weekly and monthly periodicals, ably edited by men of splendid scientific attainments, reflecting the best thought of the day and devoted exclusively to a discussion of mining questions, can be had at very reasonable figures. Connection with an Institute organized for such purposes as this one is, will not fail to widen a member's mental horizon. With such means at our command is there any plausible excuse why we, who are engaged in mining should not have a better technical education? Is there any excuse for the ignorance of the mine boss of thirty years experience who, when asked at one of the late examinations what he knew about carburetted hydrogen, said he had never heard of such a machine! In fact, gentlemen, some of us are about as familiar with technical terms as was the young man who enrolled himself as a student at a college which had a theological department connected with it. When approached by the examiner and asked what course of study he intended to pursue the young man feebly shook his head and said he did not know. The examiner, wishing to assist him to arrive at a conclusion, asked him if he wanted to take the classical course. The would-be student again shook his head and answered: "No." "Do you wish to take the scientific course?" Another shake of the head and the same reply as before. "Do you want to take the theological course?" Another shake. "Perhaps you want to enter the business course?" "No." "Well," said the examiner, a trifle vexed, "What course do you want to take up?" "I want to be a preacher!" was the answer.

Our experience teaches us that the inhalation of black-damp proves injurious to life, but we know practically nothing of the gases that enter into its composition. We know that fire-damp is explosive, but we don't consider it worth the trouble to ascertain under what circumstances, nor when it attains its greatest explosive force. We, who so frequently come in contact with gases, breathe atmospheric air in blissful ignorance of the fact that it is composed principally of oxygen and nitrogen. Our knowledge of this most interesting branch of the science is confined to our ability to detect the gas when present and to remove it. Even this we are unable to do unless we have witnessed the same thing done repeatedly. Practice enables us to drive entries and lay off rooms at certain angles and at given distances with almost mathematical exactness and without so much as a speaking acquaintance with sines and cosines. If asked the "why" and "wherefore" we are completely at sea, and are obliged to give a woman's reason: "Because." To what is our ignorance attributable and how can we become more proficient? Our lack of technical education is directly responsible for the condition in which we find ourselves, and this can only be overcome by adopting as our motto the dying words of the immortal Goethe: "More light."

I have already intimated that it is not necessary to take a collegiate course in order to secure a technical education. The world is full of self educated men prominent in all the affairs of life, who are abundantly able to cope with the brightest graduates of Yale and Harvard. We should take advantage of the opportunities with which we are surrounded; employ spare moments in study and mental improvement. Abraham Lincoln never attended college. Andrew Johnson was taught

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to read and write by his wife. The elder Atkinson rose from the humbler walks of life. Some of the distinguished gentlemen whom I have the honor of addressing and who are recognized throughout the State as among our ablest mining men were never matriculated at college. Industry, energy and perseverance remove all obstacles and overcome all difficulties. This Institute is a step in the right direction. It is the dawn of a brighter future. It will awaken a general interest in study and create a desire for greater proficiency. We should therefore contribute all in our power to make it a success. This can only be done by attending the meetings and conscientiously performing the duties assigned to us by the committee on programme.

Schools of instruction, membership in which costs but little, have been organized by the publishers of some of our more enterprising journals and the experiment has proved highly satisfactory. The magnificent showing made in the examinations by the miners and mine managers who became pupils of the Colliery Engineer School of Mines is deserving of especial mention. It is a splendid demonstration of what close application and systematic study will accomplish. But the ulterior object of the technical education, of whose importance and necessity I am speaking, is not mere success at examinations. The possession of a certificate is not an evidence of superior ability. I regard the certificate only as a license to begin the study of the science of mining. The man who does not continue his studies, but whose ambition is entirely satisfied as soon as he has received his certificate, is deserving of profound pity. Indeed, it is a question whether the law should not require mine managers to be examined periodically as the mine inspectors are. If the law should require this would it not have the effect of making us cultivate a more intimate acquaintance with our books and periodicals?

A technical education carries innumerable advantages with it. The educated mine man is brought in contact with the master minds of civilization. The scholarly words of Wardle, Wilson, Atkinson, Fairley, and the host of other great authorities are open to him. He reads and comprehends. They are a source of profitable instruction to him. He can appropriate their ideas and employ the knowledge they have gained in years of study and experience for his own purposes. His education enables him to discriminate between good and bad methods and to make a proper application of the former. He is prepared for every emergency and adapts himself quickly to changes in the system of mining. The educated mine manager doesn't require years of practical experience to understand the differences between hand and machine mining. He is thoroughly familiar with the new system long before the change is made. He is not helpless when placed in charge of a long-wall mine, although his previous experience has been confined to the pillar-and-room system. Scientific knowledge enables a man to apply his practical knowledge with less difficulty and more advantageously.

The educated mine manager is not in the habit of indulging in costly experiments that have been tried years before and an account of whose failure is to be found in any standard work on mining. It was lack of technical education that worked a hardship on a gentleman, whom, for convenience sake, we will call John Smith. John had been suffering

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for some time with a sore throat. He called on a doctor who gave him a hasty examination, wrote out a prescription, told him to use the medicine as a gargle and charged him one dollar for it. John had the prescription filled at a drug store and very cheerfully paid the two dollars demanded by the druggist. The gargle effected a cure. About a month afterwards John was again bothered with a sore throat. Remembering how much he was benefited on the former occasion, he hunted up the old prescription and started for the drug store with it. He noticed that the prescription called for aqua pura and chloride sodium. When the prescription was filled and John asked how much it cost, imagine his surprise when the druggist replied: "Oh, we don't charge anything for filling a bottle with water and salt the second time!" John concluded right then and there that education pays.

Education broadens our views, removes prejudice, and causes us to entertain the views of others. It makes us more tolerant of the opinions of others. We no longer consider our methods the only ones worthy of adoption. It keeps us out of the ruts and makes us desirous of being benefited by the experience and teachings of others. It affords greater protection to life and limb, reduces the number of accidents of all kinds and renders property more secure. It produces greater skill and skill leads to economy. It stimulates to greater mental activity and brings about constant improvement: It leads to investigation and discovery. It revolutionizes men and methods. It accomplishes unlooked for results. It makes mining easier, safer, and more profitable. In the words of the poet Spencer:

"Through knowledge we behold the world's creation,
How in this cradle first he fostered was;
And judge of nature's cunning operation,
How things she formed of a formless mass.
By knowledge we do learn ourselves to know
And what to man and what to God we owe."

Mr. Harding said, that he fully endorsed Mr. Rodenberg's remarks as to the importance, the necessity of technical education. Personally, he had not had the advantage of such an education, and during the fifty years he had spent in and around mines, he had been constantly compelled to spend many hours working out—he might say, digging out—certain things which would have been very easy if he had had such an education in early life.

(Reprinted from 1893 Journal of the Illinois Mining Institute)

ELECTRICITY IN MINING OPERATIONS

Remarks by SAMUEL D. FLOOD, M. E.

Mr. Flood, of the General Electric Company, Chicago, being present, and being invited by the President to address the Institute, arose and said:

I assure you, Mr. President and gentlemen, I have been most interested in the papers and discussions of this Institute. My object in being here is to learn what is expected of electric machinery designed for coal mining purposes. Machinery highly successful in one section and proven of great commercial value to its operators, may when first used under other conditions, prove unequal to the work imposed upon it. Perhaps I should say that an apparatus properly designed for one class of work might prove improperly designed for other conditions under which it is asked to operate. Its designers may prove unequal to cope with the work in hand, but this should not count against the principle involved.

Electricity is often made to bear the odium attached to the failure of certain plants whereas it may have been due to this agent that the machines had any hope for success at all. Possibly had compressed air or steam been used as a motive force in such cases no showing whatever could have been made, and it may have been the mechanical engineering, the machine designing or the quality of the workmanship that should be criticised instead of the only good feature that was present, namely: the electric transmission of power. While it may not be a courteous statement for a guest to make, still the fact remains that the mining engineers of Illinois, which practically means the gentlemen here to-day, have done less to introduce the agent of electricity than the engineers of any other section of the country. They have shown a disposition to wait for their neighbors to try it first until the result is, that more enterprising companies in other sections have taken advantage of electric machinery and have introduced apparatus which, in many cases, has already saved enough money over the old methods in pay for itself.

The question of mine haulage is one of vital importance to mine operators, and in fact is one of the most important problems presented to mine operators. The irregular and unsatisfactory method of transportation from the face to the pit-bottom often proves so expensive as to well nigh eliminate the profits of the entire enterprise. Two systems of mechanical haulage have been used for years to somewhat modify and reduce the expense of underground haulage, and, while in many cases a great saving from the use of mules has been effected, the item of repairs has generally proved so large that it is doubtful if the capital invested has ever produced an adequate return. This problem has been solved within the past five years through the agency of the electric motor, enabling engineers to utilize a perfectly trustworthy and reliable power

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in a form that they had never before had at their disposal. The number of successful street-railway plants in operation throughout the country to-day is sufficient evidence of the soundness in theory and practice of the application of motors to railway propulsion. The problem had really been solved by street-railway engineers before locomotives were introduced into mining operations. There are cases on record where an item of \$100 per day has been saved by the introduction of a well-designed and well-built electrical haulage plant, compared to which saving the first cost is an insignificant sum, as the plant paid for itself in less than five months.

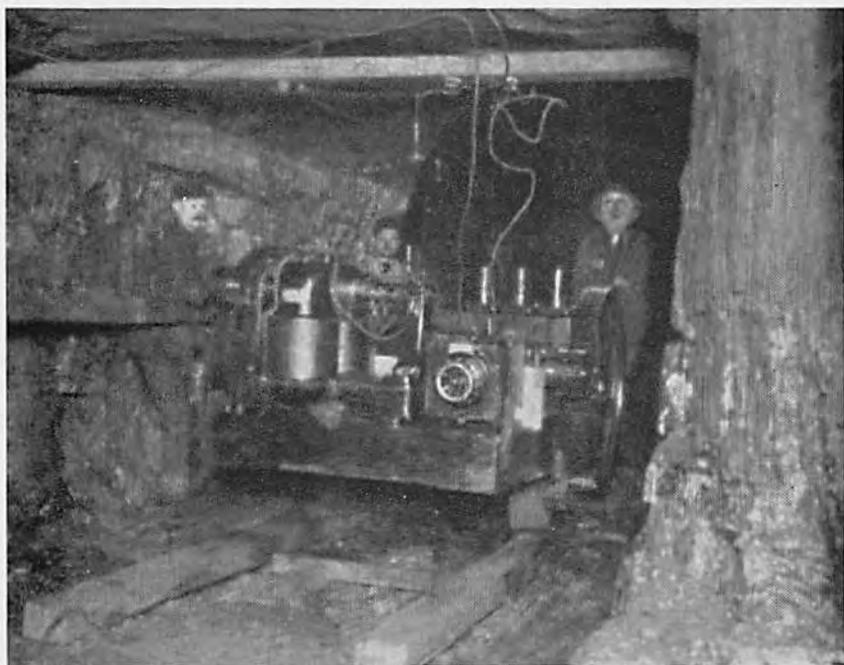
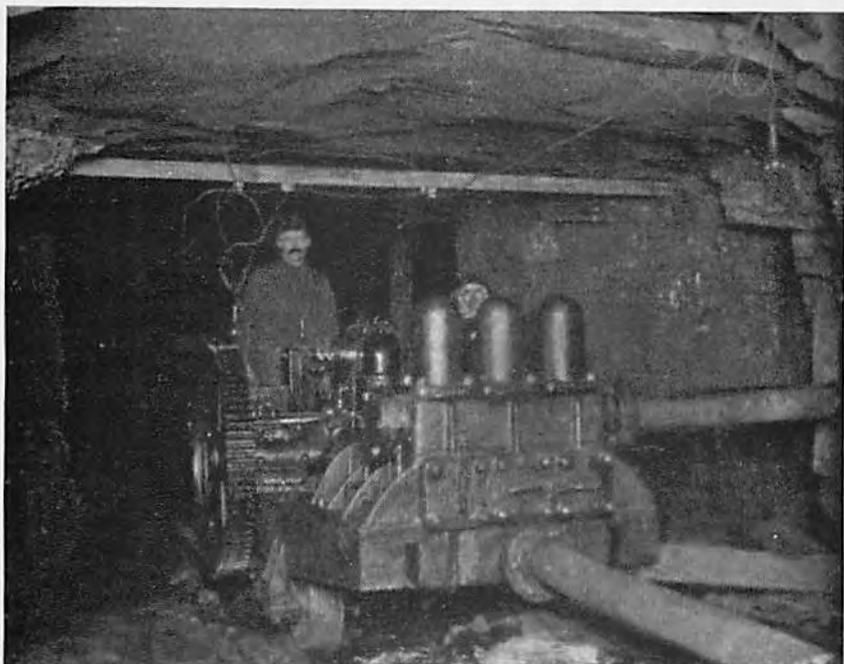
Of the numerous designs advanced for this class of work I would call your attention to the cut which I have here, representing the most successful mine locomotive at present built. (Cut reproduced herewith.) It is the result of several years of practical experimenting, and embodies all the points and details that have been discovered as necessary to a perfect design. The locomotive consists principally of two standard railway motors mounted upon a heavy iron truck-frame. The truck-frame is built of cast-iron side-frames bolted to heavy steel channel beams, which are securely fastened together by a wrought iron angle-plate. The axle bearing-boxes are small and solid in construction, easy of access for oiling and replacing the brass linings. The frame of the locomotive is hung from the axle-boxes by means of steel springs, so that there is very little pounding upon the track. By this method of construction it is possible to take the motors, together with the wheels and axles, entirely out of the frame. The motors used are of the well known standard railway water-proof type, built by the General Electric Company.

The locomotives have been designed to run on a gauge as narrow as 18 inches. The brake is a very powerful form of steel screw and lever. No adjustment is necessary for the wear of the brakes used, as the steel screw takes up the lost motion until the shoes are worn out.

The trolley is of the latest single arm, insulated type, and may be moved from one side to the other of the locomotive, as occasion may require. As the motors are perfectly self-protected, no cover on the locomotive as a whole is considered necessary. Sand boxes are provided for both front and rear wheels. All of the controlling levers are placed on the platform of the machine, within easy reach of the operator. About twenty-five of these locomotives have been built and placed in active operation, from which a great many very interesting reports and records of operation have been received.

Before closing it may be well to mention what has been done in the way of pumping, and for this purpose reference is made to the illustrations shown, which represent a plant recently installed at the "William H." colliery of the Connell Coal Company, of Duryea, Penn. The mine is one of the largest and most important in that section of the country, and the pump in question is of the horizontal triple X pattern with 6½" plungers and 8" stroke. It is operated by a 7¼ horse-power motor, and has a capacity of 150 gallons per minute. In its present position the pump is forcing a 4" stream of water 500' to the main pump of the mine. The pump and motor are mounted together so that the whole plant

Buyer meets Seller in the back of this book.



Two Views of Electric Pump at Duryea, Penn.

can be readily moved along the headings on a very roughly improvised track of timber.

The mine managers state freely that the pump requires very much less attention than any steam pump used for the same purpose, and the fact that the danger to workmen, from the loosening of the rock in the roof of the heading, occasioned by the escaping steam of the pump, is, in the use of electricity, entirely eliminated, constitutes another strong recommendation for its use.

The generator used also supplies current to a number of incandescent lamps, which light the engine house, the head of the main shaft and the workings at the foot of the same, and the contrast between the bright, steady glow of the incandescent lamps and the former illumination by the ordinary miner's flickering flame is very striking.

By a general view of the present status of mechanics, and the facilities at the disposal of the mine engineers of to-day, one will necessarily be impressed with the encouraging prospect due to the advent of electric power. The tremendous energy that can be utilized from a piece of mechanism so small, compact and light in weight as the present motor, provides the engineer with a nucleus enabling him to progress with the design of appliances and machinery that would be absolutely impracticable were the designer to depend for his power on the older form of compressed air or steam; were it not for this same science of electricity, every engineer fully realizes that he would be a great many years behind the present stage of advancement.



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Plan to Attend the

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Boat Trip

and

Summer Meeting

on the

S. S. Golden Eagle



June 4-5-6, 1943

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They are available to all authorized district first aid contests held throughout the state of Illinois.

ILLINOIS MINING INSTITUTE

BOAT TRIP AND ANNUAL SUMMER MEETING

June 5-6-7, 1942

Twenty-Fourth Annual Summer Meeting and Boat Trip of the Illinois Mining Institute held on S.S. Golden Eagle, leaving St. Louis on Friday, June 5, 1942, at eleven o'clock, p.m., and returning to St. Louis on Sunday, June 7, 1942, at seven o'clock a.m.

MORNING SESSION

The meeting was called to order on the Packet Boat Golden Eagle at 10:00 a.m., by President J. A. Jefferis, and the following proceedings were had:

Chairman Jefferis: Come to order, gentlemen. We will have the roll call.

(Secretary Schonthal called the roll.)

ATTENDANCE

ILLINOIS MINING INSTITUTE TWENTY-FOURTH ANNUAL BOAT TRIP AND SUMMER MEETING

St. Louis, Up the Illinois River, and Return

June 5-6-7, 1942

<i>Name</i>	<i>Affiliation and Address</i>
ROY L. ADAMS.....	Old Ben Coal Corp., West Frankfort, Ill.
MAT ANDERSON.....	Bituminous Casualty Corp., Rock Island, Ill.
GEORGE BAGWILL.....	State Mine Inspector, Harrisburg, Ill.
CLAYTON G. BALL.....	C/o Paul Weir, Chicago, Ill.
CHARLES BALSER.....	Pyramid Coal Corp., Pinckneyville, Ill.
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R. F. DONALDSON.....	United Electric Coal Company's Buckheart Mine, Canton, Ill.
JOHN W. DRISKO.....	General Electric Co., St. Louis, Mo.
JOHN J. DUNNE.....	Stenotypist, St. Louis, Mo.
R. L. EDGAR.....	Watt Car & Wheel Co., Barnesville, Ohio
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FRANK W. FRIES.....	Ill. Coal Oprs. Assn. & Dist. 12 UMWA, Gillespie, Ill.
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Secretary Schonthal: We have a total of 113 aboard.

Chairman Jefferis: Gentlemen, while we are all here this morning I know you know this is going to be an interesting program. I want to impress upon you the importance of the meeting this afternoon. For the coal men there are two papers on here that you must not miss, because of their importance. One deals with priorities; and answers a lot of questions that you would like to know if you are going to stay in the coal business.

There is something I am sorry I have to report. Just before we left St. Louis we received a telegram announcing the death of one of our old charter members, Mr. Hugh Murray, of Equality. And I would like to ask at this time that we all stand in honor of Mr. Murray.

(All present stood in silence.)

I would like to appoint a committee to draft a resolution to present to Mr. Murray's family. I appoint three old friends of his, Mr. John E. Jones, Mr. Thomas Moses, and Mr. Fred Weissenborn to draft this resolution to send to his family and to place upon our minutes and upon our records.

Will you accept that appointment? We take it for granted you accept it.

You will note that the first item on the printed program is an address of welcome by the President. This should really have read "A Short Address of Welcome by the President," for as much as I like to talk I assure you it is going to be short, because we do have a splendid program ahead of us, and we are going to be pressed for time.

Now for the address of welcome. I do want to extend a most hearty welcome to all of the members and guests. We would like to have you know just how much we do appreciate your being here with us on the boat. To those of you who have not been with us before and this is your first trip we would like to give a double welcome. If you want to enjoy yourself, which we hope you will do, you will just have to loosen up and act as though you are one of us and we will do the same thing toward you so that you will enjoy yourselves and will probably come back next year.

This year we are celebrating the golden anniversary of the founding of our Institute. Now, believe it or not, we are also going to celebrate our silver anniversary. We are going backwards on this, but next year we are going to celebrate the silver anniversary, or twenty-fifth year, of the boat trips with the Eagle Packet Company. This Eagle Packet Company is operated by Captain Henry Leyhe and Captain Buck Leyhe, fine fellows whom we all admire.

Mentioning this publication when writing Advertisers puts friendship into business.

I am not going to refer to the chaotic condition of the country at this time, nor of the world today, except to say that it is good to know that we can get together at meetings like this and talk over conditions of the coal mines of Illinois, which, thank God, we are still operating, and which I hope we shall keep on operating.

Now, that is the extent of my welcome. So if you want any more hearty welcome than that come to me after the meeting and I will try to give it to you.

It is quite a temptation to keep on talking because I can seldom get people to sit this long and listen to me.

I want to call on Professor Walker at this time to give us a report on our student who is at the University of Illinois under our scholarship. Professor Walker, have you anything to say?

Professor Walker: You have a report from the student, Mr. President?

Chairman Jefferis: Yes, sir.

Professor Walker: I would like to say that Mr. Walls, from West Frankfort, who was the recipient of the first scholarship, has done at least better than an acceptable job. In his work at the University the past year, he has maintained approximately a "B" average, and I find his attitude very excellent, and he is a very capable boy. He came to school with the best of conditions, that is a number of years of experience with the Chicago, Wilmington & Franklin Coal Company, West Frankfort.

Now, I don't think we ought to pass by an opportunity, though, to say that in addition to one more scholarship added this year, to another entering freshman, the Institute is acting as administrator to two scholarships by the Peabody Coal Company, and that applications are being received for three new scholarships for this coming year. This would be an excellent place to tell you people about it and let you talk to some young man in your locality who would be interested and is worthy of such help as might be given, and to get him to put in an application. There were some in for both of them, but I believe that I can say that I would prefer to have a little better grade of student for mining scholarships than we have received up to date. One boy says he is interested in mining because the Institute is offering a scholarship, but I find he does not have the entrance requirements for the College of Engineering; hasn't had any mathematics in high school. I don't know how they graduate them these days.

That might be something to keep in mind, a worthy boy who can use a hundred dollars a year which will pay for his tuition and his books. We would certainly be glad, and thankful to the scholarship committee to have him hand in his application. Since the present scholarship is up for consideration for the next year, I don't believe, Mr. Chairman,

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that it would be out of order to make a motion that this group recommend to your committee that Mr. Walls be continued for a second year on his present scholarship on the basis of his scholarship record that he has made this past year, and being a gentleman and a worthy man to receive that support.

Chairman Jefferis: I received a letter from Mr. Walls, and it impressed me very much. You were a little soft there in what you said in your letter to me, because you did speak so highly, more highly than I did today; and Mr. Walls has sent me a wonderful letter. Do I hear a second to the motion?

(Professor's Walker motion duly seconded.)

Chairman Jefferis: The motion has been made and seconded on Mr. Walls being continued on the scholarship at the University of Illinois. Are you ready for the question?

(The question was called for, the motion put and carried.)

Now I am going to turn over the meeting this morning to Mr. Howard Lewis, who will conduct the meeting from here on.

Mr. Lewis, will you come up. (Applause)

(Mr. Howard Lewis took the Chair.)

Chairman Lewis: I consider myself particularly fortunate and particularly honored by this little duty that I have to render. I have received definite instructions from our President not to do very much talking, so we will go on with the business of the meeting.

We are fortunate today in having with us Mr. Joseph Marchesi, Assistant Director of Mines and Minerals, who will read a paper on the "Production of Coal, and Accident Records for Mines in Illinois." I know of nothing that is more important to the future and destiny of the Illinois coal industry than the production of coal, and especially the reduction of accidents. In my opinion the production comes second. I mentioned it first, but it comes second. We, in these crucial days, and with the hope for the future that we should have, and do, I believe, must remember that we must do everything to prevent accidents in the coal industry of the State of Illinois in order to insure our future.

I take pleasure in presenting to you Mr. Marchesi. (Applause)

Mr. Marchesi: (Interpolating) Mr. Chairman, members and guests of the Illinois Mining Institute: First I believe that I should pass on to you the sentiments of our director, Robert M. Medill. Yesterday, when I told him that I was going to make this trip he urged me to give you his feelings of good will and that he had hoped he could be here in person

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on this day, but the doctors decided differently than what he anticipated. He is still bedfast, but coming along nicely considering the seriousness of the accident he was in. He hopes to be here with you at your next scheduled meeting in October at Springfield.

PRODUCTION OF COAL, AND ACCIDENT RECORDS FOR MINES IN ILLINOIS

By JOSEPH MARCHESI

Assistant Director, Department of Mines and Minerals,
Springfield, Illinois

From the annual schedules of 1941, submitted by the various operators of Illinois, our Annual Coal Report has been compiled and from this we get the following facts.

In 1941, we had 143 shipping mines with 30,258 employees, producing 51,033,319 tons. In 1940, we had 139 shipping mines with 29,286 employees, producing 46,071,806 tons. This shows an increase of 972 employees and 5,961,513 tons produced over 1940.

For the local mines: In 1941, we had 723 mines, employing 7,329 men, producing 4,332,516 tons. In 1940, there were 754 local mines, employing 8,733 men, producing 5,210,796 tons. This shows a decrease in 1941 of 31 mines, 1,404 employees and 826,178 tons. A total of all shows 886 mines with 37,587 employees producing 55,265,835 tons in 1941, compared to 1940 showing 891 mines with 38,019 employees, producing 51,282,602 tons.

Thus, we have a decrease of 25 in the number of mines operating, a decrease of 432 employees and an increase of 4,083,233 tons. The decreasing of mines operating and number of employees comes from the local mines and the increase in tonnage from the shipping mines.

Now we come to the part that we are all interested in, but should be more deeply interested in, that of accidents.

In 1940, there were 2,091 non-fatals and in 1941 there were 2,096, an increase of 5 injuries and represents an increase of 2/10 of 1 per cent. In 1940, there were 83 fatals and in 1941 there were 92. This is an increase of 10 per cent.

I am breaking down the above fatal accidents in an unusual manner. In 1940, the shipping mines employed 29,286 men; of these 985 were foremen and superintendents. These 985 foremen represents 3 per cent of all employees. The shipping mines in 1940 had 74 fatal accidents, of these, two were foremen—this is 2.7 per cent of the total.

In 1941 the shipping mines employed 30,258 men, of these, 970 were foremen and superintendents. These 970 foremen represents 3 per cent of all employees. The shipping mines in 1941 had 81 fatal accidents of these, 4 were foremen. The 4 represents 5 per cent of all fatal accidents.

Play ball with the Advertisers who play ball with us.

Thus we have the foremen, or 3 per cent of employees, comprising 5 per cent of the fatals.

This is brought to your attention for the sole purpose of getting you to think about it. It is from you gentlemen and your foremen that safety educational programs will come.

We know your foremen are all good, capable men or you would not employ them. Likewise they can carry on your safety educational program to a great degree of success, but are they doing so? Does the lack of progress fall in their lap or is it your problem? A few passing remarks on the subject will not be sufficient. We must hammer on it continually. Let us see what progress we can make for safety during 1942. For the first four months of 1941 we had 27 fatals, and during the first four months of 1942 we had 23. Thus we show a decrease of four.

Some few of our mines have made noticeable progress in safety. The majority have made little progress—I wonder why. Are the facts connected with the accidents mysteries; don't we understand what is causing these deaths and injuries? From year to year the deaths from fall of rock and coal at the face are 45 to 50 per cent of the total. Haulage deaths are 20 to 25 per cent. Are these mysteries that are not solvable? Perhaps it would be better if they were. Then maybe we would get so interested in the mystery we would solve the problem.

When we come here next year, let us be able to say definitely that we have accomplished something, that we have installed safe practices, safe conditions and cut our accidents to a minimum.

May I again call your attention to safety paragraph we have been placing in all our recent letters of recommendations as follows: "Don't overlook the fact that this is the most dangerous time of the year. A close check should be made of the ventilating apparatus, overcasts and doors to insure their being in good order at all times. Seals of worked-out areas should be inspected daily, and as much oftener as is necessary." In saying, "this is the most dangerous time of the year," let me impress upon you that now and every day is the most dangerous time. There are no safe periods.

We know some of you are striving to perfect safety problems. More power to you and may we all get the habit.

Let me assure you gentlemen that the one aim of the Department of Mines and Minerals is to carry out the duties of the Department to the best of our ability; to comply with the laws of our state; to protect the lives of the employees; protect the property of the operator and the resources of the state. In doing this at times it may appear that we are a little too strict; however, after considering this carefully I believe you will all agree that we are not unreasonable. Please bear this in mind, from year to year the laws are going to be more exacting and it is the duty of the Department of Mines and Minerals to comply with the laws; therefore, let us prepare ourselves in advance and make it easier and more pleasant for all concerned.

* * *

That is the record that will be shown as far as the production is in the State of Illinois in your regular annual report which will probably

You'll discover good merchandise advertised in this good publication.

be out in the latter part of this month. We compiled from the same reports received from the various coal companies the accidents in the years 1941 and 1940.

(Applause.)

Chairman Lewis: Thank you, Mr. Marchesi.

We have heard a paper that is very vital and pertinent to the interests of the industry. Do we have any comments on this paper? It seems to me that there should be a very interesting and animated discussion on this.

Mr. Jones, do you have anything?

Mr. John E. Jones: Yes, Gentlemen, I listened with a good deal of interest to the figures of Mr. Marchesi. I have been in correspondence with him regarding those figures because of my interest with respect to whether or not we are improving or going backward. I will be very glad indeed to get the figures which he mentioned, and am looking forward with a great deal of interest to the report which comes out, he says, the latter part of this month. I take a great deal of interest in the comparisons of those figures.

President Jefferis: Mr. Marchesi, you mentioned about the reports coming in. I notice on the monthly reports that come in about the production of coal you show a lot of mines which do not report. Do you mean they do not report their accidents and so on, too? And why is that, now, because that has just happened in the last year or two? I keep a record of all that.

Mr. Marchesi: Well, Mr. President, on that the law is not specific on getting the monthly coal reports from every coal operator. Therefore the monthly reports that you are referring to are not as accurate as they should be. In some instances we have found that coal operators switch their tonnage back and forth from one mine to another, for some reason or other, not to show the actual amount of tonnage they produce in certain localities. We have been having trouble with various coal companies reporting accidents. When they have an accident, whether it is a fatal accident or not, the Department requires that all accidents should be reported. And in many instances we do not get the report of the accident first-hand. We get that in a round-about way, and sometimes our inspectors get it five and six days after it has actually happened. Those are things on which, if the operators and industry want accurate reports from the Department, they must cooperate with the Department of Mines and Minerals and furnish them with the data on the accidents of those mines. Is that the answer to your question?

President Jefferis: Yes.

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Chairman Lewis: Does anyone else have anything to say on that subject?

Mr. Marchesi: Mr. Chairman, let us clear it up. The five or six day delay in getting the reports to the Department is not what we are objecting to. It is the inspectors who are in the field who do not get to find out until five or six days after the accident has happened, and they get it in a round-about way and not directly from the coal company or someone who has authority to get in touch with them. That is the part I want to bring out, that they should notify the inspectors in their districts as to the accidents that occur.

President Jefferis: Mr. Marchesi, you said if the coal men wanted these reports they should send them in. As I understand it, this report put out by the Director of Mines and Minerals is for everyone in the State of Illinois now, and not exactly for the coal men, and it seems to me there should be some way to force the mines to make the reports so that the citizens in the State of Illinois know what is going on, regardless of whether some like it or not. I didn't use to like to make them out; but I like to read them now.

Mr. Marchesi: In regard to forcing the various local mine operators, you will have to amend the law. In other words, the law will have to be amended by the Legislature to force them to do it. They are required under the present system to furnish us one yearly report, and we often have difficulty in getting that.

Doctor Leighton: Mr. Chairman, I suggest and move that this body of members of the Illinois Mining Institute send through Mr. Marchesi, back to the Director, the hearty greetings of the Institute and our best wishes for a rapid recovery, and hope that he can be with us at the next meeting.

Chairman Lewis: You have heard the motion. Is there a second?

(The motion was duly seconded.)

Secretary Schonthal: Mr. Chairman, I would like to mention that I sent a telegram to Director Medill from St. Louis yesterday on behalf of the Institute extending greetings, and I told him we have made a reservation for him on the boat for next year.

Doctor Leighton: Well, let's put this on the record.

Secretary Schonthal: O. K.; that is fine.

(The question was called, the motion put and carried.)

Chairman Lewis: Thank you, Mr. Marchesi. Your paper has been very interesting and highly illuminating, I assure you.

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We have with us today Mr. L. G. Shorthouse, Jr., Superintendent of Buckheart Mine No. 17, United Electric Coal Companies, Canton, Illinois. He will read a paper on Strip Mining in Fulton County, Illinois. We fellows who work in the deep vein mines of the State of Illinois should be deeply interested in the progress of strip mining in the State of Illinois. In 1940 the report showed that the strip mining industry in Illinois increased its tonnage nearly two million seven hundred thousand tons, if I am not mistaken, employing only twenty-nine more additional men. We fellows who hope to continue working in the deep vein mines and know nothing about strip mining had better look out for ourselves, for some of these days we will either have to be strip miners or some other kind of gold miner.

At this time I want to introduce to you Mr. L. G. Shorthouse, Jr. (Applause.)

STRIP MINING—FULTON COUNTY (ILL.)

By L. G. SHORTHOUSE, JR.

Superintendent, Buckheart Mine, United Electric Coal Companies
Canton, Ill.

Fulton County has progressed by leaps and bounds as a coal producing area of number 5 and number 6 vein coals in the past ten years. This has been due to two main factors. First, the presence of a large acreage of coal overlain by a shallow and not too tough overburden. The second factor was the introduction into the field of up-to-date coal preparation plants.

In regard to the overburden, one of its characteristics which is favorable to open pit methods of mining was, ten to fifteen years ago, one of the main factors in the abandonment of this county by the shaft mine operator, namely, the lack of a good cap rock topped by a consistently firm shale. The deep mines had worked out practically all of the field that had good roof conditions and were forced to leave several thousand acres of coal over which there was an overburden of less than 60 feet. The lack of too tough a rock along with the shallow cover makes it possible for the coal mine operator to retrieve the balance of the Fulton County field by stripping methods with modern excavating machinery.

The second factor that had limited in the past the amount of coal that could be sold and hence mined, was the inherent poor quality and dirtiness of the number 5 and 6 seams. It is noteworthy that in the period 1920 to 1933, the production of the county was on a steady downgrade, declining gradually from over 2 million tons in 1920 to less than one million in 1933. This was due in part to development of fields with cleaner coal in other parts of the state, and to the fact so little area remained for the shaft operators in the county that they did not deem it

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sound economics to go to the expense of installing modern washing plants at the few deep mines remaining in the late 1920's.

The first strip mine in the field was the United Electric Coal Companies mine at Cuba which began mining operations in 1923, with an up to date tippie but no washery. In 1929 Truax-Traer opened a strip operation on an abandoned shaft property using the same tippie and other buildings as its predecessor. As mentioned before, tonnage for the county was still on the downward trend at this time. Beginning in 1933, when production was at its lowest ebb, one strip mine after another was opened up; Midland Electric Coal Company at Middle Grove in 1933, Truax-Traer at Fiatt in '35, Central States Collieries at St. David in '36, the United Electric Coal Companies' Buckheart Mine, near Canton, in '37, Rowland Mine at Cuba in 1938, Midland Electric Coal Company, west of Farmington, in 1941, also in this same year Central States Collieries operation south of Cuba, and in 1942, F. C. Morgan Coal Company, Bryant, and Fairview Collieries at Fairview. With one exception, all of these afore-mentioned strips were equipped from the outstart with the most modern and up-to-date coal washeries and preparation plants. After the shipping tonnage had slipped to 994,505 tons in 1933, it progressed at a rate of approximately a half-million tons annually until in 1941 it reached 4,376,488 tons and gives all indication of becoming even greater in 1942.

The Method

Any discussion of coal mining whether it be by shaft, slope, drift or strip method, necessitates consideration of the three main divisions of operation, namely, the actual mining, haulage and preparation. In this discussion, stripping will be the main topic with some mention of haulage, but only as it affects the stripping operation. In the open pit method there are several methods of removing the overburden. In Fulton County this has been accomplished by various combinations of large and small shovels and drag lines. They are: (1) single shovel operation, (2) shovel and drag line, in tandem (3) two shovels in tandem, (4) shovel and drag line with drag line relaying the excess material in the waste bank and (5) by drag line alone.

The actual opening of the pits in the various mines has been done mainly by following the coal crop line, the stripping unit or units removing the overburden from the coal and spoiling it in the hollows and valleys that lie below the coal elevation. In this practice, of course, care has to be taken that a main artery of drainage is not dammed up with a consequent backing up of the water into the operating pit. Where the crop line is followed, the coal is first removed from the side of the pit next the out-crop by a loading shovel. The stripping unit or units then follow up by dumping into the cut taken out by the loader, etc., so that the field is worked by starting at the out-crop and gradually working away from it with cuts that average 45 feet in width.

The typical type of overburden encountered in Fulton County, regardless of depth, usually consists of the top half being surface or dirt and the bottom half mainly shale with a few inches of slate directly over the coal and about two feet of cap rock above the slate.

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With the single shovel method it has been found best to place the shale and rock at the base of the spoil pile to form a retaining wall and then spoil the top half or surface dirt behind it. Placing the rock and shale at the bottom has two distinct advantages: (1) the rock and shale, being heavier and more stable, are more able to hold back the load than would the top dirt and (2) the rock and shale is not liable to soak up water as would the dirt and, consequently, does not become mushy, which of course leads to slides, the bane of every open pit operator.

With the shovel and drag line units working in tandem on the coal, the general principle is the same as a single shovel, and is used only where the total overburden is too great for the shovel to handle by itself. As before, the rock, shale, and slate are placed on the bottom with what dirt the shovel handles being dumped on top. The shovel in this case, throws up a great retaining wall, followed by the drag line with its longer boom and greater digging and dumping range. The drag line takes off the top one-third of the overburden as a general practice, spoiling its dig behind the shovel's spoil pile, thereby, leaving the bottom two-thirds of the overburden which is mostly rock and shale, for the shovel's next cut.

In the two shovel operation, working in tandem on the coal, the first shovel, with comparatively short dumping range, spoils its dig first. Of necessity, it digs that part of the bank which is nearest the open cut left by the previous loading cut. It is followed by a shovel of wider and higher dumping range which removes the overburden furthest from the last previous cut and spoils it beyond the waste bank laid up by the first shovel. This method in shallow overburden (thirty to forty feet) leaves a wide operating pit, the loader removing the coal by two cuts, instead of the customary one. Where this method has been followed in the county, the loading shovel operated an extra shift over and above the regular mining operation. During this extra time, the loading shovel dug the coal next the waste bank and dumped it on the coal nearest the haulage way, the loose coal being loaded at the same time as the previously unremoved coal during the next regular working shift.

Where the stripping shovel works on the coal and a small drag line (three to five yards) works on the top of the waste bank, the drag relays the top dirt on the waste bank, back passing it to a point further removed from the pit. It well might be explained here that dirt when dug and dumped attains a height greater than the original virgin bank and sometimes where the stripping shovel can dig the original bank, it cannot dump its load because of the waste bank's higher elevation, thus, the small drag line removing this top dirt enables the stripper to go through deep spots in the operating pit. This method is not used consistently throughout the length of the pit as it has been found more advantageous to use the shovel and large drag line in tandem on the coal, and is only used where excessively deep stripping is encountered occasionally.

Where the single drag line operates from on top the dig bank, the loading shovel has previously taken out all the coal from spoil pile to dig bank. The drag line, in removing the overburden, digs off the top dirt and places it behind a retaining wall of rock and shale. It next digs

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the rock and shale, by now uncovered, swinging its load over the waste bank beside it and dumps the rock and shale in the open pit below and behind it, thus making the retaining wall for the next move of the machine which will, of course, take off the top dirt first.

In general, regardless of what method is used, the pit is shaped in a long arc with the coal being removed from the outside edge and the overburden being removed from the inside or shorter arc. This has the distinct advantage of there being more dirt room than is actually needed for normal digging and allows the stripper to tackle successfully, overburdens greater than could be handled if the pit were a straight line. Also it allows for leaving an opening or openings in the waste banks which serve as haulageways. These gaps can only be left by cramming the overburden behind and ahead. This, in most pits, would be impossible to do unless the pit is shaped in an outside curve.

* * *

Mr. Shorthouse: (Interpolating) Mr. Chairman and members, this is my first attendance at any meeting of the Illinois Mining Institute. I don't want to express my feelings now, but I have certainly enjoyed it so far, and think I am going to derive quite a bit of benefit from it, and am quite sure you can count on me, if Mr. Roosevelt sees fit, next year.

What I have chosen to talk about is that which I know about, but inasmuch as most of you here are deep miners I hope you understand my explanation of why this paper was written.

Chairman Lewis: You have heard a very interesting paper on strip mines. Being a coal digger, a deep vein coal digger by environment and position, when I hear the word "strip mine" mentioned I can't help but have the similar feeling that an old fellow did out in Hippapaw, Nevada. I was driving from Ely to Hippapaw, ninety miles, and in that distance I didn't see a blade of grass, didn't see anything growing. I saw nothing but rocks and sand and lava, and little gophers along the road. Finally about ten or fifteen miles from Hippapaw I ran into a badger with two of his young in front of his hole. When I got to Hippapaw, in front of the post office, which was the only building in town, a fellow was out in front there. I described this animal that I had seen and asked him what it was. He said, "That's a badger. The damn things ain't no good." He said, "They spoil the land." Naturally, being a coal digger, I had the same reaction. Although some of this land isn't any good, I have the same reaction he had.

Nevertheless the stripping business is a powerful factor in the Illinois industry today. In 1918 the industry, operating only in the outcroppings of northern and southern Illinois coal fields, produced 400,000 tons, and in 1940 they produced 17,000,000 tons. I believe those figures are correct. I feel it incumbent, rather, upon us fellows who make our living and depend upon the deep vein shafts for our livelihood to become aware of these fellows that are "spoilng the land."

Has anybody any comments?

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Mr. Joseph E. Hitt: Mr. Chairman, I think your story would make it very appropriate for Mr. Shorthouse, while it wasn't mentioned in his paper, to tell us briefly what the strippers are doing to restore the land and to make it valuable for us commercially in the future, after the strippers get through with it.

Mr. Shorthouse: Of course, my experience has been rather limited as far as range goes. I can tell you something of what all the operators are doing in Fulton County and some of the other neighboring counties. Mr. Byron Somers, who is a member of your Board of Directors, has been experimenting and has now got quite a stock-grazing field at that Truax mine at Fiatt. Mr. Truax himself has done experimental work with various crops such as clover. The rest of the mines, I do know, have with the assistance of the State raised trees, have been planting anywhere from fifty to one hundred fifty thousand trees each year on each property; and of course that will have in the future a definite economic value.

Chairman Lewis: Has anyone else anything to say in discussion of the interesting paper? If not we will move on to the next.

We have another paper on a proposition that is very important to the industry in the State of Illinois, something that we have just discussed in theory. It has been very little in practice in the State of Illinois now, and that is "Water Tank Shortwall Spraying." Mr. D. H. Davis, Chief Chemist of the Pittsburgh Coal Company, Pittsburgh, Pennsylvania, will read this paper.

Mr. Davis, if you will come forward.

Mr. Davis: I am very happy to be here and am surely enjoying myself. I would like to just offer a few remarks before reading the paper. We are more or less just getting started on this spraying and anything that is said today is based on our experience to date. It does not represent the best practice by any means, and I wish you would accept this information simply as what we have been doing and what we are trying to do.



WATER TANK SHORTWALL SPRAYING

By D. H. DAVIS

Chief Chemist, Pittsburgh Coal Co., Pittsburgh, Pa.

In recent months recommendations have been received by the mining industry for the suppression of fine coal dust at the source. Modern methods of mining produce more coal dust in shorter periods of time and the industry is faced with the problem of suppressing dust in a practical and economical manner. So much has been written concerning the subject of the hazards of fine coal dust that we feel it unnecessary to review at this time any of these publications. Rather, we propose to describe some of the method used by Pittsburgh Coal Company for shortwall spraying.

In many instances, restricted amounts of spray water are necessary because of the effect on the marketing of the coal. The delivered B.t.u., handling characteristics, necessity for fine screening within specified limits, and the efficiency of air cleaning are all affected adversely by the addition of excessive moisture to the coal. Some of these economical and practical influences must be considered in the use of water for reducing dust at the source.

In most cases, the problem of spraying resolves itself into obtaining the highest obtainable dust reduction compatible with reasonable cost and reasonable quantities of water. Spraying the undercut involves the selection of a method of applying water during the cutting operation and a method of water distribution. The method of distribution is closely allied to the amount of moisture that may be added to the coal and will be influenced by the number of sources to be sprayed and the amount of water necessary to adequately reduce the dust.

Dust produced in underground mining operations may be classified as primary or secondary sources of dust. Undercutting, drilling, blasting, and shooting may be considered primary sources of dust. Sources considered as secondary are loading, underground transfer points, transportation, miscellaneous operations such as movement of men and machinery, timbering, air velocity, etc. Experience, backed with adequate test data has indicated that when dust is controlled at the primary sources, dust arising from secondary sources is reduced. Pittsburgh Coal Company has considered undercutting to be the principal primary source of underground dust and therefore, in our underground mining operations, the control of the dust produced while undercutting, has been given first attention.

Method of Spraying the Undercut

Several shortwall mining machines of three manufacturers have each been equipped with sprays located on either side of the cutter chain in the front of the machine, making two spray nozzles per machine. On two of the three types of mining machines, both the right and left hand sprays have been located approximately 6" above the cutter bar and

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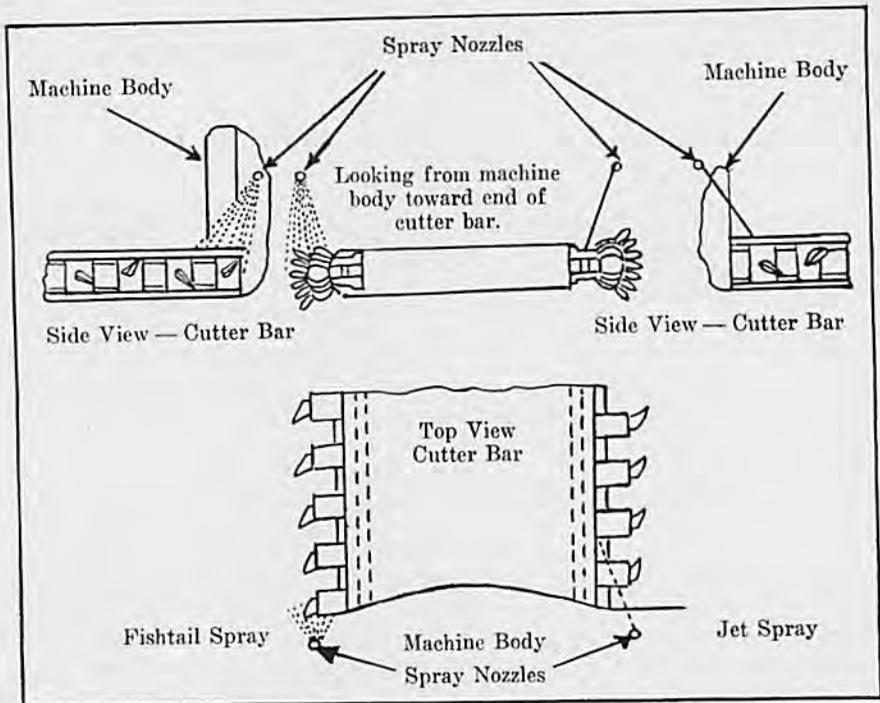


Figure 1. Diagram showing location of spray nozzles in respect to cutter bar.

slightly to the outside of the cutter chain. It has been found best to locate the sprays back of the front of the armature casing in order to give protection to spray nozzles. When a recess is not available, special guards or hoods have been built. Looking toward the working face, the right hand spray is a pencil like jet directed so as to strike the ingoing chain as it enters the kerf and thus be carried to the back of the cut. (See Figure 1.) On the left hand side (looking toward the working face) there is a fishtail spray located so that it brackets the stream of cuttings as they are carried out by the cutter bar. The application of spray water from two points allows a certain safety factor in that if one spray clogs, considerable dust reduction will still be effected by the other. Also in these positions, the sprays are accessible for inspection and repair and can be protected against damage. Lastly, and very important is that the operation of the sprays at these points is not affected by the manner in which the cutting machine is operated in respect to the removal of cuttings.

In some publications, it has been stated that reduction of dust has been accomplished by spraying the dust in suspension by means of a mist and not by wetting the coal. Our work indicates that on the shortwall cutting machines, it is unnecessary to use sufficient pressure to produce a mist which would require 75 lbs. per square inch or over. At a pressure

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of 75 lbs., it was found that the diameter of the orifice would have to be reduced to a size that could not be kept from plugging in order that the moisture of the cuttings will not be increased more than 1.0 to 1.5 percent. Our practice has been to use a pressure of approximately 35 lbs. per square inch at the nozzle with a spray of .065" diameter orifice. One-half of the water is not sprayed at all, but is applied as a jet so as to be carried to the back of the cut. Tests with application of water by the jet spray alone give a substantial reduction of dust and indicate that mists produced by high pressures are not essential to good dust reduction. The turbulence that occurs when cuttings are produced and the time interval between production of the fines and ejection of cuttings is an advantage in shortwall spraying. By applying water on the ingoing chain, one-half of the water is carried to the points where the fines are produced and where the two factors named above (i.e. turbulence and time) will have a chance to aid in spreading the water.

In a 21 foot place with a 9 foot depth of undercut, 12 to 15 gallons of water is being applied per cut, when spraying at 35 lbs. per square inch pressure with two nozzles of .065" diameter orifice. The increase in free moisture of the cuttings is approximately one percent (1.0%).

Regardless of the method of supplying water under pressure to the nozzles, the spray installation on the cutting machine is the same. $\frac{1}{4}$ " pipe is extended from each nozzle to a point on the top of the machine convenient to the operator. Near the end of the line is a valve and filter and at the end is a hose connection all protected by a hood. The hose connection provides a simple and quick connection between spray installation on the cutting machine and the source of the water. While the machine is tramming, the hose is coiled and placed on top of the machine. Protection of the piping and nozzles is of paramount importance as the entire spray system depends on keeping these parts in operating order. A good filter is also necessary to keep the nozzles open and maintain steady operation of sprays. The filter consists of a reducing tee, filled with steel wool and cellulose sponge, with a plug in one end of the fitting for easy cleaning. In our opinion, this type of filter has been proven superior to other types of filters used. Where the diameter of the orifice is below .065", a 1" pipe sleeve filled with cellulose sponge is used as a filter just before the nozzle.

Water Distribution

Water distribution represents the bulk of expense in the operation of spray systems and hence must be given careful consideration. The number of dust sources that are to be controlled and the degree of dust reduction required must first be recognized. If all operations in the production cycle are to be sprayed, water distribution by pipe is probably the most practical. If only one or a few of the operations are to be sprayed, then other methods are applicable.

Some of the various methods used for supplying water at the face are:

1. Use of pipe throughout the mine with water supply from a central source.

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2. Use of pipe in working sections with water supply from a conveniently located dam or sump. These dams or sumps may be supplied by:
 - a. track mounted tank car
 - b. drill hole tapping surface stream
 - c. connection to mine drainage system
3. Use of track mounted tank car holding about 1000 gallons which may be switched off the main track in the working section and the water distributed to the face by pipes.
4. The use of track mounted tank car that is hauled with the cutting machine or loading machine.
5. Use of the tank built as an integral part of the cutting machine truck.
6. Use of small hand portable tanks holding from 5 to 5½ gallons of water, charged into the tank after an initial charge of air pressure.

The first three methods involve the use of pipe for distributing water at the face. We have used pipe at the face in experimental set-ups and are using it regularly at loading heads and shuttle car transfer points. Also, in an experimental set-up, a tank was hauled after the cutting machine.

Tank Built as an Integral Part of Shortwall Truck

In order that additional pieces of equipment will not be added to those already at the face, the shortwall mining machine truck has been equipped with a tank of approximately 200 gallons capacity for supplying water to the face while undercutting. The turntable and tilting frame are mounted directly on top the tank. No change is made in the length of the tilting frame or in the overall height of the unit. The tank is internally braced and reinforced with the necessary stiffening plates and has protective plates to form a substantial bumper. In other respects, the machines are no different from standard equipment of the same make.

A Dayton-Dowd one inch turbine type, single stage centrifugal pump, operated at 1750 r.p.m. is directly connected to a ⅓ HP, 550 volt, direct current approved permissible type motor. Pump and motor are mounted on one side of the tank truck. At a 130 ft. head, the pump has a capacity of one gallon per minute. The control switch is also an approved permissible type. The pump motor is wired integral with the cutting machine motor.

One end of the 30 ft. length of rubber hose is attached to the discharge of the pump, and when cutting, the other end of the hose is connected to the piping system of the cutting machine. The length of the hose is coiled up and placed on the machine when the shortwall machine is tramming. The piping and valves assembled with the pump are so

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arranged that the same pump used for spraying may be used for filling the tank by simply changing the valve and drawing the water into the cutting machine tank. This method is not usually used as considerable time is consumed; it serves as an emergency method for filling the tank. Usual methods of filling the tank are by gravity flow or by pumping from a water delivery tank or sump.

Three makes of cutting machines have been equipped with integral tanks and are in use. All tanks, pumps, etc. have worked satisfactorily with but little trouble. We have found that location and protection of nozzles and piping is the vital part of any spray system. Considerable time and effort has been spent in making a practical design of protective hood and piping; standard designs have been made for each type of machine.

In the use of water tanks integral with the shortwall machine, it is necessary to work out an adequate supply system for filling these tanks. The tanks hold sufficient water for 10 to 15 cuts. The best method appears to be by means of a large water tank of approximately 1000 gallon capacity, fitted with a pump of 50 gallon per minute capacity. Little time is lost in filling the cutting machine tank trucks from this type of tank.

There are systems of mining such as conveyors, where there is no track to the face and the cutting machine truck is not used. To meet this condition, one man in our organization devised hand portable tanks consisting of a 5½ foot length of a light-weight boiler tubing with tightly welded end plates and fitted with a substantial valve. These tanks are filled and charged in batteries of five to ten tanks at a time, and the tanks are capable of maintaining the charge for a week or more. They are fitted with handles and are usually dragged from the entry to the face. The total weight of a filled tank is approximately 100 lbs. These tanks may be used in connection with any of the face operations and are inexpensive and easy to build. To operate, the rubber hose leading to the cutting machine spray system is coupled to the portable tank, the valve on the tank is opened and the air pressure previously charged into the tank, forces the water through the spray system. A cock or valve located on the cutting machine provides the operator instant control while cutting. Approximately 50 per cent less water is used with the hand portable tanks as compared to the cutting machine tanks and a strong concentration of wetting agent is being added to water.

Results Obtained by Spraying Undercut

Following this method of spraying, the dust concentration in the air when undercutting has been reduced by 80 to 90 per cent with quantities of water which are not detrimental to the marketability or the handling characteristics of the $0 \times \frac{3}{8}$ ". By this method of spraying, an attempt is made to fix the dust forming fines to the larger particles in such a manner that they cannot subsequently disperse into the air. After four weeks of spraying the undercut, the dust concentration in that section before starting the undercut, had been reduced by 67 per cent. This indicates

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that dust from other operations such as loading are reduced by spraying the undercut.

Slack Conveyor for Removing Cuttings

Due to the higher rates of cutting by the newer types of shortwall mining machines, the cuttings cannot be removed by one scraper as fast as they are produced. The incorporation of a cuttings conveyor into the shortwall cutting machine will eliminate a large proportion of hand shoveling of the cuttings as they emerge from the machine. In England, where cutting in bottoms is the usual practice, mechanical removal of cuttings has long been used. In this country, some of the manufacturers of mining machines have built such units and preliminary results on one of these in our mines indicate that after improvements have been made in design, the slack conveyor will offer many advantages.

Some of the advantages claimed for a slack conveyor to remove cuttings are:

1. Reduction in power consumption.
2. A clean undercut will permit better preparation of the cut for loading and should produce a greater proportion of lump coal. As bugdusting is a disagreeable job and just isn't done properly 100 per cent of the time, the slack conveyor will eliminate much of the human element from this job.
3. A coarser slack will be produced due to cuttings being discharged from the machine rather than be carried by the chain back by the cutting bits.
4. In England, tests have indicated a reduction in dust produced.
5. Reduction in labor in keeping the cuttings away from the machine.
6. A decided savings in bit life.

Two types of slack conveyors have been designed by one manufacturer. The first operates in the same longitudinal plane as the shortwall and the second is turned at a 45 degree angle opposite to the direction of travel of the shortwall. The slack conveyor is clamped to the rear end of the shortwall machine. Either of these conveyors can easily be disconnected when the machine is being moved. Power for both types of conveyors is taken from the intermediate shaft of the shortwall and by various arrangements of gearing and chain and sprockets, power is transmitted to the conveyor chain.

We have attempted to give a brief picture of the method used by the Pittsburgh Coal Company for spraying the undercuts and some of the factors which have influenced the selection of this method. No doubt many of you have satisfactory systems for suppressing dust while cutting.

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Undoubtedly, many improvements in method and application will be made in the future as but a small percentage of mines are now spraying the undercut. Progress will result if we are willing to cooperate in the interchange of ideas on this subject as well as on other subjects relating to coal production.

* * *

Also I wish to emphasize that this paper refers entirely to spraying on shortwall mining machines.

Chairman Lewis: We have just heard an excellent paper, very important in the future preparations in the State of Illinois. We are learning a lot of things in Illinois. We are going to learn a lot more in the future. We are on the spot, like a young fellow that was trying to join the army. I have told this story a couple times; don't stop me if you have heard it. A young man was trying to join an honorable and traditional force of the United States Army. His physique was perfect, but his I. Q. was decidedly low. These gentlemen were questioning him, and they asked him about his family, and said, "How many in your family?" And he said, "Pa and Ma, sister and two brothers." They said, "Where do they live?" He said, "Pa is down in the Big House." They said, "Where is your mother?" He said, "She's in the state hospital." They said, "Where do your sister and brothers live?" He said, "One of my brothers is with Pa, and my sister is with Ma, and my other brother, he's in Harvard." They asked, "What in the deuce is your brother studying in Harvard?" He replied, "Heck, he ain't studying nothing. They're studying him." (Laughter.)

That is my impression of the Illinois coal industry, gentlemen. We are studying today. It will behoove us to give good attention to these interesting papers, and absorb the information and knowledge they have given us, because in the future we will need them.

Is there any discussion on this paper?

Doctor Leighton: I want to ask if there is any data available on the increased efficiency from the use of something to lower the surface tension of water, increasing the wettability of the dust, that efficiency would be less use of water and greater length in the drop of the coal dust.

Mr. Davis: There has been quite a bit written on that. The conditions underground are highly variable, as you know, and it takes quite a bit of work to really prove what value wetting agents may have. I do not doubt for a moment that they will help greatly in the reduction of water, but I hesitate to even give an approximate idea of how much value they are. We hear people say, yes, they help the reduction of water, but how much? Well, I cannot answer it, I am frank in saying.

Doctor Leighton: You have no data?

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Mr. Davis: We have quite a bit of data on the use of wetting agents. What we have found to be best for us has been an oil in water emulsion. Here is why; we experienced corrosion of the threads of the set screws which hold the cutting bits. After two or three weeks of spraying with water alone, it was necessary to take the machine to the shop and heat the set screws to loosen them. By using less than a half of one per cent of the oil emulsifying agent, we are able to do away entirely with the freezing of the set screws and we are reducing the corrosion also on the cutter bar itself. The oil is also working as a "fixer" of the dust to the larger particles the same as oil treatment for dustproofing coal. As I have pointed out, you have a good opportunity of trapping the dust at the face when using the shortwall machine. And you obtain a large part of the reduction from the "surface smear"; that is, by the smearing of the water on the coal more due to the turbulent action of the cutting chain than by anything else. So the situation in regard to wetting agents is more complicated than it first appears. In the case of the shortwall cutting machine, it is possible to obtain excellent dust reduction with water alone by giving attention to the necessary details. Now if you were trying to spray dust out of the air, the use of wetting agents would undoubtedly help. And we do use wetting agents at such points as loading heads, and I don't think there is any doubt, but that in such instances, wetting agents are a great help.

A Voice: : Get in touch with Tom Garwood at C. W. & F.; I think Tom can give you some data on that. I have done some work with Tom on that and I think he has some information that might be interesting.

Mr. E. H. Johnson: Mr. Davis mentioned that in this wetting agent you are using that as a regular spray in the small portable tanks.

Mr. Davis: Yes, sir.

Mr. Johnson: Have you attempted using the thousand gallon for wetting the face?

Mr. Davis: We use the thousand gallon tanks, transferring the water to the cutting machine tanks. The water-oil emulsion is put into the thousand gallon tanks and this is pre-mixed before it reaches the cutting machine.

Mr. Weir: Mr. Chairman, Mr. Davis' paper is particularly timely. I have been receiving, along with many others, press releases of Dr. Sayers, the head of the Bureau of Mines in Washington, having to do with the federal inspection. That is the results of the inspection of various mines. These reports are critical to some extent. I think they are also complimentary to some extent when good practices are found, but one invariable with them is use of water at the face. Now, whether they like it or not that is the situation, and unquestionably we are going to have that practice — I would not say forced on the industry, any

more than rock dust was forced on the industry — but it is my humble opinion that we are going to use water at the face before very many years have passed.

Chairman Lewis: Thank you.

Mr. Moses: Mr. Chairman, I might add a word of commendation to the practice described by Mr. Davis by saying sometime ago I visited a mine where a large rotary dump was placed underground, where we dump four mine cars at one time into a bin. When we turned those cars over we created such a cloud of dust and the hazards were so great we did not know what we were going to do with it. We put sprays on our mine machines, probably not with as much perfection as the description you have heard, but it relieved our problem, and today that mine is operating producing fifteen thousand tons a day and the dust hazard has been removed. All inconveniences attributed to the increasing of the moisture is negligible when compared with the water on the coal in wetting.

Mr. V. D. Hanson: I wonder if Mr. Davis will tell us the water he figured would be necessary to do the job and just what he wound up with.

Mr. Davis: I don't recall the actual figures, but it was two to three times as much water as we actually use. In the practical use of sprays, you have to cut down your orifice to a size that will not plug or you will have to provide filters to remove the exceptionally fine particles. And we have found by practical experience that around sixty-five thousandths of an inch orifice will keep open with the type of filter described. We have balanced both pressure and orifice diameters, to give the amount of water required for an 80 to 90 per cent dust reduction. It was remarkable what could be done by reducing the water and still keep the dust reduction in the air down to a reasonable point.

Mr. C. C. Conway: Mr. Chairman, I would like to ask Mr. Davis a question. I would like to know what type of oil he uses, whether agitation is required to make this emulsion, and whether agitation is required to maintain the emulsion, and whether any emulsifying agent is used?

Mr. Davis: I will tell you how we found this oil. I called a representative of an oil company and asked, "What have you in the way of a soluble oil to help cut down some corrosion?" And he delivered to me the next day, a can and we have used it; called "Duspray" made by the Freedom Oil Company. Incidentally, the other day when the order came out prohibiting oil spraying of coal, this product was included, and I guess we are going to have to ask them to deliver this oil for anti-corrosive purposes. That is what it is being used for anyhow.

But as to its properties it produces, it makes the water a milky white and will stay in the water without separating out. As to its specific

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properties, I cannot tell you other than it is an oil with an emulsifying agent, and I believe, a wetting agent.

Mr. Conway: I would also like to ask Mr. Davis what effect he has noticed on the life of his chains?

Mr. Davis: I would like to call Mr. Hanson on that.

Mr. Hanson: Where it has been used, where we started it on a machine and then stopped using it the maintenance on that machine went up exceedingly fast. By reverting back to the use of it the maintenance was lowered. Now, this has all been done, that check has been held about over a six months period, and in this mine where we have various kinds of these sprays, some machines are equipped and some machines are not, with the spray, we had a very easy check that way.

And referring to the set screw that held the bit, as he mentioned the freezing action took place there, but also in the channel of the frame we ran into a lot of trouble; pulling the bar loose from the machine. We found wherever we used the spray it came apart very well and the machine service has remained normal. Other places there was a pitting action.

Mr. Davis: In all cases, we bring water from the outside into the mine for use in spraying the cutter bar. We are at no place using mine drainage water. We are either hauling water into the mine or tapping the strata above the coal.

Mr. A. N. Porter: You speak only of the framework of the machine itself. Have you ever tried any sort of arrangement from the cutting bar into the actual cutting surface?

Mr. Davis: You mean by extending a pipe back to the cutter bar?

Mr. Porter: Yes.

Mr. Davis: No. From what we are able to read and determine, and from the amount of water that would be consumed by that type of installation, we felt that we could not use that, from the very beginning. Most of those installations consist of a pipe running up the cutter bar, and there are holes spaced at intervals, and these holes are quite large; the amount of water that is used would be excessive in our conditions.

Chairman Lewis: Does anyone else have any questions or comment to make? If not I will turn the gavel back to Mr. Jefferis.

(President Jefferis resumed the Chair.)

Chairman Jefferis: Gentlemen, I wish to thank you for the close attention you have given to these splendid papers this morning, and I want to again call your attention to the extreme importance of the two

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papers this afternoon. They hook right up with each other, and, as I said, they are of extreme importance, and there will be an honest-to-goodness discussion on these papers. I know that you will miss a lot if you are not present and I am going to urge all of you to be present at two o'clock sharp, so we won't have to round you up.

The meeting is adjourned until two o'clock.

(Adjournment.)

AFTERNOON SESSION

The second and final session of the meeting on the packet *Golden Eagle* was called to order at two o'clock p.m., Saturday, June 6, 1942, and the following proceedings were had:

President Jefferis: Without further ado I am going to turn the gavel over to Mr. Carl Hayden, Vice President of our Institute, who will conduct the meeting this afternoon.

(Mr. Carl T. Hayden, Sahara Coal Company, Chicago, Illinois, assumed the Chair.)

Chairman Hayden: Mr. President, members of the Institute, we were privileged this morning to hear a number of very excellent papers and discussions regarding certain practical problems of the industry. This afternoon the program is set up to cover some different phases and problems. We have, I believe, three speakers. Two of the papers I am sure will result in considerable discussion. We are fortunate in having with us one of the old timers who is at least indirectly connected with the industry, who has always been able to present to us an interesting picture on the various subjects on which he has talked to us on different occasions. While he needs no introduction, it is a pleasure to present to you Dean Thompson. (Applause.)



ADJUSTING BUSINESS TO WAR CONDITIONS

By DEAN CHARLES M. THOMPSON

College of Commerce and Business Administration,
University of Illinois, Urbana, Ill.

You know, when I was a boy growing up I used to wonder why preachers used to move around pretty often, every year or two, rather than stay in the same spot. Well, since I have grown up and become a preacher of a sort I can see why, because we run out of ideas and run in circles, that is all. It is a simple matter and I am sure I could not talk long without repeating some of the things I have already said.

I was a little disappointed, though, because I have had an ambition all my life and I am beginning to fear I am not going to realize it. Perhaps some of you don't know it, but the late William E. Gladstone had the same situation in his life. What I mean is this, among great philosophers he was regarded as a great statesman and among statesmen he was regarded as a great philosopher. Upon the campus I am looked upon as being a business man. Why in the dickens can't you call me a business man down here and call me an educator up there? It just doesn't work that way apparently. (Laughter.)

I think most of you know what I am trying to do and why I am here on this particular occasion. I invited myself, and so I am here, and I appreciate the generosity on the part of the Secretary and officers in letting me come. I am away from the university on a leave, and what I am trying to do is help industry in the State of Illinois adjust itself to these new and rather strange conditions. I don't know, though, when I have ever been more confused than I am now, and I think the reason is that I am running into so many new situations and I am meeting so many things that are not true. The new situation reminds me of a friend of mine in Chicago, a business man who is a native Dane, and when he was twenty years of age, some twenty-five or thirty years ago, had come to this country. He was telling me about it a week or two ago. He landed at Ellis Island. His brother, who had preceded him to America, was late in meeting him, so he was there all alone, and knew nothing about the habits and customs of this country, but he was hungry, he knew that, because that speaks a universal language. He went to the restaurant. He thought that everything in the restaurant ought to be edible, and he pointed to what was a very strange thing to him. It happened to be a pie. He never saw a pie before in his life, but he took a chance and ate the pie. His brother finally came, and asked him if he was hungry, and he said "Yes and no." The brother said, "What do you mean, 'Yes and no'?" And he replied "Well, I could eat some more, but I don't want any more of that." The brother was mystified, because American pie was his favorite, and he went over to the young lady waitress and said, "Look here, my brother has just come in, he has eaten one of your pies, but he says he doesn't want any more. What is the trouble?" She had

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a big grin. She said, "I can tell you what is the matter, mister." He said, "What?" She said, "He ate the plate." (Laughter.)

Now, as to things that aren't true they remind me of the little story that has come out of the war, and it isn't the one you think it is. It doesn't take that direction. It keeps a decent course. But to this draftee the Doctor said "Can you see those letters on the wall?" And the boy said, "Which wall?" They kept him out, because if he couldn't see the wall there was no use to take him into the army because he never could see a Jap.

He went down to the motion picture show, and here was the doctor sitting next to him, and the boy was pretty nimble minded, because he turned to him and he said, "Excuse me sir. Is this the bus to Chicago?" So there I am; that has been my situation.

Well, to make my story very short, I am going to tell you that we are trying to help the business men adjust themselves to these conditions; and we are not dumb enough to think we have any specifics, because we don't. We can't have specifics. If I had a specific I would keep it to myself and become a billionaire overnight. But I haven't. But we can perhaps help in variety of ways. You people don't know it, but you are helping more than you think, because in the organization that we have set up a number of you are on our committees and we are also using your Mining Institute as one of six organizations in the State which we are calling upon to help us as a group. That is all news to most of you, but I have made my peace with the Secretary and officers and they have not only agreed to help, but they have agreed very willingly. We are keenly interested, let us say, in war production. Every one is. We want to win the war quickly, decisively and completely. And then we are interested in civilian production. I hope I am not considered unpatriotic when I say that in my opinion the one hundred thirty million people who are cold and bedraggled and caught up with the complexion of frustration are not going to win any wars. We are not going to win wars with all the morale on the battle front. We need it there, of course, but also we need plenty in back of it.

I am going to say to you men there are two reasons I am doing this. I have never been busier and never been happier in my life, and the two reasons I am doing it are these. Some of you know this, perhaps all of you, that I owe a tremendous debt of gratitude to the State of Illinois for what it has done for me. It has made it possible, this thing we call the American way of life, the way we live in Illinois has made it possible for me to do what I did not dream of ever being able to do when I was growing up. And the second reason I am willing to give every ounce of effort and every bit of ability I have is that I want to preserve this American way of life. I would not give a nickel to win this war and lose the thing that we call Democracy and American way of life here. (Applause.) It wouldn't be worth the effort. We can win the war without losing that. And, speaking for myself — I am going to do everything I can to see to it that we preserve this thing that we call free enterprise, the thing that has made us great beyond the expectation and imagination and the dreams of all the world leaders in times past.

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Now, just a word about our methods. It happens I am a member of the State Council of Defense, after Mr. Green came into office. It is because I am a member of that Council of Defense that I have been asked to undertake to do what in reality is practically every function that the Council has to perform which has not to do with the direct defense. Most of our work has to do with defense purely and simply, as the name indicates. But I sold the Governor, if I may use that term, and the Council the idea that the business men of this State needed help, if we could help them, not only to adapt themselves to war work, but also to improve their position in civilian production. Those were the producers, and certainly the retailers, whether it be coal or groceries or what else. And I said if you couldn't help him you would afford him an opportunity to weep on your shoulder, and he would certainly appreciate that.

Also with the idea that when this war is over the adjustment to go back to peace conditions is going to be more difficult than the adjustment to war conditions, because instead of having more contracts ahead of them the manufacturers who go back to peace conditions are going to have the stiffest competition they ever saw. There are going to be new methods, processes, and in the meantime they are going to lose contact with the customers, both in front of them and behind them.

And I think the thing is going to carry over after the war when we are going to adjust ourselves to peace conditions. But in order to carry out the war part we have set up in Chicago — and I say Chicago, with the exception of ordinance and chemicals; St. Louis is also a part, and what we are doing in Chicago we are doing in St. Louis also; but in Chicago we have an agency set up there where we have been able to help producers who wanted to do war work. The reason I proposed this plan to the Governor and the Council was this, I read in the paper, and I was permitted to observe once, twice, this eternal running around, walking on one another's feet. You couldn't get an answer of any kind. It was "Go see somebody else." And what I was trying to do was to set up an agency that would get a yes or no answer as of now. If you could not do it, if there was no possibility of a shop being machined for war work if there wasn't a Chinaman's chance, why not tell a fellow and have it over with, and not send him to someone else. And that is why we set up that agency.

Now, we have a civilian production agency with an engineer in charge, and that man is prepared — perhaps you are not interested — but he is prepared to go to any plant in the State of Illinois now and consult with them about raw materials and all the things that go with it; and we think that is going to be a fine agency. You are not interested in the financial side of it, but from the very beginning we have cooperated with the Federal Reserve Bank and now we have funds set aside for these war contracts.

The transportation problem, you certainly must be interested in that, and the trucking problem. These trucking orders are in the process of coming out, and we are having that gone into very carefully by people in whom we have a great deal of confidence.

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Now, in the marketing end, I would like to find a good coal miner or two to put on our committee. I happen to know the producers but I don't know the marketing side of it. In the marketing end we are going to get ready to set up in this State between seventy-five and a hundred conferences on retailing. We waited until the O.P.A. went around and explained their laws. We did not make them and we did not feel obliged to explain them. Now we are going around and organizing the State whereby we are trying to get every retailer in to meetings in which we will have clinics and in which there will be practical discussions by retailers as to what can be done under the law. Now, I know from first hand experience what happened, for instance, when the Interstate Commerce act was passed. We have not yet learned of all the things we can or cannot do because it takes a long time to try it out. We know what the limits are, but how close the thing can be operated within the limits is the question. There is a great deal of confusion in this retailing in particular, the ceilings, the inventories, and then a lot of practical problems like deliveries, packaging and that sort of thing, which we are trying to solve with these retailers.

Now, one more thing and I am going to sit down. I will tell you what has been impressing me. I hope I have given you a little picture of what our Committee is going to do, and I hope you will understand we expect the Mining Institute to be of great assistance to us as a great and going association and going to have several of the members working on our committees.

I had experience in another war, in a war in which a soldier carried about everything he needed. We slept on the ground; we were tickled to death to get a little chewing tobacco once a month, and we carried everything. We had a cook that got drunk and cooked up everything the first thing, and as a result we went without the last three or four days. There was no organization to it. We fought typhoid fever and syphilis and all the rest of the things that go with armies. And that is all right; I am very proud of it and glad to have made a lot of improvement in the meantime. But let me point out some things to you, to show you what I mean about this war, and then I will sit down.

When the Spanish-American war came on a very reluctant Congress appropriated money, passed money bills for the use of the President of the United States, a certain amount of money to put on the Spanish-American war. It is now half-past two, and that is the amount of money which has been spent since half-past nine this morning. We talk about a hundred and twenty thousand this, and one hundred sixty-five thousand of that, and mentioning air planes and tanks, and it doesn't mean a thing to us because most of us never saw an airplane of the kind we are talking about, and most of us never saw a tank, and if we did it wouldn't mean anything because we are not accustomed to the unit. Let me give you a unit. I am trying to give you a picture of what we propose spending in this federal government in one year. Suppose you imagine a truck of silver, five tons of silver on a truck. Now, I suppose that is as much silver as Sir Walter Raleigh and Sir Francis Drake and Frobisher stole in their whole lives. How many trucks do you think it would take? Not

dramatizing, let's put one hundred to a mile; that will give them approximately fifty-three feet each, bumper to bumper. Will they extend at least from here to New Orleans? Well, that is a lot of trucks. But they will go further than that. They will go from here to New Orleans and back, from here to Minneapolis and back, from here to San Francisco and back, from here to New York and back, from here to London. One million five hundred thousand of those trucks loaded with silver, five tons to the truck, represents what we propose spending in one year.

Let me put it another way to you. Most of us do recall a few years ago, when we voted twice in this State to build hard roads, and we appropriated one hundred sixty million dollars and borrowed the money, and many of us predicted we would go bankrupt. Illinois is making a certain contribution to this war today in the form of taxes and debt, our share of the debt. And, after all, we are paying for it in man power. Don't fool yourselves we can postpone one single penny of this war cost. We are going to pay it right now, as far as man power and raw materials are concerned. But measured in money and in debt, today every eleven days we are contributing to the federal cause exactly that hundred and sixty million dollars which we appropriated for roads a few years ago. Just a year ago we were saying that we have the largest state budget in our history. And today every seventeen days we are making that contribution to the federal cause. And one of the largest single items of State expenditure is the University. There has been some complaint about the amount of money that the State has been spending on the University. But consider the present annual appropriation. Our State contribution to the federal cause equals that State annual appropriation to the university since half-past two this morning. Twice every day we are contributing to the federal cause what the University costs to run three hundred sixty-five days. In other words, about one-seven-hundredth. The contribution of this State to the federal cause in this war is about seven hundred times the cost of the University.

One more thing on that and I will quit that part of it. For seventy-five years we have been contributing the money to the University. In seventy-five years the University has been able to accumulate a certain capital account consisting largely of buildings, laboratories, libraries and physical equipment. And you go up there and look at that five thousand acres of land covered with the buildings, major and minor buildings. You say that is an enormous thing. And yet that is only two-thirds of what the Normandie cost. A battleship costs fifty per cent more than we have been able to accumulate in seventy-five years. Aren't you astonished? No wonder there is confusion. And if any man says he has an over-all picture of this war situation, so far as the magnitude is concerned, he is either a snide or an idiot or both, because there isn't any other conclusion one can arrive at. No one has a complete picture of it, it is too big. Is there any wonder then we have tremendous confusion?

Now that is why, and I only emphasize that to tell you why I have undertaken this job, and why I have the temerity to ask business men like you and hundreds of other business men in the State to go on the

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committee with me in order to give me good advice and keep me straight. I do want to make this contribution. We are saying to the business men, we guarantee them we won't do them any damage, we are going to help them all we can, if we can. And that is the object of this committee, of the Council of Defense, on the subject of adjustment of defense and war conditions. I am going to need your prayers and moral support before I am through, because I am finding, and I knew I would find it, that I am being frustrated at every point. I don't mean by people who want to frustrate me, but just by circumstances. The thing is unwieldy; it is heavy to carry and it is difficult to get decisions. Well, out of the goodness of my heart I say I attribute it to the magnitude of the task.

I think I have told you my story. If any of you are interested later, over the cheese and pickles which I hope we will have tonight, we can talk this thing out. I thank you very much. (Applause.)

* * *

Chairman Hayden: Thank you, Dean Thompson, for that excellent presentation of the work that you are now engaged in. I think I can say, not only for the Illinois Mining Institute but for every member, that we will give you every bit of support possible in this very valuable work that you are doing.

We may be able to contribute better if there are some questions asked on some specific problems. Does anyone have a question he would like to ask Dean Thompson?

Dean Thompson: Don't be afraid of embarrassing me, because I have said to the students for many years if I could answer all the questions I would have a better job and I wouldn't be here if I could answer all your questions. I would be running the export-import bank or something.

Mr. Richard F. Wood: I would like to ask a question. You mentioned something about your work concerning the St. Louis territory on some certain features.

Dean Thompson: The ordnance and chemical; I believe the St. Louis headquarters reach over into Illinois. Chicago includes Alton. But in the ordnance there is a line drawn across Illinois that separates Illinois between Chicago and St. Louis. And in the chemical it swings around and takes in a little area right across the river. Does that answer your question?

Mr. Wood: Yes.

Chairman Hayden: Dean Thompson, you mentioned one problem, that you might need some advice and assistance on, some marketing help.

Dean Thompson: I know pretty nearly all types of marketing, but I have never known much about coal marketing, and I have been waiting for this opportunity to have some person, not an operator, not in my term, like Harry Treadwell and Roy Adams, but men who are interested, if

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there are any around, it would be wholesale, I suppose, in every instance; might be a retailer. I could use a good coal man, both retail and wholesale in my committees.

Chairman Hayden: Do you have any other suggestions?

Mr. Richard F. Wood: Dean Thompson, I am in charge of marketing agency for five Illinois mines. Our offices are in St. Louis and we have considerable statistical information and marketing studies there that I am sure you would be welcome to.

Dean Thompson: What I need is someone who knows those things. After many years of education I have come to the conclusion that education is knowing where to find the thing, so that is very welcome, that information.

Chairman Hayden: Fortunately, there are a number of marketing associations that cover a large part of the tonnage sold from Illinois, similar to the one Mr. Wood speaks of. I am very sure that each of these other marketing agencies would be very happy to assist you in any way possible.

Dean Thompson: I want to say this, I am very thankful because a number of operators have shown their willingness and agreed to help; they have six associations that are state-wide, like the Bankers Association, the Manufacturers Association, the Illinois Chamber of Commerce, and your association and two others, helping us. When I say helping us I mean being agencies for anything which we call for in the way of advice.

I might say that among other things we have a group of laboratory trained men in natural resources and engineering who have been very helpful up to the present time. We have been fighting the stove problem. It might be interesting to you coal men to know that under Order 23 we have been able to get a continuation of stove production, in which all the twenty-two plants in Belleville are going to operate. We have had a hand in that. The argument I made was that we were not trying to keep people busy; we were trying to keep people warm. The trouble with some of the boys down in Washington is that they thought "durable" was an abstract term. Well, "durable" is a relative term. Even people wear out in time. And then we have a lot of cockeyed information coming from some quarters about the amount of replacement. When you worked it out it was only ten per cent correct.

Chairman Hayden: Do you have any further suggestions as to how this Institute or any of its members could be helpful to you?

Dean Thompson: No, other than they needn't be surprised if I call them on the phone at any time and ask them some foolish question.

Chairman Hayden: I know they will be glad to hear from you at any time.

Dean Thompson: I am sure they will. Thank you very much.

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Chairman Hayden: The administration at Washington apparently early in the game realized the importance of the coal industry, and if I am correct I believe that the coal industry was one of the first to have an orderly system instituted whereby they could get the critical materials to stay in operation. I think the industry was fortunate. I think further the administration has done a relatively good job, even if there have been a lot of difficulties, in getting the materials that we need to keep going. Fortunately or unfortunately a large part of what we use to operate these mines is the same material, of the same type of material that the army and navy and rest of the war efforts need. It has been a difficult job, and I think a job relatively well handled. We have this afternoon two speakers that will talk to this group on the system of getting for the whole industry those materials that it needs. The first speaker, Mr. Paul Beda, vice-president in charge of purchases, Old Ben Coal Corporation, will read a paper, or talk to us on "Priority Regulations to Date."

(Applause.)

PRIORITY REGULATIONS TO DATE

By P. W. BEDA

Vice-President in Charge of Purchases, Old Ben Coal Corp., Chicago, Ill.

This meeting of our Illinois Mining Institute presents the first opportunity for discussion of the vital topic of Priorities as the Summer meeting of 1941 took place before these regulations became part of our industrial life, and the Fall meeting was held while the system was in the formative stage when frequent changes left little opening for discussion. Our present Priority order P-56 has now been operating for some six months and we have had sufficient experience to bring out valuable ideas in the discussion to follow.

About this time last year the only Priority we heard of was held by the Army and Navy who were then placing orders for large quantities of materials of all kinds and it seemed their competitive efforts would soon absorb all available stocks of goods. No doubt industry in general would have suffered severely if a means of relief had not been devised.

The Office of Production Management then in charge of such matters issued a list of critical materials and some regulations pertaining principally to copper and steel alloys, containing nickel and chromium, followed shortly thereafter by a Defense Rating Plan which was designed to permit a manufacturer or contractor who had direct defense orders to extend his defense priority rating to subcontractors and suppliers of materials. Under this plan the purchasers of materials were required to file affidavits attesting to the percentage of defense orders with relation to the whole of their business. The principal result was an avalanche of requests for such certificates. Many companies simply sent requests to everyone on their mailing lists without regard to whether or not they

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had any previous dealings and it is certain thousands of these forms were filed in the waste basket. However, it was a start in the right direction, and in somewhat modified form is still used by many concerns who are not included in some industry with blanket priority classification.

Through the summer of 1941 we noticed a gradual slowing up of deliveries of orders for some special items but in the main our orders for tools, general supplies, and repair parts for mining machinery were filled quite promptly because our suppliers had well stocked shelves and were then still able to replenish their stocks without too much delay.

During all that time our mining industry apparently received little attention although in April, 1941, Mr. Conover of the American Mining Congress petitioned the Office of Production Management for recognition of our industry in the Priorities System. Mr. John Battle, Secretary of the National Coal Association, also worked diligently to obtain the help we required and we were particularly fortunate to have the assistance of Dr. Wilbur A. Nelson who had been appointed in May, 1941, as Associate Advisor in the Mining Branch of the Office of Production Management. Dr. Nelson is by profession a geologist, a graduate of Vanderbilt University and Master of Arts from Stanford University, and because of his knowledge of our mining problems we may attribute our favorable position in the Priorities System very largely to Dr. Nelson's efforts.

The first priority we obtained was under order P-22 which became effective on August 8th and granted A-10 rating to a great number of industries. In fact, almost everyone then in business was included in that order. Four weeks later when Mr. Donald Nelson was appointed head of the Priorities Division, he promptly revoked the order with a statement that he would not sign any order which granted a specified preference rating for all categories of supplies and equipment to so many industries. However, on September 9th, Mr. Nelson signed a revised order P-22 which still included a large number of industries but restricted the use of A-10 rating to Repairs incident to actual or imminent breakdown and to Emergency Inventory defined as meaning material required to provide for repairs to meet actual or imminent breakdown. This order still left much to be desired as it contained no provision for purchase of new equipment unless a mine was shut down for want of it. Then, too, the A-10 rating was no longer high enough to command early attention to orders for materials on the critical list.

With the approach of winter some real attention was then given to our coal mining industry and one week later Mr. Nelson approved Preference Rating Order P-56 which set up priority for the mining industry alone, and while still a maintenance and repair order there was provision for the procurement of new equipment by special application to Washington.

This order P-56 was revised a few times for the purpose of defining the application of the ratings A-8 and A-3 and in its present form as revised on March 2, 1942, the A-3 rating was replaced by A-1-C rating which makes possible the operation of our mines which we could not do under the lower ratings. The disturbing feature of P-56 and previous orders is the fact that while necessary attention has been given to the

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procurement of new equipment and repairs for our mining machinery there has apparently little attention been given to the hundreds of general supply items which are also necessary in the operation of modern mines. It may be interesting to note that in exchange of letters with Mr. Battle I once sent to him the entire index of a general supply catalog which contained some fourteen thousand items, at least two-thirds of them being tools and miscellaneous supplies which we buy from time to time.

Among the items which we currently require and consider as maintenance items, are trolley wire and light rail for underground use. The War Production Board insists upon classifying these as new equipment. Thus we are not permitted to purchase these items without first sending an application on prescribed form to the Mining Branch who issue letters of authority for the purchase and assign the Priority rating which may be used.

Under the heading of New Equipment order P-56 lists Copper Transmission Wire, Mine Cars, Mine Skips, and Electric Motors. I believe this was intended to apply only to Electric Locomotives, but as it is worded we must make application for any new electric motor even though it be only a fractional horse power unit.

Our greatest difficulty is experienced in the purchase of copper trolley wire and cables, because the copper industry is now under a regulation which compels the manufacturer of copper products to present to the War Production Board on the last day of each month a list of the unfilled orders then on their books, and from that list they are allocated a supply of copper for fabrication. Thus, if we place an order for trolley wire in June we would place the order subject to obtaining a letter of authority to apply an A-1-C rating. The copper company will not enter the order until the official rating is received but if handled promptly they include the tonnage in their June 30th list, and if enough copper is allocated they can then ship the order in August. If your order is placed toward the end of June and authority for rating is not received until after July 1st, then the order cannot be shipped until September. Of course, if a mine is wholly or partially shut down for need of this wire we are permitted to apply for an A-1-A rating which might expedite delivery, but the loss of time and conflict with special rules pertaining to the copper industry would result in loss of tonnage which our Country cannot afford.

Under another paragraph entitled "The Mining Branch will Determine" there is listed Belting (elevator and conveyor), Mine rail, Electric Batteries for haulage motors, Metal flumes, Pipe for pipe lines, Tram cable and Ventilating tubing. Hoist ropes and wire cable were formerly listed in this class, but restriction was lifted on May 13th. We purchasing agents were more than pleased with that revision as the necessity for special application to Washington for each order for wire rope, no matter how small, was a nuisance, and I think the Mining Branch found it a great burden to themselves. I recently had a letter from Mr. Weysser giving his opinion that a special application is not necessary for the purchase of reasonable quantities of pipe if the supplier will ship on A-10 rating, but a higher rating may not be applied without special authority.

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The favorable position accorded to our industry under Order P-56 is due largely to the efforts of Dr. Wilbur Nelson but while the order gives us many basic advantages it does require the special applications which we have referred to and in the routine work we are indebted to Dr. Nelson and his assistants for prompt handling of our applications. Dr. Nelson's department includes Dr. McElroy, who was formerly Professor of Mining at West Virginia University, Mr. Wm. A. Wheeler, Mr. K. G. Pfoor, and Mr. G. L. G. Weysser. Many of our members are well acquainted with Mr. Weysser, who was formerly Assistant Professor of Mining Engineering of the University of Illinois. There was recently appointed Mr. Carl A. Kelly, Field Technical Advisor for the states of Illinois and Indiana. Our purchasing agents have had a few meetings with Mr. Kelly and we are informed that he intends to hold meetings or clinics at convenient locations for each of the coal districts. To complete the list we have our own State Coordinator, Mr. Robert Medill, State Director of Mines and Minerals to whom we furnish monthly reports of the purchases of materials with priority rating. Our meetings with Mr. Medill were interrupted by his unfortunate accident, and while during Mr. Medill's absence the priority work has been ably handled by his assistant, Mr. J. R. Pearce, we are glad to learn that Mr. Medill is well on the way to recovery and we look forward to his presence at future meetings.

The general trend of priorities has been toward Production Requirement Plan which provides for allocation of materials to various manufacturers. For instance, a steel casting company reports at regular intervals the number of orders they have on hand and quantity of raw material required to complete the orders. The War Production Board then studies these orders and from their knowledge of the quantity of raw material available they allocate the tonnage which that particular manufacturer may have. Such plan is not practical for supplying the mining industry with materials but we will have something close to it in the allocation of dollar value of materials which we may buy in any one quarter. Early this year we furnished figures to the War Production Board covering tonnage mined and dollar value of materials purchased during 1941 and the first quarter of 1942. From this information they will allocate the dollar value of new purchases which we may have for the quarter ending June 30th and each quarter thereafter while this ruling remains in effect. I am very hopeful that when this plan is worked out they may remove restrictions pertaining to some articles such as rail, pipe, trolley wire, etc., and they should be able to do this because the purpose of the plan is to maintain a control of our inventories.

For that reason it is going to be more necessary than ever to have the closest cooperation between the Operating and Purchasing Departments of our companies to avoid loading up inventories with excess supply of goods which may be obtained quite promptly at any time.

The plan has not been discussed to any extent but after the quotas are received there will probably be a number of details to be worked out at our meetings with representatives of the Mining Branch.

* * *

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Chairman Hayden: Thank you, Paul, for that very excellent discussion of a very important problem that we have in the industry.

The next speaker on the program is Mr. DeWitt, purchasing agent of the Chicago Wilmington & Franklin Coal Company. He will follow Mr. Beda and lead the discussion, and after Mr. DeWitt gets through with his end of it we will throw this open for discussion on the part of everybody. Mr. DeWitt. (Applause.)

PRIORITY REGULATIONS TO DATE

By C. S. DeWITT

Purchasing Agent, Chicago, Wilmington & Franklin Coal Co.,
Chicago, Ill.

The general subject of "Priorities," even though limited to the ratings and details of preference accorded the needs of the mining industry by the War Production Board, offers much for discussion. Unfortunately, the Mining Branch never has had the personnel or facilities for disseminating among serial number holders the various rulings and interpretations of Order P-56, which are issued from time to time. The important task of spreading the word to the industry when something new comes out or some detail is altered by the Mining Branch has been delegated almost entirely to American Mining Congress and National Coal Association. To Mr. Beda's comments in this respect, may I add that we all owe a debt of gratitude to these two organizations which so faithfully and effectively have informed the mining industry of new developments in the regulations which practically constitute the life blood of our mines.

As Mr. Beda has pointed out, it is only since March 2nd, that the mining industry of new developments in the regulations which practically constitute the life blood of our mines.

As Mr. Beda has pointed out, it is only since March 2nd, that the mining industry has been extended a sufficiently high preference rating set-up under Order P-56 Revised for the mines to secure materials in kinds and quantities to insure continuing fitness of equipment and property so that coal may move without interruption to munitions and war materials plants, power and transportation systems, and other industries vital to the Victory Program.

It must be borne in mind throughout any discussion of our priorities set-up that Order P-56 Revised is primarily an instrument to facilitate mine "maintenance and repair." The order itself defines "Maintenance and repair" in a concise recital of what these terms mean so far as mine priorities assistance is concerned. We may look, however, to another interpretation, promulgated by the WPB and released under the designation WPB-642, for a more detailed definition of "maintenance and

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repair," outlining, in addition, what these terms do not include:—
(I quote)

“ ‘Maintenance’ means the upkeep of a Structure or Equipment in a sound working condition with a minimum expenditure of Material.

“ ‘Repair’ means the restoration of a Structure or Equipment to a sound working condition when such Structure or Equipment has been rendered unsafe or unfit for further service by wear and tear, damage, destruction or failure of parts, or similar causes.

“The terms ‘maintenance’ and ‘repair’ do not include any of the following:

1. The replacement of an item or part thereof where such replacement is carried on the books as a fixed asset;
2. The use of Material for the improvement of a Structure or Equipment through the replacement of Material in the existing installation, unless the item or part thereof which is replaced is beyond economic Repair, or has been rendered unusable by fire or other hazard or natural cause;
3. The use of Material for additions to or expansion of a Structure or Equipment;
4. The use of Material for a purpose which could not properly be charged on the books to ‘Maintenance’, ‘Repair’, or the equivalent in the established method of bookkeeping.” (End of quotation.)

Broad enough, is it not, when you consider that nothing is excepted in the way of scarce or critical materials you may need for the maintenance of Structure or Equipment? As long as what you do, in the way of keeping up your machinery and production units, is held to a reasonable minimum, maintenance materials can be had. The Mining Branch with its able staff can and does render valuable assistance to mine operators in getting material or parts needed to maintain or repair vital equipment.

Another point mentioned by Mr. Beda is the provision in Order P-56 Revised for the acquisition of necessary new mine equipment. The Mining Branch very properly, and with foresight, has caused the War Production Board to recognize that mining equipment, even with the best of care and maintenance, does wear out, and requires replacement in full. Thus the order provides that upon application and with proper supporting evidence an operator may receive authorization of preference rating for essential equipment, either new or replacement. I would like to stress at this time the extreme importance of submitting your application for new equipment rating in full detail and supported by production figures and the operating history of the worn-out or obsolete equipment if same is to be replaced. Present to the Mining Branch a complete, clean-cut, accurate picture of your need for the new equipment, and give a definite delivery date on each of several A-ratings. Approach the

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matter with the idea that they have to be sold on your need for a new machine. Actually they do; there isn't enough and there won't be enough new mine machinery for every mine that wants it because the raw material from which to build or assemble it is becoming harder to obtain as demands for military use become heavier and more urgent.

The Mining Branch is particularly insistent that applications state fully what disposition is to be made of the old equipment to be replaced. If replacement is required to provide greater capacity or to speed up some operation to meet a change in conditions, perhaps limited or standby service can be found for the old unit. If it will not do for any kind of further service, many parts can doubtless be salvaged for upkeep on similar units in or around the mine. Lacking that possibility, say that you are moving the old machine out as scrap and, if you haven't heard it before, your scrap is badly needed at the steel mills.

I have with me several copies of the accepted form of application for new equipment, and anyone interested is welcome to a copy as far as they will go.

Let us now proceed to some discussion of the priorities procedure governing certain classes of mine supplies, orders for which cannot be stamped with the prescribed endorsement of rating unless authorized.

Mr. Beda mentioned in his paper that many general supply items necessary in the operation of modern mines had received rather indifferent treatment in the formulation of Order P-56 and its revisions, and in rulings and interpretations issued by the Mining Branch. I think the Mining Branch is making a sincere effort to overcome or eliminate any serious difficulty in obtaining needed supplies as a result of oversight or lack of suitable priority provision for those items. For example, wire rope, as was mentioned, was placed for a short period on the restricted list and could only be purchased after formal authorization of rating by WPB. It seemed an almost endless task to have to make a separate application for every length or lot of wire rope. However, after complaints had been voiced by numerous mine users, the restriction was lifted, and wire rope placed on the "A-1-C Quota" basis when purchased for repair or replacement to any of the Schedule "A" equipment items including, of course, hoist ropes.

Again, we are told that a mining enterprise may receive on endorsed orders a total of 300 feet, per calendar quarter, of pipe not to exceed one inch in diameter. For needs beyond this quantity and size allotment, you must apply for authorization of rating.

Perhaps this very severe restriction already has been lifted. If not, some of us are working on it in the hope of getting the same treatment as was accorded wire rope.

Briefly, our operating supplies have been placed in four categories:—

1. "A-1-C Quota"—covering the bulk of necessary operating supplies from air hose through drill steel, and mechanics' hand tools to track accessories, trailing cable and welding materials, just to mention a few. I have a complete list if anyone would like to look it over. Orders for any materials in this group may be endorsed with the A-1-C rating; no application is necessary.

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2. "Mine Branch Will Determine"—this list comprises Conveyor Belting, Locomotive Storage Batteries, Metal Flumes, Mine Rail, Pipe for Pipe Lines, Tram Cable and Ventilating Tubing. An application in full detail, as discussed a while ago, is required if you want a rating for an order for any of these materials. You will not necessarily receive an A-1-C rating on an application for any of these items and I do not advise seeking it in all cases. It may be an A-1-J or an A-3. However, it is within the discretion of the Mining Branch to permit the Operator to buy the material under his Quota by endorsement of the A-1-C rating. (And, incidentally, Dr. Nelson's staff is becoming quite familiar with the delivery situation on most mine equipment and supply items. Don't wire for and tell them you can get a methane tester, for example, in about three or four weeks on an A-1-C because you'll get a short reply in a couple of days to the effect that delivery of methane testers is 12 weeks on either A-1-C or A-1-J, and if you will submit the application form by mail you will receive an A-1-J rating).

3. "Operating Supply A-8"—In this group are Lamp Carbide, First Aid Supplies, Flame Safety Lamps, Hard Hats, Picks and Shovels (for mines where handloading is used), and Self-Rescuers. Orders for any of these items may be purchased on an order carrying the prescribed signed endorsement with A-8 rating.

4. "New Equipment"—This group covers a few specific items manufactured from critical materials on which the priorities privileges had been used somewhat incorrectly before the WPB made them subject to the same treatment as new equipment. The incorrect use of ratings on these items apparently resulted from misunderstandings or lack of information in the hands of both operators and manufacturers. They are:—Copper transmission wire, Electric Motors, Mine Cars, Mine Skips and Pull-wire Fuse Lighters. You order them now subject to authorization of rating. The Mining Branch has explained, with particular reference to articles containing copper, that they must be considered as new equipment because of scarcity of the red metal. Through this method of control they are trying to effect equitable distribution of copper and provide at least minimum requirements for each mine.

I expect we could go on indefinitely with this discussion but any subject gets tiresome if talked on too much. Therefore, I would like to leave you, in closing, with these thoughts:—Look ahead—Plan ahead—Let us adjust our minds and habits to rationing. Tomorrow and each succeeding day that we are at War brings total rationing a day closer. Sugar rations, and gas rations for our cars are just beginning. We already have curtailment of *Production* of many things. Let this be the warning that curtailment of *Consumption* of many things will be the next phase in restricting our mode of living, both as individuals and as an industry.

I thank you.

* * *

Mr. Beda: Mr. DeWitt mentioned he has copies of that form, it is not too long, and I think perhaps instead of passing out copies you might

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just tell the members some of the principal things we have got to report in our application.

Chairman Hayden: I agree with you, Paul, and we will keep the discussion just as long as it seems helpful.

Mr. DeWitt: I don't know that there is any need for a great deal of discussion on the application form. I have quite a few copies, and I will be very glad to pass them around to any one that is interested in having them. The information called for is as follows:

Date.....

**APPLICATION TO MINING BRANCH,
MATERIALS DIVISION, WAR PRODUCTION BOARD**

For preference rating under P-56 on new equipment, as below:

Applicant Company

Address

Name of Mine.....Serial Number under P-56.....

Mine located at.....

Producing bituminous coal. Present weekly output tons

Will this new equipment result in increasing weekly output?.....
(Yes or No)

If Yes, how much?.....If No, why needed?.....

Number of men employed.....Number of days worked last month.....

Number of shifts worked last month.....

Machinery or Equipment on which preference rating is requested:.....

Weight (if metallic plates or castings).....

Ordered from

Date of Order.....Order number.....Cost \$.....

Delivery date promised (if requisite preference rating is forthcoming)

Rating requested

If you request a rating higher than A-3, explain just why higher rating is
deemed necessary

If the new equipment or machinery to which this application relates is to
replace worn out or obsolete equipment now in the mine, state what dis-
position is to be made of the old equipment.

List on the reverse side of this sheet the major defense customers to whom
you are shipping.

Approximate per cent of your mine output which goes to defense work

(Signed).....

By.....

Chairman Hayden: The meeting will now be open for discussion. It is my suggestion you address your questions to either of these gentlemen.

Mr. Beda: May I say one thing more. We haven't, in our discussion, mentioned this one thing, which I think our members should know. The principal theme of the American Mining Congress meeting at Cincinnati this year was a discussion of the priority ratings for manufacturers of mining equipment. Doctor Nelson came there especially to address the convention Tuesday afternoon. We had a meeting about a week beforehand. A number of us were going down to this meeting, and decided we should have an opportunity to meet with Doctor Nelson. We previously talked with Dr. McElroy, who has been to Chicago. For some reason they elected me to leave early on Monday and get there Monday evening in time to see Doctor Nelson and have a talk with him, which I did. I said, "Doctor, a number of our boys are going to be here from Illinois. They have made this whole meeting apparently for the manufacturers of mining equipment. We purchasing agents would like to have a meeting with you." He said, "Mr. Beda, it's a splendid idea. You name your time and we will have a meeting." The meeting took place at 10:30 Tuesday morning, and those present comprised our Illinois group, a few from Indiana, Kentucky, and West Virginia, some twenty five or thirty in all. We had a very interesting meeting, and if it had not been for a noon day luncheon we would have stayed with Doctor Nelson all day. It was really one of the highlights to us of the convention, and there we found, as I said before, his attitude is absolutely sympathetic, cooperative, and he is going to give us every bit of assistance he can in procurement of supplies, equipment, anything we need in our mines. But he has the barrier of contending with the steel, copper, and some of the other divisions of the priority sections on some items.

Chairman Hayden: Who has a question?

Mr. E. H. Johnson: There is one point neither of the gentlemen brought out very clearly or completely with regard to the manufacturers, which is that a couple of months ago, through the War Production Board, an A-1 rating for the material going into replacement parts, and new equipment, was extended to mining machinery manufacturers. Up to the time that we got that A-1 rating, which we can extend to our suppliers of other raw materials, we were between the "Devil and the Deep Sea." We were getting to where we could not depend on getting alloys. We were up against this copper question, and of course, still are, but that A-1-A has been a life saver for the industry, and again is an indication of the good work in Washington that has been done by the various representatives of the manufacturers and coal producers, and the sympathetic attitude of the War Production Board, particularly, represented by the Mining Branch.

Now, there is a question Mr. DeWitt referred to briefly in the purchase of new equipment. We have had frequent inquiries for equipment, where the purchaser has asked us for promises of delivery on an A-1-A,

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A-1-B, C, D, all the way up to 3. There is not much to distinguished between A-3, or better than A-3. Something better than A-3 is possible for defense contracts, for people who are working a hundred per cent on the production of coal for defense purposes, and we have quite a number of items on our books for a higher rating than A-3, that particularly applies to steel companies, chemical companies, and the like, but we could not give you, for instance, a definite promise that on an A-1-A we can do this, and so on. First, we have to have the order; then the order has to go to the War Production Board, and they return it with whatever rating they see fit to apply to it. Now, an A-1-J and A-1-K, might be just the same. They would both be just a little better than an A-2. We have taken a lot of business, and a lot of other people have also, on more or less definite promises, as nearly definite as promises can be made these days, on an A-3 basis, in good faith, hoping to deliver equipment in three, four, five, six, or seven months. Then some high priority order comes in and we are definitely advised by the War Production Board where to put that in our schedule. We have to send our shipping schedules at regular intervals to Washington, and this is rapidly getting around to a point of allocation of new equipment to the extent that new equipment is going to go where the War Production Board thinks it is most needed.

Mr. Beda: May I answer Mr. Johnson? He mentioned when he gets an order for equipment; that is, when they take an order they must be assured they will get a rating. The procedure usually is to place an order with the company, and place on the order a notation that an application for rating has been made. If it is an A-1-C we show that. There is one thing that has been rather difficult to handle in these applications; the War Production Board insists that a definite date of shipment be shown. You cannot show that the shipment can be made from stock, or you cannot show some month in which you expect shipment. They insist it must show a definite day, so we just usually take a date out of the air and show it.

Mr. Johnson: The definite dates we show are just hopes.

Mr. Beda: They also insist you show why the material is required. It is not sufficient just to say it is required for maintenance or to maintain tonnage. They ask you to show very definitely that it will prevent the loss of tonnage, or it will increase tonnage, and they usually ask you to show how much, either on your application or by letter.

Chairman Hayden: If there are no further questions immediately, Mr. DeWitt has prepared a few questions and answers, and I am going to suggest he read them to you, and in addition I am going to ask him to read just one short paragraph again out of his paper, because I think it is very good.

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QUESTIONS AND ANSWERS FOLLOWING DISCUSSION PAPER
ON "PRIORITY REGULATIONS TO DATE"

1. Q. You have pointed out that Conveyor Belting is to be purchased on priority rating determined by the Mining Branch upon an operator's application. What status does Transmission Belting have?
 - A. Rubber Belting for transmission purposes can be bought for replacement or repair with an endorsed A-1-c. The same presumably applies to other types of transmission belting.
2. Q. There have been persistent rumors that the Production Requirement Plan will ultimately replace all "P" orders including P-56. Is there any indication that priority assistance to mines under P-56 will not continue in force?
 - A. National Coal Association reported as late as May 20th that good reasons existed to anticipate that the underlying policies and essential provisions of the P-56 order will be maintained. They do not look for P-56 to be abolished.
3. Q. Refiners are beginning to request priority ratings on lubricating materials. Does order P-56 provide for priority on this class of material?
 - A. Not directly, but lubricating materials are clearly operating supplies and entitled to an A-8 under P-56 if the supplier requests it.
4. Q. To what extent can ratings under P-56 be applied to repair material for Company owned miners' houses?
 - A. My understanding is that an operator may use A-8 by endorsement on orders for house repair material with certain limitations:
 1. If houses are company owned.
 2. If occupants work in the mines.
 3. If the contract with the Miners' Union specifies obligation to keep the houses in repair.
5. Q. To what extent can ratings under P-56 be used by Mining Company Commissaries to purchase merchandise sold to employees?
 - A. The operator with a P-56 serial number may permit his Commissary to apply ratings to orders for tools and essential equipment which the Commissary sells to the miner for use in the mines. It is not permissible for Commissary to endorse a rating to orders for merchandise such as electrical appliances.
6. Q. Is it permissible to endorse an A-1-c rating on an order for a repair part involving both material and labor; for example, rewinding an armature?
 - A. Yes.

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7. Q. In connection with applications for new equipment or supplies, does the Mining Branch give any special preference to an operator having a high percentage of his mine output going to customers engaged in war materials production?
- A. Very definitely. I understand that a mine selling less than 30% of its output to customers working on War orders is likely to be denied equipment replacements.

* * *

Mr. DeWitt: Mr. Hayden has picked out a paragraph that is really more than important, it is vital for making your applications on new equipment. This is what he referred to: "I would like to stress at this time the extreme importance of submitting your application for new equipment rating in full detail and supported by production figures and the operating history of the worn-out or obsolete equipment if same is to be replaced. Present to the Mining Branch a complete, clean-cut, accurate picture of your need for the new equipment, and give a definite delivery date on each of several A-ratings. Approach the matter with the idea that they have to be sold on your need for a new machine. Actually they do; there isn't enough and there won't be enough new mine machinery for every mine that wants it because the raw material from which to build or assemble it is becoming harder to obtain as demands for military use become heavier and more urgent."

I think that closes the discussions as far as the preparation I have made for it is concerned.

Mr. Conway: Mr. Chairman, before Mr. DeWitt sits down, I would like to ask him, immediately after he finished his paper he asked one question regarding the percentage of defense business a coal company would have to have in order that they would be granted priority. The answer was that they should have at least 30 per cent. I wonder whose answer that was?

Mr. DeWitt: If you will notice particularly I said any one applying for new equipment and reporting less than 30 per cent of the mine output going to defense work was likely to have that application rejected. I won't say that they will turn you down flat, but certainly the higher your percentage of output going to defense industries the better your chance for having your application approved.

Mr. Conway: That was then your opinion. The War Production Board has never made such a statement?

Mr. DeWitt: No, never made a direct statement to that effect. They implied that in one or two statements I have read.

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Mr. Beda: I think the question is answered in the provisions of order P 56 which defines an Operator coming under the order as "A Mining Enterprise less than 30 per cent of the production of which in dollar value for the previous calendar quarter was derived from any one or more of the following:

"Sand (except foundry sand), gravel, crushed stone and slag.

"Clay except that used for refractories and ceramics for electrical use.

"Building and ornamental stone.

"Gypsum, talc, soapstone, slate (except for electrical use) and all raw material for the manufacture of lime and calcareous cements."

Thus by elimination the order applies principally to coal and metal mines, and I believe all mines which qualify for a serial number under this order are presumed to be essential to the Defense Program.

Chairman Hayden: I want to thank the speakers for their part in the program this afternoon, and turn the meeting back to our president. (Applause.)

(President Jefferis resumed the chair.)

President Jefferis: Thank you, Mr. Hayden.

We are running a little late. I have worked in harmony with the secretary right along until this time. We were out to see a friend of ours the day before yesterday, and he asked us to convey to the Institute some kind wishes and so on, and he specifically asked Mr. Schonthal, who has been sitting here doing a lot, but saying nothing, to make this report, and I asked him to do it, and he says, "No, you do it." Now, I am going to insist on his doing it. Mr. Schonthal. (Applause.)

Secretary Schonthal: Being of a peace loving people, I don't want to argue with you gentlemen. Jeff and I went out to see Sam Jenkins on Thursday afternoon. He had been back from Florida for about two or three weeks. I was in St. Louis a week ago Tuesday, had to come down to put some side-boards on this boat, to make room for the slow members who always delay making reservations, and found out Sam was here, so we called him on the phone. Last year he came down to the boat for a little while before we left, and we made him promise he would not come down to the boat this year, as it was too hard on him. So he made Jeff and me come out to see him. We spent three hours with him. I sat there and listened to a lot of this stuff that he and Jeff hand out, that I couldn't question, because it all happened so long ago, and I wasn't there. But if half of the things they said were true this Institute was really an Institute in years gone by, a whole lot different than it is today, probably a lot better, because Sam showed me a swell leather fishing case that he had been given, I think back in 1921. I think it would hold about six or eight rods, and some reels and stuff. Sam says when he got it it was equipped with a lot of tackle for deep sea fishing, and he never did any deep sea fishing in his life, and hasn't yet, and never has used any of the equipment that is in there at all. But he did ask us to extend for him to this Institute his very cordial greetings, and to say he hoped next year—that is one thing that is carrying him through, his hopes—next

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year to make a trip with us. I hope he will, because he is a grand fellow who deserves well, and if he can get through this summer and get to St. Petersburg and improve as much as I think he may, he may come along, and we will give him one of those quiet places on the upper deck so he can get some rest. Thank you, very much.

President Jefferis: Thank you, Mr. Schonthal.

Gentlemen, I don't know of anything else. Has any one anything else to bring up?

Mr. Jones: Mr. Chairman, would you like to hear the report of our committee?

“RESOLUTION

The Golden Eagle, Mississippi River,
June 6, 1942

“Mrs. Hugh Murray,
Equality, Illinois.

It is with deep regret and sympathy that we learn of the passing on of your husband, who at this, the fiftieth anniversary of the Illinois Mining Institute, and the Twenty-fourth anniversary of the annual meeting upon the Father of Waters, lies in state in your home town in Equality. Mr. Murray was one of the organizers of this Institute in February, 1892. For many years he has been an honorary member. This morning in assembly prior to the business of the day we stood in silent attention in respect to his memory and in appreciation for the great part he filled in all the pioneer work in mining laws, mining regulations and mining records of our State.

“Father Time has depleted the number of us here who knew Mr. Hugh Murray when he gave of his time and talent a half century ago as member and Secretary of the State Mining Board. We, the undersigned committee, are three of those who knew him well and honored him. We three are honored in being chosen to prepare this record to be written in the minutes of Hugh's and our Institute. In deepest sympathy and respect,

John E. Jones, Chairman,
Thomas Moses
Fred Weissenborn
For the I.M.I.”

The Secretary asked me to prepare a telegram to be sent to Mrs. Hugh Murray, Equality, Illinois:

“The Illinois Mining Institute today, at its fiftieth anniversary, stood in silence in respect to the passing on of your husband, one of the organizers of our Institute, and a pioneer in Illinois mining industry. We express to you our deepest sympathy in this sad hour of your sorrow.

Illinois Mining Institute.”

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Mr. Schonthal: I move the adoption of the "Resolution."

(The motion was duly seconded.)

Chairman Jefferis: "The motion has been made and seconded. All in favor signify by the usual voting sign.

(The motion was carried unanimously.)

The Resolution has been adopted and a copy will be sent to Mrs. Murray, and spread upon the minutes of our meeting.

Mr. Jones, I thank you and your committee for preparing this resolution.

Now, is there anything more to be brought up? If not, we will stand adjourned until our meeting in Springfield in October, and hope to see you all there, because we are going to have a great doing on the Fiftieth Anniversary, still being celebrated.

(Adjournment.)



PROCEEDINGS OF ILLINOIS MINING INSTITUTE FIFTIETH ANNUAL MEETING

Held in Springfield, Illinois
FRIDAY, OCTOBER 23, 1942

MORNING SESSION 10 O'clock A. M.

The Fiftieth Annual Meeting of the Illinois Mining Institute convened at ten o'clock in the Hotel Abraham Lincoln, Springfield, Illinois, Mr. J. A. Jefferis, President of the Institute, presiding.

President Jefferis: Gentlemen, will you please come to order?

It is needless for me to tell you how happy and how proud I am to be here this morning to welcome you to the Fiftieth Golden Anniversary Meeting of the Institute.

There is no provision on the program for an address of welcome or anything of that sort. I have been told to try and run this meeting through on schedule and to reserve any remarks which I may have until this evening, which are few.

Without any further ado, I am going to get right down to business and ask Mr. Schonthal, our Secretary-Treasurer, to make his report. Mr. Schonthal!

REPORT OF THE SECRETARY-TREASURER

Secretary-Treasurer Schonthal: Officers and Members of the Illinois Mining Institute: In presenting my report at this, our Golden Jubilee Celebration, I should like to pay tribute to those men who fifty years ago had the vision to organize this Institute here at Springfield. As an illustration of their foresight, let me quote Article I of the Constitution and By-Laws, which is still in effect:

“Article I. *Name and Purpose*: The Illinois Mining Institute has for its object the advancement of the mining industry by encouraging and promoting the study and investigation of mining problems, by encouraging education in practical and scientific mining, and by diffusing information in regard to mining that would be of benefit to its members.”

Throughout the past fifty years, with the exception of a few years at the turn of the century, the organization has functioned continuously following those same principles.

I invite you all to look through our next Yearbook, in which will appear some reprints of articles from the first bulletin issued late in 1892 and early in 1893, and to note some of the problems that were being wrestled with at that time. Then compare with today's problems, and you will see that in one way at least we are no worse nor better off than were our pioneers. We still have problems.

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When it was decided a few years ago to broaden the scope of the work of the Institute, our first job was to build up membership and our financial position to the point where we could do more effective work along broader lines. Our Institute now has an enrollment of our 800 active members. We had hoped to build it up to 1,000 during this Golden Anniversary year and are setting that figure for our goal this next year. I am sure that if the work of our organization is fully appreciated by all those here, and if they will pass along the word about our work, our goal can easily be reached.

We are carrying all members who have joined the armed forces as special members without dues. If anyone knows of any fellow members who have or will join the armed forces, it will be most helpful to the Secretary to learn of it from you.

We have many projects in mind, following the purposes of this Institute. As they progress sufficiently, the membership will become acquainted with these advancements.

Today and tonight we shall have as our guests four scholarship students. You will have an opportunity to greet them. Two are sponsored by the I.M.I. and two by the Peabody Coal Company and administered through the I.M.I. The number will be increased to a total of four I.M.I. scholarships—one in each year of school; and eight Peabody scholarships—two in each year of school. We are hopeful that we shall be able to interest other coal mining companies in the state to sponsor scholarship students throughout the years. In order to plan for the future, this is a very important matter and worth careful consideration on the part of the operating companies in this district.

We shall also have as special guests today fourteen or fifteen of our Past Presidents, representing nearly all the living Past Presidents of the Institute.

Our financial position is excellent. We own \$8,000 in Government bonds; \$1,500 in War Savings and Defense bonds; \$1,000 in Chicago, Burlington & Quincy Railroad bonds; \$1,000 in Missouri-Pacific Railroad bonds; and we have on hand \$1,204.80 in cash. I might add that during the year just closed we expended for participation in the activities of the Museum of Science & Industry in Chicago, our anniversary souvenirs to the membership, and our scholarships, about \$1,000 and have added \$1,500 to our bond holdings.

During the past year we have lost five members by death. One was an Honorary Member and one of the organizers of our Institute: Hugh Murray. One was a Life Member: G. D. Cowin. The other three were: F. F. Schlink of the Goodman Manufacturing Company; James M. Rollo of the Egyptian Powder Company; and Sydney A. Hale of "Coal Age." Suitable expressions of sympathy were sent to the families promptly, as is our custom.

Although your Secretary has on many occasions found his duties rather trying, he has had such ready and willing support from the officers, executive boards, and members, that any problems which may have seemed tough were finally worked out satisfactorily. It has been a real pleasure to be connected with this Institute these several years. I do wish to express my deep appreciation to you all for your help. I am

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sure that the entire group here today will benefit greatly by being present, because the messages to be given are to be most helpful to us all in these times. (Applause.)

* * *

President Jefferis: Thank you, Mr. Schonthal, for this very splendid report.

Would anyone like to ask Mr. Schonthal any questions pertaining to this report? If there are no objections, may I hear a motion to accept the report and have same placed on file?

Mr. A. R. Joyce: Mr. President, I move that the report be adopted and placed on file.

(The motion was regularly seconded.)

President Jefferis: A motion has been made and regularly seconded that the Secretary's report be accepted and placed on file. Are you ready for the question?

(The question was called for.)

President Jefferis: All those in favor will signify by saying "aye"; contrary "no." It is carried.

The next order of business is the report of the Nominating Committee and the election of officers. You will hear this report from Mr. Schonthal as the report has been given to him.

Secretary-Treasurer Schonthal: This report was sent to me from Benton, Illinois and is dated September 23, 1942, and reads as follows:

REPORT OF THE NOMINATING COMMITTEE

"The following men have been nominated for consideration at the fall meeting of the Illinois Mining Institute. The report of this Committee is unanimous.

President—Carl T. Hayden, Sahara Coal Company, Chicago, Illinois.
Vice President—B. H. Schull, Pyramid Coal Company, Chicago, Illinois.

Secretary-Treasurer—B. E. Schonthal, 28 E. Jackson Blvd., Chicago, Illinois.

Executive Committee, to serve for three years:

W. J. Jenkins, Consolidated Coal Company, St. Louis, Missouri.
Prof. H. L. Walker, University of Illinois, Urbana, Illinois.
F. S. Pfahler, Superior Coal Company, Chicago, Illinois.
James White, Franklin County Coal Corp., Herrin, Illinois.

(Signed) "H. A. Treadwell, Chairman
F. W. Roman,
R. L. Adams,
Nominating Committee"

President Jefferis: Gentlemen, you have heard the report of the Nominating Committee. Are there any other nominations? If not, I will declare the nominations closed.

We will proceed to ballot.

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Mr. B. K. Leach: Mr. President, I move that the Secretary be instructed to cast a unanimous ballot for the acceptance of the report and the election of the officers and executive committee named.

(The motion was regularly seconded.)

President Jefferis: Are you ready for the question?

(The question was called for.)

President Jefferis: All in favor will signify by saying "aye"; contrary "no". The "ayes" have it and the motion is carried. The members whose names have been read are elected for the coming year.

Secretary-Treasurer Schonthal: The ballot is cast and the members are elected as recommended.

Is Bob Medill in the room? I want the boys to see Bob! (Applause.)

President Jefferis: Mr. Medill, we are surely glad to see you and have you here.

Mr. Robert M. Medill: I'm glad to be here.

President Jefferis: Our next report will be presented by the chairman of our Committee on Scholarships. I am going to ask Professor Harold Walker to make this report. Professor Walker, will you make this report, please?

REPORT OF THE SCHOLARSHIP COMMITTEE

Harold L. Walker, Professor of Metallurgical Engineering and Head of the Department of Mining and Metallurgical Engineering:

There are now in operation two Illinois Mining Institute and two Peabody Coal Company scholarships. The holders of these scholarships are with us at this meeting and will be presented to you at the banquet tonight.

The scholarship plans operate in this way — one Illinois Mining Institute scholarship is added each year and two Peabody Coal Company scholarships, administered by the Illinois Mining Institute, are added each year. In this way there will be three new scholarship men entering and three scholarship men graduating each year when the plan is in full operation.

These boys are all fine young men and they are doing their work at the University in an admirable manner. They greatly appreciate this opportunity of being with you and I know they will benefit by the contacts with you and by listening to the papers to be presented on this program.

We are always on the lookout for worthy and qualified young men to receive these scholarships and since your committee cannot interview all the young men in all our mining districts, we are depending upon you to bring to our attention young men in your communities that are

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interested in continuing their education in mining engineering. It is hoped that other mining companies of the state will offer scholarships in the near future. The continued complexities of mining operations make it imperative that an unbroken supply of technically trained men be available for our mining industries.

* * *

President Jefferis: Thank you, Professor Walker, for this report.

I know that you are all glad to hear that this program of scholarships in mining in the University is working out so nicely. In fact, it is doing much better than I think we expected it would when we started.

Are there any other committees to report this morning? Is there any matter that any of you wish to bring up?

Secretary-Treasurer Schonthal: I have one communication, Mr. Jefferis. I have a telegram here from one of our very loyal members, Dr. J. J. Rutledge of Annapolis, Maryland.

He says: "Congratulations on Golden Anniversary Illinois Mining Institute. Salute old friends."

So the old friends are saluted! That is all I have.

President Jefferis: Thank you. If there is nothing more to come before the business meeting at this time, I will ask Mr. Dwight Wilcox to act as Chairman of the remainder of the program this morning. Mr. Wilcox! (Applause.)

(Mr. Dwight D. Wilcox took the chair.)

Chairman Wilcox: Mr. President and Members of the Institute: Our policy should be, of course, to give all the time to discussion this is possible, and to get through on time. I don't think anyone expected or is going to get a speech any further than that from me.

Before I introduce the first speaker, I would like to carry out a little vow of my own, if you want to call it that. We had some trouble at our properties this year in which the new Federal Inspection Department showed themselves to be real coal mining men. I would like, if I could, to talk about some particular people, but I shall not do that because I have the idea that those fellows who were at our place during our trouble were fairly representative of this new Inspection Department. I vowed then that at every opportunity I had I would thank them. I am doing it again.

Our first speaker today is Mr. E. H. Denny, Chief of the Coal Mine Inspection Division, Bureau of Mines, Department of the Interior, Washington, D. C., and his subject will be: "Federal Coal Mines Inspections to Date." I am introducing to you Mr. Denny! (Applause.)

Mr. E. H. Denny: Mr. Chairman, Officers of the Illinois Mining Institute, and Friends: It is a privilege to be here today on the occasion of your Fiftieth Anniversary. You know, I have been sort of drafted into this work. I have been a supervising engineer for a good many years

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in the West. It has been a good many years since I worked in the East with Mr. Parker in Pittsburgh; I believe it has been some 18 years. A little over two months ago I was informed that I was to come into Pittsburgh for the duration to work under and with Mr. Harrington and Mr. Forbes on the safety and inspection work of the Bureau of Mines.

I regret very much that Mr. Herbert is not here today. He is our Supervising Engineer in charge of all safety and health service work of the Bureau in these states. Mr. Herbert was called to Pittsburgh on account of a group meeting there of the Explosives Investigators Bureau which various supervising engineers it is known have been asked to attend. I know that he also deeply regrets not being here and I wish most certainly that he had been able to be here. I know that he has taken a part in these meetings for many years.

I was also very glad to call on Mr. Medill and to see him again here today. We last met in Colorado and I have had many pleasant associations with him.

I would now like to proceed with my paper, which I have entitled, "Federal Coal Mine Inspection Work."



FEDERAL COAL MINE INSPECTION WORK *

By E. H. DENNY

Chief, Coal Mine Inspection Division, Bureau of Mines, Pittsburgh, Pa.

The purpose of this paper is to discuss the Federal Coal Mine Inspection Act of May 7, 1941, organization of the inspection work, and steps taken thus far to carry out the provisions of the Act.

The Federal Coal Mine Inspection Act authorizes the Secretary of the Interior, acting through the Federal Bureau of Mines, to make, or cause to be made, annual or necessary inspections and investigations in coal mines to obtain information relating to health and safety conditions and to determine the causes of accidents and occupational diseases originating in coal mines.

The purpose of the Act is to reduce the number of mine accidents, particularly disasters, and to improve conditions affecting the health of miners.

Under the Act a duly authorized representative of the Bureau of Mines has the right to entry to a mine for purposes of inspection and the right to request from the operator information pertaining to accidents involving bodily injury or loss of life that occurred during the calendar year of the request or the previous calendar year; under the law, the operator must comply with such request.

The Coal Mine Inspection Act directs the Secretary of the Interior, acting through the Federal Bureau of Mines, to make available for public inspection, either in summary or detailed form, the information obtained by him under this Act, as soon as practicable after the acquisition of such information.

To comply with the above and other provisions of the Act, the Bureau of Mines administrative set-up is as follows:

Under Director R. R. Sayers, D. Harrington is chief of the Health and Safety Service with headquarters at Washington, D. C. J. J. Forbes assists him there in the direction and coordination of the work of the four divisions of the Safety Service—the Safety Division, the Coal Mine Inspection Division, the Explosives Control Division, and the Mineral Production Security Division. Mr. Forbes is also chief of this newly created Mineral Production Security Division.

The field work of the Inspection and Safety Divisions is administered out of the headquarters of the chief of the Inspection Division at Pittsburgh, Pa. Inspectors and electrical and explosives engineers of the Inspection Division and engineers and safety instructors of the Safety Division report through their district supervising engineers to the Pittsburgh headquarters.

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The Safety Division work of the Bureau in the past has been divided into nine districts, with an engineer having supervision over each district. This arrangement has been continued, and the inspections of mines, as well as safety, explosives control, and security work placed under the supervising engineers of the districts, who in Illinois, Indiana, Missouri, western Kentucky, Iowa, and Nebraska is C. A. Herbert.

Under the Inspection Act funds were allotted for the employment of 107 inspectors and 5 electrical and 5 explosives engineers. Of these, all but 2 explosives engineers are now employed.

Under the Act officers and employees are appointed from Civil Service registers. Every coal-mine inspector is required to have the basic qualification of at least 5 years' practical experience in the mining of coal and to be recognized by the Federal Bureau of Mines as having had the training or experience of a practical mining engineer in those essentials necessary for competent coal-mine inspection. Certain physical and age requirements have been set by the Civil Service Commission. Fifty-five years is the age maximum for senior inspectors; grades of assistant, associate, inspector, and senior inspector have been established with entrance salaries of \$2600, \$3200, \$3800, and \$4600, respectively. More than 1,500 persons have taken the examination for inspector positions. From the register of over 800 who passed the examination, the present inspectors have been selected. Former superintendents, mine foremen, assistant mine foremen, and practicing mining engineers make up the force; in the aggregate, many years of practical mining experience in many coal-mining fields are represented. All inspectors were first given several weeks' training at the Pittsburgh station of the Bureau. In Mr. Herbert's district 15 inspectors and 1 electrical and 1 explosives engineer have been assigned; 8 inspectors work in Illinois.

The personnel engaged in laboratory investigative and analytical work and in accident statistical work in Pittsburgh and Washington has been expanded to provide the help necessary to meet problems arising from mine inspections. Additional clerical employees have been provided to type reports. Final reports are reviewed in the district offices and then again in the College Park office before transmittal to recipients by the Director of the Bureau of Mines.

In this inspection work, endeavor is being made to have inspections thorough and complete. Enough information is also acquired to permit a complete report to be made on mine safety conditions. Roughly, two such inspections and complete reports covering moderate-size mines can be completed by each inspector in a month. Some large mines, in which operations are spread out widely, may require much more time for inspection; on the other hand, a small operation may be completely inspected, both as to surface and underground, in a few days. In the initial inspections the Bureau has frequently used two or even three inspectors to a mine to enable them to gain familiarity with and uniformity in their work. Likewise, preparation of detailed reports takes much more time at first than later. For the present, inspections will be confined mainly to mines employing more than 25 men because of the greater number of men exposed in such mines to possible catastrophe

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hazard; nevertheless, some small mines are being inspected. The present report system is as follows:

A preliminary report is compiled immediately after an inspection; it is discussed with the mine superintendent and perhaps other mine officials, and a request is made to allow it to be posted at the mine. A copy of the report is sent to the State mine inspector. This report deals with practices and conditions, the rectification of which is considered to be of immediate importance. If conditions are discovered during the inspection that involve immediate hazard to a number of men, they are discussed immediately with the local mine management and usually with the State inspector.

The final report follows several weeks after the preliminary one. Attention is called to good practices and conditions as well as poor ones. The Director of the Bureau of Mines sends one or more copies to an operating official of the company, one and sometimes two copies to the State mine inspectors concerned, one copy to the International Office of the United Mine Workers of America at Washington and one copy to the District Office of the Mine Workers, if this organization is the employees' recognized bargaining agent, and one copy to the Bureau of Mines District Office (for example, Vincennes, Ind.) The copies in the Bureau of Mines field offices and also that in the Washington, D. C. office are available for public inspection but not for removal from the offices. The Bureau ordinarily will be glad to have a representative go over the final report, after publication, with the operator or others properly concerned.

The inspection and report are based largely upon the Tentative Coal-Mine Inspection Standards recently published by the Bureau as Information Circular 7204. These standards were adapted from various State mining laws published, Bureau of Mines safety decisions, company safety rules, and nationally recognized safety codes. They have been edited in detail on several occasions by Bureau Division personnel. Nevertheless, as indicated by the word tentative, they are subject to modification, deletion, and addition as experience and change in mining methods and conditions justify. The introduction to the Standards states, in part:

It is believed that compliance with them will eventually be possible in most mines. In many cases objections will be raised to them because a long-established mining customs and practices that are inherently of dubious safety and because of a natural inclination to oppose change. In other cases there will be valid objections due to conditions not foreseen at the time these standards were prepared. Or there may be substandard conditions and practices due to original mine lay-outs that it is not practicable to change during the lifetime of the mine; in such cases it is likely that some effective measures can be taken toward lessening hazards.

The Act provides for cooperation with the official mine-inspection or safety agencies of the several States and Territories to promote sound and effective coordination of Federal and local activities within the field covered by the Act. Accordingly, the Bureau of Mines has sought and received excellent cooperation from State mine-inspection departments.

The first inspections by the Federal mine inspectors were made in Illinois in January 1942, and the training at Pittsburgh of the last group of inspectors was completed early in August of this year. With the field

assignments of the inspection force thus having just been completed, up inspections have been made in mines representing a substantial part of the employment and tonnage of the Nation's coal mines. Already much information has been received on the many safe practices long in effect in mines throughout the country. Also, much information has gathered on substandard or dangerous practices — some the responsibility of operators, some the responsibility of miners, and some the responsibility of both. In several mines, both in the East and in the West, hazards that threatened an immediate catastrophe have been found and corrective measures have been taken through action by management or State inspector, or both. Such immediate hazards have not been the presence of explosive gas and deficient ventilation only, but have included underground water and dangerous roofs. As might be expected, numerous hazards to individuals connected with unsupported and dangerous roof, haulage, electricity, and explosives, have been found, as well as instances wherein miners as well as the operators were reluctant to change practices to conform to safer ones prevalent in other mines or fields, owing to the immediate cost involved, or for some other reason.

Earlier in this paper it was stated that in some mines conditions prevail that are not in accordance with the Bureau of Mines tentative standards, and which, in the opinion of Bureau engineers, involved a definite hazard to life and property; yet, owing to such things as original mine lay-out, short life of mine, was shortages of material, and similar conditions or causes, compliance with some of the standards is not practicable. In some such instances substitute safety measures may be practicable, and if an engineering safety problem is involved the Bureau Safety and Inspection Division engineers will, if desired, endeavor to work out a satisfactory solution.

The purpose of the Act is fundamentally to increase mine safety. The writer believes that as greater measures for safety are taken in more mines, and as these safety measures become more uniform, greater mine safety will result. Securing such increased safety depends ultimately on operators and miners alike, and in every instance cooperative effort is absolutely essential to success.

For the immediate future, the job confronting the United States is to win the war. Production of coal is necessary to the war program and must be maintained. The full-time service of every available miner is needed to produce the required tonnage. Loss of life or limb as a result of injury in the mines must be avoided to maintain production. Similarly, all reasonable measures should be taken to prevent mass loss of life and property in mine disasters, if only from the realistic standpoint of providing uninterrupted production. Accordingly, the Mine Inspection Division will work toward accident prevention as a war necessity. The division will also assist in carrying out certain wartime measures, as ordered by Congress, to prevent sabotage, control explosives, and secure mineral production.

* * *

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Chairman Wilcox: Thank you, Mr. Denny.

Before we start in on our discussion I would like to call on one of our members who knows this safety angle and have him come up here and give us some of his ideas for just a few minutes. Mr. John E. Jones.

ROCK DUST BAG INSTALLATION

By JOHN E. JONES

Safety Engineer, Old Ben Coal Corporation, West Frankfort, Ill.

Mr. John E. Jones: I am glad to shake hands with you again, Mr. Denny. Our first meeting was at your Experimental Mine in 1916. That was nearly 27 years ago. We were just youngsters then. My sole interest on that trip was safety against mine disaster hazards and the reason for my trip there was to learn more about rock dusting and electric cap lamps. You will recall you were my escort to the few mines not far from Pittsburgh which were using the new lamps; also at the Experimental Mine where several explosion tests were made. I was greatly impressed with the possibilities of rock dust application that might be developed in the prevention of the propagation of coal dust explosions in bituminous coal mines.

Mr. Denny in his address has covered many of the problems of mine safety and, of course, we are interested in all of them. The more we can do towards their solution the more will be the benefit to our men in our industry.

I, too, have had the same sort of experience that Mr. Wilcox has had in regard to government inspection work. I have accompanied these inspectors in coal mines in two of our leading coal mining states. True, there are many things on which we do agree, and there are some others on which we do not agree. We certainly agree on adequate ventilation, good timbering, safe haulage practice, guarding of machinery, and the majority of their recommendations, but here in Illinois we have mining conditions which are different from those in the East. These inspection reports ask us to change our entire procedure on some of our mining problems. We in Illinois usually have, as you know, our main line haulage on return air and our hoisting shafts are upcast airshafts. This is contrary to the United States Bureau of Mines' standards of safety. We think that with the gas conditions which we have in the State of Illinois, this is not a hazardous procedure. Our experience in the State of Illinois does not indicate that it has been detrimental. To reverse our air, as recommended, would be of great cost to us and of added roof fall hazard. Our roof is usually a soft shale that is soon deteriorated by alternate increase and decrease of moisture due to outside temperature changes.

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Where height permits we leave coal for roof. This is more lasting than the shale roof but it, also, deteriorates rather quickly in intake air currents. The roof on our main intakes, that are now returns, would soon become loosened and timbering and retimbering of hundreds of miles of main line haulage would be necessary at once. This could not be done immediately and roof fall hazard from between present timbers and in non-timbered locations would result. A study of the roof in the main intake aircourses of our shale roof mines will convince one of the added roof hazard should air reversal be made, and continuation of that added hazard.

It is requested by our secretary that while I am here on the platform that explanation be made that I am on this morning's program although this is not shown on the printed program you have. Less than a week ago it occurred to me, because of the added interest in rock dusting bag installation, and the many letters and visits I receive on the subject, that I explain to you here as I would if you visited us at the mines, how our rock dust bag equipment is manufactured and installation is made. It is through the courtesy of the Old Ben Coal Corporation, the Department of Mines and Minerals and your Secretary, that I have this place on the program at this late suggestion and that I have been able to set up in the Exhibit Room a full-sized model showing how our rock dust is installed by this bag method in coal mining. I hope that those of you who are interested can find time to visit the model back in the Exhibit Room where some or other of the Old Ben employees will be, including myself, to explain to you in detail just how the bags are installed and operate and how each part of the equipment is manufactured. We make the equipment ourselves and we have tools there to show you in detail how every part is made.

In the proceedings of this Institute of 1938 you will find a brief explanation of the bag system of rock dusting. But in the report of the investigations of the United States Bureau of Mines, No. 3411, which you can get from the Superintendent of Documents in Washington, D. C., you will find a detailed account about how the device is made and about the various tests which were conducted at the Bruceeton Experimental Mine.

My reason for the development of this type of rock dust installation was due to some of the difficulties that we had in our mines. The chief difficulty was the temporariness of coated rock due to the spalling or rashing of coal ribs and roof. There was difficulty in redusting in trackless entries such as in aircourses. This bag system is a semi-permanent type of rock dusting. When once installed, it remains intact for a large number of years. I have a few slides to show you about the bag and its installation. While the operator shows the slides, I will go on talking.

Fig. No. 1 is a picture of the bags as they were installed at the United States experimental mine for the demonstration. This shows the staggered position that they had for that particular test.

Fig. No. 2 is a close-up picture of two bags from Fig. 1 showing in detail how the bags were installed.

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Fig. No. 1

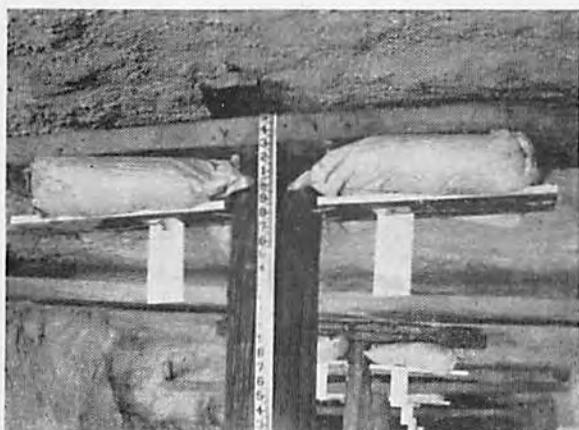


Fig. No. 2

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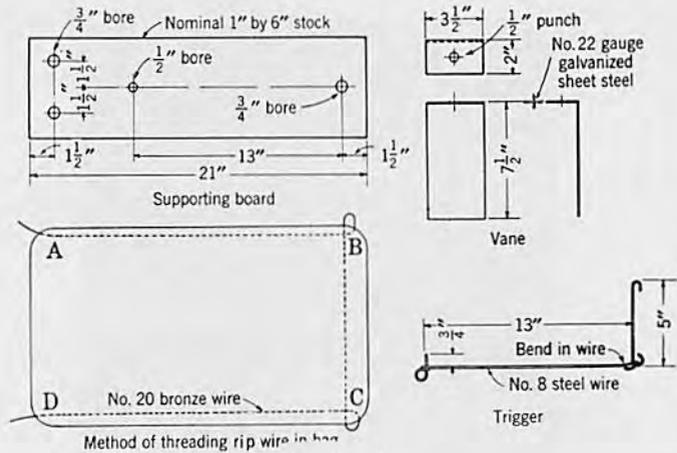


Fig. No. 3

Fig. No. 3 is also copied from the R. I. 3411 U. S. Bureau of Mines report and shows details of the operating parts. There has been no change except boards from 8" to 12" in width are preferable. With the 6" board, as shown, some rock dust is wasted when bags are tripped accidentally or mischievously.

Fig. No. 4. This is the bag as we install it along our track entries. It is put under an I-beam or a cross-beam or we will install a prop with a cap-block over it under which to install the bag. I might say right there that we do not call this a barrier. We install the bags continuously



Fig. No. 4

throughout the mines, in our trackless entries especially. We have in our four mines in Illinois some fifty miles of these bags installed. In each of the mines there is an average of one and one-half miles of bags from the working face back along the trackless entries.

I shall explain some of the details now in regard to its installation. The board is put up as on a hinge. The 50 lb. bag received from the rock dust company is placed on the board. One end only of the bag drops. The bag drops 13 inches on that one end. It is so wired on top by those nails you see that when the bag drops the top half of the bag is torn and the dust flows and clouds in front of and during the explosion wave.

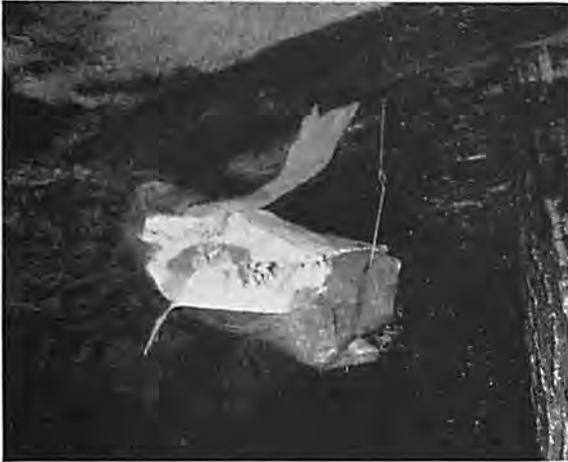


Fig. No. 5

Fig. No. 5 shows you the bag when it is dropped. Some of the dust has spilled. You can see the tearing wires by looking closely. These are the wires that were threaded through the top of the bag and hooked on to the nails in the cap block. There are four nails, two on each side. The reason for the bag not being permitted to drop in a vertical position is that too much of the rock dust falls to the floor at once and much would be missed by the explosion wave.

The first test that we made in the experimental mine was to simply drop the bag to a stopped position, than it fell to the floor. It stopped the explosion when installed in that manner, but much of the rock dust was wasted by falling to the floor. In this picture the dust is retained so that the explosion can get all of it. There is another advantage: Some of the bags are tripped mischievously. There is an interest in seeing the bag dropped. At first the workers and bosses, and even now some of our visitors, liked to throw small lumps of coal at those vanes and see the bags trip. We told our men they could trip one. Rarely did they do more than that. The newness is now over.

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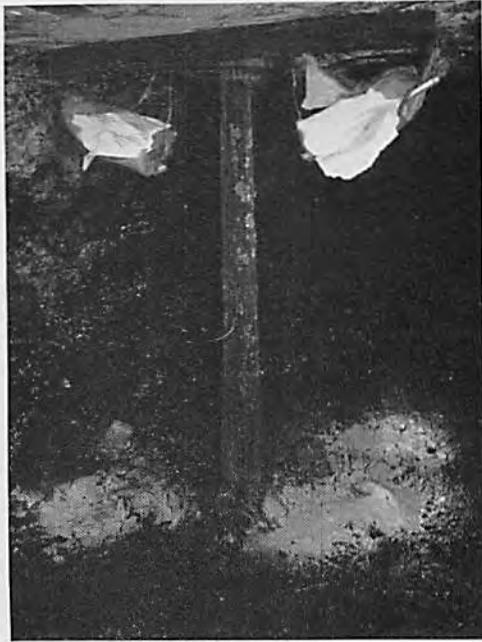


Fig. No. 6



Fig. No. 7

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Fig. No. 6 shows how the bags are installed in the aircourses. We put the props up about every ten or twelve feet. They serve a double purpose: first, as a protection of our roof in the aircourses; and second, for the installation of the bags. You will notice that there is some rock dust on the floor. During an explosion that dust instead of falling is carried on by the explosion force.

Fig. No. 7. Here we have a group of bags shown, showing how we put the rock dust in our back entries. The props are closer together than is usual. This is a location at the intersection of cross entries and main entries. At such intersections we double up the bag installations as well as the props for roof support.



Fig. No. 8

Fig. No. 8 is a picture of bags after a real explosion. This explosion happened on December 7, 1938 at Old Ben Mine No. 15, West Frankfort. Of course, the bags which stopped the explosion were gone. So were the timbers. Everything was gone from that particular location. These bags shown were farther in the mine where the explosion force was lessened. Here is a picture showing an actual occurrence with regard to the bags tripping following an explosion. You will notice that there is no rock dust on the floor. You will notice how it has been thrown on the props and roof and ribs by the force of the explosion.

Fig. No. 9 is a close-up view of the same location. This was at the time when we had wooden vanes instead of metal vanes as we now use. These were the first bags we installed. They were put up in 1937. The installation is identically the same now except galvanized vanes are used instead of wood vanes.

Those are all the pictures, gentlemen. With the exhibit I have about 100 copies in mimeographed form showing details with regard to the

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installation and what materials to get to manufacture the device. I also have 100 sets of triggers. There are many more than 100 of you here and I am quite sure that some of you are just interested in looking at it. To those of you who are interested in installation, we shall be glad to give you a set of triggers and a copy of this mimeographed sheet so that you may have them as a sample in case you want to manufacture them. You will note the proper sizes.



Fig. No. 9

Play ball with the Advertisers who play ball with us.

The Mimeograph Sheet on Details of
ROCK DUST BAG INSTALLATION

1. Details of U.S. Bureau of Mines tests are given in Report of Investigation 3411 of the Bureau of Mines. Details of the device are given in Fig. 3 opposite page 5. Figs. 1 and 2 show how the bags are installed ready for tripping and tearing. This report is obtainable from the Superintendent of Documents, Washington, D.C. Ask for R.I. 3411. A brief description is given on page 115 in the 1938 Illinois Mining Institute Proceedings.
2. The supporting boards may be any width from 6" to 12". Ten inch width is preferable. Rough-sawed lumber from local saw mills, any thickness from $\frac{1}{2}$ " to $1\frac{1}{8}$ " and 21" in length, but SQUARE ON ONE END, makes good boards at low cost.
3. Vanes are purchased cut to $3\frac{1}{2}$ " x 9.6" (with $\frac{1}{8}$ " tolerance) from No. 22 galvanized sheets. We drill the $\frac{1}{4}$ " hole and bend the vanes on a form.
4. The triggers are made from No. 8 soft basic galvanized steel telephone wire. This is purchased in 200 lb. rolls. We form the triggers on a vise and with tools made for that purpose.
5. Tearing wire was formerly No. 20 bronze wire. This is now unobtainable, so we use our scrap shunt field coils. Fine wire, whether insulated or not, will efficiently tear the bags.
6. A needle 21" long for threading the wire through the bags can be made from a $\frac{1}{4}$ " welding rod. One end is sharpened on an emery wheel and a hole approximately $\frac{1}{10}$ " in diameter is drilled at right angles at the other end.
7. Rock dust is shipped to us in double thickness paper bags holding 50 lbs. The outside paper is water proof.
8. We do not use the bags as barriers, but install them continuously along the trackless entries on cap blocks set on props for that purpose, also on cross bars and beams on haulage entries.

We have nothing here to sell. We are not trying to make anything out of this except to promote safety. The only thing that we are trying to sell is the safety idea. In fact we are not really selling it. We are just trying to give it away.

Thank you again, gentlemen.

* * *

Chairman Wilcox: I don't know how you folks out there feel about it, but we had the idea up here that John was working for the Old Ben Coal Corporation, and yet he ended his talk by saying that he didn't have anything to sell. Is that right?

Really, I would advise and suggest that every one stop at that exhibit. I am therefore again reminding you that that has just been brought up here as a contribution to safety.

I have kept Mr. Denny up here on the platform so that he can either ask or tell. I think some of the fellows have had a desire to tell off this Federal Inspection Department and if any of you had that idea, Mr. Denny is here and I think will ably take care of himself. Are there any questions that any of you would like to ask?

I am wondering if Bob Weir is present, the Assistant Director of Mines and Minerals of Illinois? Bob, I wish you would come up here and at least be introduced. We would like to have you make a few comments about safety in Illinois. Bob Weir! (Applause.)

Mr. Robert Weir (Zeigler, Illinois): This is all very unexpected. I didn't expect anything like this.

As regards safety in Illinois, I don't think we are second to any. At one time I worked for the Superior Coal Company and I think they were one of the leaders of the safety movement in this state. Fortunately, every company I have worked for in the state has been one of the leaders in this field.

I thank you. (Applause.)

Chairman Wilcox: He is one of the fellows we trained in the Superior and we are still proud of him.

Is there anyone here who would now like to ask any question of Mr. Denny? If not, we will go on to our next paper.

Thank you, Mr. Denny. (Applause.)

INDUSTRIAL SALVAGE WITH REFERENCE TO COAL MINES

By MR. R. E. SNOBERGER

Industrial Salvage Section, War Production Board

Mr. Chairman, Mr. President, Gentlemen of the Institute: I am particularly happy to be here on the occasion of your Fiftieth Anniversary. I have discovered that this body not only gives close attention and study to the various technical matters concerned with the industry but also spends considerable time in the study and performance of the arts—particularly vocal music. I think "Sweet Adeline" and "The Old Mill Stream" have reached a high state of perfection! (Laughter.)

I should like to thank you on behalf of the Bureau of Conservation, War Production Board, and more particularly the Industrial Salvage Section, for this opportunity to discuss with you briefly (and I mean that) this problem of salvage. I think it would be somewhat presumptuous before this body to attempt to increase your realization of the criticalness of salvage, particularly iron and steel scrap. The objective for the last six months of this year is 17 million tons of so-called yard or purchased scrap. This is entirely exclusive of home scrap or rather scrap made by industry that flows in the course of trade as a matter of course, because it is in most industries a profit item. It is watched very closely. It is segregated and used to both the best economic and productive advantage.

I recently had the opportunity of hearing the vice president of one of our larger steel companies give an address on the salvage question, and he stated that in his opinion the Number One critical raw material of the United States today is iron and steel scrap. I know of no one in a better position to make such a statement than the vice president of this particular company, because among other duties, it is his to obtain for his company sufficient scrap with which to operate.

He gave another surprising statement. This mill is located in Indiana. He said that they had made a complete survey of the auto graveyards of Indiana. They knew how many cars as of this particular week—I mean how many junkers—were in the graveyards of the State of Indiana. I think that to all of us the automobile graveyards have been particular eyesores. We drive by them, we pass by them on the train, and we wonder what is being done about them, and we think there is a tremendous tonnage of iron and steel scrap. This gentleman stated in his address that as a result of this survey in the State of Indiana they found there was sufficient scrap in all of the graveyards in that state to run his mill only 20 days. That gave me an entirely different idea regarding the potentialities of some of these particular efforts.

Like most people, I presume, I have had the idea that we would have sufficient scrap to run all these steel mills of ours for two or three years, but that evidently is far from the truth.

Buyer meets Seller in the back of this book.

As I say, I think you are all very much scrap-conscious in a general way. The general scrap drive which has been gathering momentum now for some three or four months seems to have reached its peak within the last two weeks. We see these little scrap piles scattered all over town as we pass through and we probably think that there is another source of tremendous tonnage of iron and steel scrap. While it is important in a general effort, it is far from being of prime importance. The estimated return of this particular drive, based on spot checking, is that it would yield somewhere between five and seven millions of tons over the United States. That, again, is a very small amount compared to the demand.

This year the mills of the United States will consume approximately 60 millions of tons of scrap. Next year they will have to have at least as much and probably more, because the demand for finished steel products next year is raised some nine or ten million tons. I agree with this vice president of Continental Steel that scrap is perhaps one of our top-ranking critical materials. I think it deserves the best that each of us has in us to get it flowing in the course of trade.

In this flow of scrap material the junk man or the junk yard operator is a very necessary adjunct. He has been criticized by all and sundry because his yard is full of scrap all of the time. Innumerable letters have been written to Washington, to the Bureau of Conservation, demanding to know why "Joe Blow" didn't clean up his scrap yard. We checked any number of those yards and we found in the main that "Joe Blow" was cleaning up his scrap yard but that he had a tremendous turnover of scrap, and that the efficient scrap yard or junk yard is the one which does maintain a big backlog upon which to work. The inefficient junk yard is the one that is clean. I think those people have had much undeserved criticism.

When I went to Washington the 1st of March with the assignment to organize a salvage drive in the coal mining industry, I was advised to immediately form a bureau of some size, with a staff in Washington, and a large group of field men to perform an inspection service in the mines of the United States. I disagreed violently with that idea and, after consulting with many coal operators, decided that the way to handle the thing was through the various local coal operators' associations in the United States. I told my chief that the job could be done and would be done by the coal mining industry without cost to the Government, if they were only told *what* was needed and *why* it was needed and if someone in Washington did not set himself up as a little tin god to tell them just *how* to do it in detail. It was my opinion then and it still is that you men know *how* to do it in your particular property better than any man in Washington could possibly tell you.

That plan of organization has worked out, I think, marvelously well over the United States as a whole. I am sorry to say that Illinois as a state cannot be too proud of the results obtained. A good many companies in this state have outstanding records. They have done a marvelous job. But I think that a good many of you, because of the fear that you have of your inability to get parts (and it is a justifiable fear),

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have leaned over backwards in holding on to things which you might use a year from now but which you probably never will use.

As a result of that situation, in Illinois and several other states, because there has been a complete decentralization of the War Production Board, considerable criticism has come to the coal mining industry for lack of performance in the national salvage drive. I think it is entirely undeserved. I know from the records of the office which I formed in Washington that the coal mining industry has done an outstanding job, as an industry. I know of no industry which has done as well. Still, this criticism has been coming from various members of the staff of the general Salvage Section and other sections of the Bureau of Conservation because they are entirely unfamiliar with the industry. We have as a matter of record in Washington some 200,000 tons of iron and steel returned by the coal industry so far and something over two-and-one-half million pounds of copper and over two millions pounds of other nonferrous metals. That certainly is not to be sneezed at and is not to be criticised by someone who doesn't know what he is talking about.

As a result of the decentralization of the War Production Board into separate regions in the United States, each of which is headed by a director—a little Donald Nelson, if you please, in that particular region—the various sections of the Conservation Division have also been decentralized with a man representing each section assigned to these different regions. These men, because they have a responsibility in their particular regions, have demanded that they be given the entire detail of working out the plan in their regions. From an organizational standpoint I can sympathize with them, but I think there are certain exceptions which always prove the rule.

You will recall that the plan of the salvage campaign in certain industries was organized on a so-called vertical project basis whereby a man was taken from that industry and given complete charge of that industry. Those industries are coal mining, railroads, utilities, and petroleum. I told you the first time I appeared before the Illinois operators in Chicago that so long as I was at the head of this organization, there would be no inspection of coal mines. Fortunately, I got out before this had to come. There is going to be an inspection of coal mines. I was called to Washington two weeks ago and spent two days on this subject matter trying to get it ironed out in a constructive manner. There was a determination on the part of some people that inspectors be appointed to come into your properties and mines and tell you what we should scrap and what we should not scrap. We were finally able to kill that with the very fine and helpful cooperation on the part of Mr. Harrington of the United States Bureau of Mines. We spent a great deal of time talking this matter over with him and he finally volunteered that he would give us the services of his Health and Safety Division inspectors 50 per cent of the time to perform this service.

These men in their routine inspections will consult with the superintendents of the mines to determine, particularly with reference to machines, those doubtful machines, and in selecting from those so-called doubtful machines the ones which are obviously scrap and the ones

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which are usable. There will be an attempt made to classify all machines in the mines not being used by the present owners as to whether they are scrap and should be immediately scrapped, whether they are doubtful, or whether they are usable machines not then being needed by the present owners. A report will be made on those findings to the chief of this service, Mr. Harrington, and I am told that he expects to enlist the services of the Mine Inspection Bureau in this work. We have already enlisted the aid of all the state mining departments of the country.

As a result of that inspection and report, a running record inventory will be kept in Washington of all usable equipment not then in use or for which use is not contemplated by its present owners. It will be cleared through Mr. Harrington to Dr. Wilbur Nelson, as head of the Mining Branch. We hope to establish a sort of federal swap shop, if you please. We hope to keep a running inventory of all of those machines so that when any of us asks for priorities on certain machines and we are told by the Mining Branch that they are not available, if there is a used machine that can be used in place of a new one, we will be informed by the Mining Branch that "Joe Blow" has such a machine at his place and is willing to sell it at a fair price. We think that may turn out to be a very helpful service to the mining industry of the country. It is not an original idea. The idea first came to our attention in the State of Arizona where the metal mines, for their own protection, organized it on a state-wide basis some ten months ago and it has been highly successful out there. We hope to have the same success with it on a national basis.

I have been spending considerable time of late talking to many men in the industry, and to many of the manufacturers, and I am getting very much concerned about the future of this industry during this war. I think it would well behoove the coal operators of this country to get together and get some proper representation in Washington. When I say that, I am not decrying in any way the efforts of the National Coal Association or of the American Mining Congress. Both of them have done a grand job for us so far. But it is up to us as mining men to help organize and formulate the policies upon which our industry will depend. It is going to catch up with us, gentlemen, some time in the near future, within the next five or six months at the best, and we will then be very sorry and we will be griping at everyone except ourselves because the proper policy was not adopted.

We are learning a new business, gentlemen, all of us in this country. That business is total war. We were not educated for it and many of us believed that we would never need be educated for it. But we are learning it, and we are learning it the bitter way and not nearly fast enough. Too much, I think, has already been said and written in a general way about this war and the various efforts that are being made. It has not yet been personalized. It has not been brought home to us as individuals. We are going along more or less in the same old way, doing everything anyone asks us to do in this effort, but I wonder if

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we sit down and argue with ourselves as to whether we are doing everything we can. I think not—not many of us.

I don't believe we realize what could and would happen to us if we lost this war. It was brought home to me very forcibly a few weeks ago in an issue of The American Legion Magazine wherein was published a decree, a proclamation, if you please. This was a composite proclamation taken from the various edicts which have been issued by Nazi Germany to the occupied countries of Europe. The authenticity of these items is unquestioned. It was put together and translated by Doctor Beers, a man of unquestioned integrity and a member of the League of Nations.

To get entirely away from the salvage question and to try and bring home to you what it would mean to lose this war, and to make you realize, (if you can tie the two subjects together) that salvaging of scrap metal is a very definite part in winning this war, I ask your indulgence while I read to you this proclamation. Get, if you can, the significance of this thing, particularly of the opening statement:

“DECREE

“To safeguard the property of the United States and to prevent acts against the security of the American people and the German Occupation Forces:

“By virtue of authority vested in me by My Fuehrer and the All-Mightiest Commander of the Army, I decree:

“I. All powers of state in the United States rest in the hands of the Army of Occupation.

“II. The occupying forces have taken command of all government offices, the courts, the police, all transports, banks, industrial plants, farms, universities, schools, hospitals and churches. All executives, whitecollar workers, and laborers, insofar as they are retained by the Germans, who disregard German orders will be executed.

“III. All products of farms and industry, raw materials, gold and silver, jewels and art objects may be requisitioned by the military authorities, who will decide how they may be used in the public interest. This order includes all foodstuffs above the normal requirements.

“IV. Anyone caught trying to destroy farm or industrial products, buildings, plants, public utilities, or posters put up by the German authorities, will be shot.

“V. Anyone attempting sabotage, changing his residence to escape work, or refusing to go wherever he is sent to work will be put to death.

“VI. Taxes will be levied by the military. All costs of occupation must be paid by the communities involved, until withdrawal of the occupying forces.

“VII. In all of the occupied territory the German reichsmark will be the medium of exchange, at a rate to be determined by the occupation authorities. The Army of Occupation may

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make payments over one hundred and twenty-five dollars by giving an I.O.U. Anyone refusing to honor German money or scrip will be fined not less than 100,000 marks and imprisoned for not less than five years.

"VIII. All political activities must cease as of this date. Political parties, labor unions, religious and charitable organizations are hereby outlawed. Any attempt to evade this section will subject the offender to extreme penalties.

"IX. All public meetings of whatever character are forbidden. Violations will be dealt with by military court.

"X. Theater and moving picture shows, art exhibits, sporting events, social and religious meetings, publication of books, newspapers and magazines are hereby made subject to authorization and censorship by the military.

"Books and art objects obnoxious to the military authorities must be destroyed by their owners. Violation of this order will be punished with a fine of not less than 100,000 marks and imprisonment for not less than five years.

"XI. Anyone trying to leave the United States without permission will be deported to German concentration camps or shot.

"XII. Within four days of publication of this proclamation all males between the ages of 16 and 60 must register with the local commander, giving all significant data as to education and vocational aptitude. Similarly with females between the ages of 16 and 45, within ten days of publication of this decree. Other residents must comply with these regulations within three weeks. Refusal to comply will result in fine and sentence to a concentration camp.

"School children must be registered by their teachers, as a first step to facilitate their transfer to National Socialist youth camps.

"XIII. Jews will be dealt with in accordance with regulations in force wherever German authority extends. A future order will deal with methods for deportation of the negro population.

"XIV. Weapons of all kinds, broadcasting equipment, short wave radios, cameras, anti-German literature, letters and pictures must be turned in as of this day to the local military authorities. Failure to comply with this order will bring the death penalty.

"The death penalty will also be invoked against all persons who listen to foreign radio broadcasts, pick up or distribute unauthorized leaflets, or read newspapers and books under the ban of the German military authorities.

"XV. All Americans must pay due respect to officers and men in German uniforms and make way for them in all public places. The penalty for violation will be fine, imprisonment or deportation to a concentration camp.

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“Persons insulting the German uniform or German officials, or American under the German protection, or who criticize National Socialism will be liable to deportation, with the death penalty mandatory for repetition of any of these offenses. Any-one threatening physical harm to military or civil authority will be shot.

“XVI. Any violations of German authority by groups of two or more persons will subject the entire community to heavy fine, and economic and social leaders of the community will be dealt with drastically. If those committing these outrages are not apprehended, a group of citizens of the community, selected at random, will be shot, the number depending on the gravity of the crime.

“XVII. Disrespect for any flag displayed with the permission of the Occupation Authorities is absolutely forbidden. Flags not in sympathy with the German cause must be turned in to the authorities at once, or destroyed. Non-compliance with this order will result in sentence to a concentration camp, or death.

“Washington, August 25, 1944

Head of the Military Occupation
of the United States of America
Von Mueller,
Lieutenant General.”

That, gentlemen, is the awful choice, that is the awful alternative to winning this war, and that is what has happened in Europe. I think there is a very definite tie-up between that proclamation and all of these efforts which contribute to the winning of the war.

I should like to repeat to you the little story of the recruiting sergeant (this was in the days when there was recruiting) who had done a good job. He had a big crowd in headquarters to be signed up. They were very gabby and they talked all the time. Several times he was forced to bring some quiet and order into the gathering which he always did in a very soft and gentlemanly tone of voice, by saying, “Gentlemen—gentlemen—please! We must have quiet.” At last they had all signed up and taken the oath of allegiance to the United States, after which they started gabbing again, which caused the sergeant to bark at them, “Gentlemen, you are now in the United States Army. Goddam it, shut up!” (Laughter.)

Gentlemen, you are in a war and, goddam it, get in that scrap! (Laughter and applause.)

* * *

Chairman Wilcox: Thank you, Mr. Snoberger. I don't know whether the boys are going to let you get away with all of that or not.

Would anyone like to ask Mr. Snoberger any questions?

Mr. J. G. Crawford: Just one question: Has any attempt been made to find out the tonnage of metal—take, for example, iron or copper—going into coal mines in any one year as compared with the tonnage coming out? In other words, how much is going into the job.

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Mr. Snoberger: My section has made no such effort and I doubt if any other section in the salvage end has. That is an interesting question. I have no answer to that particular question. I know that no such survey has been made by any branch of the Conservation Bureau. Perhaps some other department of the government has. If they have, I have not heard of it. Perhaps one of the machinery manufacturers can answer that?

These various bureaus, you know, are so active that we sometimes find as many as twelve of them working on one subject and no one of them know that the other eleven are working on the same thing. I can't really answer that for you, Mr. Crawford. Does anyone else have any questions that I can shed any light on?

Mr. J. H. Fletcher: What was the amount of scrap sent to Japan? I was quite surprised when I heard what that amount would have meant to our salvage drive. Could you give us a figure on the tonnage that was shipped?

Mr. Snoberger: I have forgotten the figure, but I can give you the fraction. For the four years immediately preceding the date upon which shipment was stopped or upon which the embargo became effective we shipped one-thirty-seventh of the yard scrap of the United States. As a tonnage figure, that would amount to about 16 million tons. That was a lot of scrap for Japan; it is not a lot of scrap for us, although it would be right now under present circumstances.

Mr. Fletcher: How much was sent to Italy?

Mr. Snoberger: That was a very minor quantity. That whole thing was brought out in a House investigating committee last December at which the president of the Iron and Steel Institute gave testimony of actual figures. They apparently had kept a very close record of it.

Question: If an operator has obsolete equipment in a bad section of the mine, it will probably cost two or three times as much for that equipment to be taken out. Would you expect him to get it?

Mr. Snoberger: I shall try and answer that. Because of the limitation of time, I did not have a change this morning or felt that I couldn't take enough time to go into the subject matter of so-called special projects which will be handled by War Materials, Inc., which is a new corporation set up with a budget of five hundred millions of dollars with an office in Pittsburgh. It will be their job to salvage all of those items such as abandoned bridges, abandoned buildings, street car rails or what not, where the cost of recovery exceeds the possible realization. It is purely a subsidy to get the scrap. As for such items as you have mentioned, it would be up to War Materials, Inc. and Special Projects to handle them.

Anything else?

Again I thank you, gentlemen. (Applause.)

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Chairman Wilcox: Thank you again, Mr. Snoberger.

You have in your programs a supplementary announcement. At this time we are going to have a paper by Howard Lewis. I am sure you all know Howard of the Old Ben Coal Corporation. His subject is going to be, "On-Shift Versus Off-Shift Shooting in Illinois Mines." Howard Lewis! (Applause.)

Mr. Howard Lewis: I am awfully glad to be here today.

ON-SHIFT VERSUS OFF-SHIFT SHOOTING IN ILLINOIS MINES

By HOWARD LEWIS

Underground Supt., Old Ben Coal Corp., W. Frankfort, Ill.

I am motivated in presenting this paper by the hope that it will be of value to the Illinois coal industry with which most of us have cast our lot, and that it will react favorably to bring about some consideration and planning for the future of that industry; planning predicated on a sound and honest appraisal of facts concerning the past and present condition of Illinois shaft mine operation. Together we have seen the Illinois coal industry prosper, producing great tonnages exclusively from shaft mines and providing a livelihood for thousands of families. Together we have lived through its years of greatest majesty and glory. We have seen it reel and stagger from the forces opposing its stability and progress; we have watched its production decline until many of its great mines were abandoned, and its manpower was roaming the highways seeking food, shelter and a job. We have seen the production of the remaining shaft mines, able to carry on, decline in markets at our front door made highly competitive with coal from distant fields and from stripping operations produced and shipped under more favorable political and economic conditions. Last year about 36% of Illinois production of coal came from sources other than deep shafts, such as strip mines and local mines. This alone is significant of the trend of shaft mining unless corrective measures are taken without further delay. Our shaft mining industry suffers from antiquated laws, rules and regulations made to fit conditions entirely different from those now existing in a modern, fully mechanized mine.

We who have been mindful of all this have not had the economic strength or political power necessary to make ourselves heard, so the old laws, rules and regulations still remain to hamper us to this very day. I refer especially to the Illinois Shot Firers' Act which became the law in this State more than 37 years ago. It may have been justified at that time, but in this day of complete mechanization it is one of the most stringent measures imposed upon the Illinois shaft mines and has

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been largely responsible for the decline of underground mining. It has made it possible for other coal fields where on-shift shooting prevails to outstrip us in production and invade our natural markets. It has caused unemployment, hunger and destitution in many Illinois communities through idle mines that could no longer operate in competition with on-shift shooting in other fields.

Face preparation has become a vital matter in the mechanized mine of today. Improved methods of combustion require careful sizing and cleaning, all of which received little consideration 37 years ago. In the hand-loading days this part of the production cycle was entirely in the hands of the miner at the face, working on a tonnage basis. He was not concerned with the quality of coal which he blasted from the coal face beyond that required to escape penalty for impurities by the dock boss. As a result, he used excessive charges of explosive to make his work easier and loaded out his coal with 55% to 75% of it under 2 inches in diameter. His safety and that of his fellow miners depended largely upon his own ability and judgment, which many times were bad.

Times have changed. It is now necessary to break the coal from the solid face in such a way as to approximate the sizes for which there is the greatest demand in the market and also with the least damage to roof and timbering. Although we now have more and better supervision in our mines, neither in the past nor in the present has it been possible to properly supervise face preparation when it is necessary that the coal be blasted when only men engaged in that work are in the mine. In our shaft mines today the shotfirers hurry through their work, intent on firing as many shots as possible in as short a time as possible, thus gaining a few minutes out of the allotted time for this work so as to leave the mine a little earlier.

Several thousand tons of coal are blasted down in the average mine after the hoisting shift in a period of two hours or less. Large areas of roof are thereby left exposed to work and settle until the next shift reports for work, creating hazardous conditions over this lapse of time that should be rectified immediately. The management has no opportunity to know of these hazards until the following morning when they get the report of the mine examiners. Such hazards must first be removed and the places made safe before the coal can be loaded out and another day may go by before production can be resumed. If it were possible to make inspection and take care of dangerous conditions immediately after the shots are fired, as is done in on-shift shooting mines, many accidents from roof falls would be prevented and a great step towards economy in operation would be made.

Let us suppose that the Illinois Shot Firers' Act, by executive order, should be applied to all coal mines in the United States today. In a short time the coal production of the Nation would drop sharply. Perhaps half the mines would be unable to continue operation. Those mines now operating double and triple shifts would, for the most part, find it impossible to produce coal for more than one shift per day. Mines working coal seams carrying one or more large bands of impurities would be among those to close immediately. A crisis would exist, the like of

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which this Nation has never seen. The price of coal, now limited both as to maximum and minimum, would have to be raised to a figure never heretofore reached, if production in any more than half a dozen fields of the Nation was continued on a sound basis.

Great areas of virgin coal adjacent to mines now working and mines already abandoned lie untouched because they carry dirt bands that must be removed by selective mining, requiring successive shooting and loading out, which is and has been economically prohibitive in this State. There is no need to go into detail in describing the extreme difficulty of operating shaft mines in Illinois two shifts in 24 hours. Yet, we are in direct competition with mines in other fields that operate double and triple shift, carrying out the complete cycle from solid face to railroad car on each shift. They shoot on-shift, of course.

On-shift shooting has always been the practice in the two largest coal producing states of the Nation, namely, Pennsylvania and West Virginia. We cannot say that these commonwealths are indifferent or negligent toward their people who work in the mines. We cannot say that they have failed to keep step with progress in coal mining methods. If on-shift shooting were not being done in the mines of these two states in comparative safety to life, limb and property it would not be permitted. Only in recent weeks have the shaft mines of southern Illinois been permitted to expend their full capacity in the production of coal for the war effort, but the on-shift shooting mines of the Nation have been going at full capacity, working double and triple shifts for the past two years. We have been told that we cannot have certain equipment which we need to keep our mines in full production during the present emergency because we do not utilize them for more than one shift of production in 24 hours, and that other mines operating two or more shifts a day will make twice or three times the use of this same equipment. The WPB uses this argument in the allocation of new equipment.

It is only possible for the shaft mines of the State to increase their production but slightly during the present emergency. Franklin County, with its limited number of large mechanized mines and large areas of undeveloped coal, had no new mines opened in 23 years. Fourteen of its mines have closed since World War No. 1. Franklin County production began to decline in 1923 and not until 1937 was there a break in the downward trend. This County is cited as an example of similar conditions in other parts of the State where mines have closed, leaving large areas of unworked coal which must ultimately be recovered from deep shafts. Strip mining has its limitations and the limited acreage that can be recovered in this manner will have been exhausted many years before the total coal reserves of the State, too deep for recovery in any way except by underground mining, have been exhausted. Much of this coal reserve is either thin seam or the seam carries bands of impurities which must be blasted and removed separately. In order to mine this coal economically it must be broken from the solid face on-shift, enabling a proper disposal of the impurities and loading out of the clean coal in a continuous cycle in no way limited or impeded by the number of shifts per day. If this is not made possible by a change in the present

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laws, rules and regulations, this coal will remain where it is and the coal industry of the State of Illinois will become a thing of the past. Mine No. 11 of the Old Ben Coal Corporation in Franklin County, a completely mechanized operation employing 350 men with a payroll of \$750,000.00 in 1941, is one of the mines having an area sufficient for 10 or 12 years' operation, which has been left untouched in recent years because of a band of rock in the middle of the seam which prohibits operation under existing conditions. All production comes from one side of this mine, where natural conditions are normal. In just a few years this mine will close unless the laws are changed to permit a continuous cycle of operation at the face in this split seam area. Other operating mines in the County are facing the same alternative.

I have mentioned Franklin County and its mines because I am more familiar with conditions there. Similar conditions exist in other parts of the State. It is unnecessary for me to go into detail in describing how on-shift shooting can be done in Illinois mines in safety to the workmen and in security to the mine properties. It is sufficient to say that the record in states where on-shift shooting has been and is now being done, is open to the scrutiny of anyone interested.

We are engaged in a terrible war for the preservation of our American way of life. Our coal is a vital contribution to the war effort. When the victory is won, the world must be reconstructed. Coal will be a vital contribution to that effort. Illinois shaft mines will do their part in direct proportion to their ability to produce. It is time that all interests—operators, mine workers, legislators, the Department of Mines and Minerals, civic organizations, business interests affected by coal—get together for the common purpose of revising the laws, rules and regulations in line with progress in mining methods for the good of the industry and the people who depend on it for a living. (Applause.)

* * *

Chairman Wilcox: Howard, I thank you. I think many of us have been waiting for years to have that subject stated as plainly as that. Are there any questions or remarks?

Mr. Norman Prudent: I think this question just discussed in the paper by Mr. Lewis is of such vital importance to all of us that are here today that we should decide to do something about it.

Mr. Chairman, I make a motion that this Institute go on record as favoring on-shift shooting and favoring the change of the mining laws in Illinois to permit on-shift shooting in order that we can save this industry that we are all so vitally interested in. We can go on record here today as favoring it and contacting our legislators and other people who are vitally interested and contacting our workers' organizations, insisting that we do something about this problem that we are confronted with of on-shift shooting. We can sit around and do a lot of howling about it and cuss all we want to, but until we decide to do something about it, we are always going to be behind the eight ball.

So if I am in order, I put that motion before this meeting today.

. . . The motion was regularly seconded . . .

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Mr. E. H. Johnson: Mr. Chairman, I would like to second that motion too. I would also like to say that I think it is generally admitted by every one in this room (and I think it is true) that there is scarcely a well-qualified engineer in the country who will fail to agree that on-shift shooting is far safer than off-shift shooting. There is probably not more than 50 per cent of the coal of the country right now being produced in states that limit their shooting to off-shift.

Chairman Wilcox: Are there any remarks before the motion is put?

The question was called for.

Chairman Wilcox: It has been regularly moved and seconded that this organization go on record as favoring on-shift shooting.

Chairman Wilcox: You have heard the motion and you have heard Mr. Prudent's remarks. All those in favor will signify by saying "aye"; contrary "no." The motion is carried.

That completes our program for this morning and I shall now turn this meeting back to our President. (Applause.)

President Jefferis resumed the chair.

President Jefferis: Thank you, Dwight, for the splendid manner in which you conducted this meeting.

If there is nothing else to come before the meeting at this time, we will adjourn until two o'clock this afternoon. Please be here promptly at that time because we have some wonderful papers to be presented at this afternoon's meeting.

The meeting recessed at twelve-fifteen o'clock.

AFTERNOON SESSION

2:15 O'clock P. M.

The meeting reconvened at two-fifteen o'clock, President Jefferis presiding.

President Jefferis: Gentlemen, let's come to order.

We have a very splendid program for this afternoon and we must get started on time, for there is likely to be quite a little discussion later on. Without any further ado, I am going to call on Mr. Carl Hayden to take charge of the meeting this afternoon. Mr. Hayden!

Mr. Carl T. Hayden took the chair.

Chairman Hayden: Mr. President and Gentlemen: As usual, the Illinois Mining Institute in the preparation of its programs has attempted

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to cover the various subjects in which the industry is always interested. We had some exceptional papers presented this morning. This afternoon the program takes a little different approach. The first paper has to do with the problem of the utilization of the products we produce, and I am pleased to present for the first speaker this afternoon Professor Fellows of the Department of Mechanical Engineering, University of Illinois, Urbana, Illinois, who will speak to us on the subject, "Present and Future Possibilities for Smokeless Combustion of Illinois Coal." Professor Fellows! (Applause.)

Prof. J. R. Fellows: Mr. President, Mr. Chairman, and Members of the Illinois Mining Institute: It would be a very easy matter for me to talk to you all the afternoon on the subject of the "Present and Future Possibilities for Smokeless Combustion of Illinois Coal." It is going to be a rather difficult matter for me to speak to you for twenty minutes on that subject as I have been asked to do. However, I am going to try very hard to hold my remarks within that period of time. To check on myself, I shall get my watch out here and place it in front of me.



PRESENT AND FUTURE POSSIBILITIES FOR SMOKELESS COMBUSTION OF ILLINOIS COALS

By PROF. J. R. FELLOWS

Dept. of Mechanical Engineering, University of Illinois, Urbana, Ill.

Illinois bituminous coal can be burned smokelessly in hand-fired heating plants which are properly designed.

The requirements for smokeless combustion are well known and may be simply stated as follows:

1. There must be sufficient air at all times to supply the oxygen required for the complete combustion of all the hydrogen and carbon in the fuel.
2. There must be thorough mixing of the air and the hydrocarbon gases which are distilled from the fresh coal during the coking process.
3. The mixture of air and hydrocarbon gases must be heated to the ignition temperature, (which is approximately 1300 degrees fahrenheit) by bringing it close to some incondescent coke left from the previous charge of fuel.

Research conducted in the Mechanical Engineering Department at the University of Illinois has led to the development of a hand fired furnace in which bituminous coals of all types can be burned without the production of any smoke.

The smokeless furnace developed at the University of Illinois employs a combination of the well known down-draft principle with the conventional up-draft principle used in practically all hand fired equipment now in service. The furnace consists of the following essential parts:

1. A coking chamber at the front with sloping floor to facilitate transfer of coke to the coke burning chamber at the back.
2. A coke burning chamber or fire pot equipped with a conventional shaking grate.
3. A combustion chamber.
4. A down draft baffle wall provided with air flues which deliver the secondary air to the bottom edge of the baffle wall where it is positively mixed with the gases from the coking coal. The baffle wall also confines the fresh coal to the coking chamber separate from the combustion chamber where the rate of coking can be definitely controlled.

The rate at which the coal is coked and the rate at which the coke from the previous charge is burned are correctly proportioned by the sizes of the openings which admit air to the coking chamber and the ash pit respectively. When the fire fails to respond to the draft dampers and refueling is required, the coke is simply pushed to the back of the furnace as in the well known coking method of firing and a fresh charge of coal is placed at the front.

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The hydrocarbon gases from the coking coal pass under the baffle wall where they are thoroughly mixed with secondary air which issues from vertical flues in the wall and the mixture is passed over the incandescent coke from the previous charge of coal. This arrangement meets all the requirements for complete combustion and no smoke is produced.

Coals from many different regions of the Western Hemisphere ranging from Nova Scotia in the north to Chile in South America have been burned in experimental furnaces of this type. The tests indicate that smokeless combustion can be achieved with all types of bituminous coal. In the mild weather of early fall and late spring when it is impractical to maintain a steady fire, the furnace will hold fire for as long as twenty-four hours and when the draft is turned on and a fresh charge placed, the coke is heated very quickly to the temperature necessary to ignite the gases and smoke is produced for only a few minutes of each day.

The combination down draft-updraft principle incorporated in the smokeless furnaces used in the aforementioned tests is applicable to all types of hand fired furnaces, boilers, stoves and water heaters, and it appears likely that all such devices of the future which are intended for the burning of bituminous coal will incorporate this or some equally effective principle.

While the author believes that smokeless coal heaters of all types will ultimately be available to the public, it obviously will be many years before all of the conventional heating units now in use are replaced. A down draft conversion burner which converts a conventional furnace to the down draft-up draft principle of operation and may be easily installed in any warm air furnace has also been developed at the University of Illinois. When the heat resisting alloy metals required in its construction are again available, the conversion burner will become a possible means of burning bituminous coal smokelessly in conventional hand-fired furnaces. Other devices for converting hand fired furnaces to smokeless operation are being developed and some of them show considerable promise.

Since it appeared that the acute shortage of metals caused by the war effort would stop the manufacture of improved coal burning devices of all types for the duration of the war, an intensive study was undertaken in the Mechanical Engineering Laboratory of the University of Illinois to determine ways for obtaining the best possible results while burning bituminous coal in conventional hand fired furnaces, using the tools now available to the average householder.

The test procedure, the equipment used, the test results and the recommendations offered, are all described in detail in University of Illinois Engineering Experiment Station Circular Number 46 entitled "Hand Firing of Bituminous Coal in the Home." This circular may be obtained without cost by writing to the University of Illinois Engineering Experiment Station, Urbana, Illinois.

The study disclosed that a definite technique is necessary for securing the best results from hand fired furnaces. A few of the more important points are as follows:

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1. The fuel bed cannot be properly prepared with a conventional poker or with a shovel of any type. An oblique angled poker with which any part of the grate may be reached for probing or removing hot coals is necessary.
2. The side bank method of firing bituminous coal will fail to effectively accomplish its purpose of reducing smoke unless *all* of the hot coals are removed from the side of the furnace where the fresh coal is to be placed. If there is so much coke that it is impossible to move it all from one side, and if circumstances do not permit waiting for the excess to burn away, that which cannot be removed from the side to be charged with fresh coal must be covered with ashes before placing the fresh coal.
3. A small amount of screenings, or yard forkings properly placed as a cap on top of each charge of nut coal by the nut and slack method described in Circular Number 46 reduces the amount of smoke produced, causes the fire to hold longer and generally improves the performance of bituminous coal when used in conventional hand fired heating plants.
4. To reduce the smoke to a minimum even when the side bank method or the nut and slack method is properly applied, it is necessary in cold weather to limit the opening of the ash pit air damper. In most furnaces there is sufficient leakage around the ash removal door so that the chain operating the ash pit air damper may be disconnected during the winter months. Opening the ash pit air damper as is the universal custom, results in excessive fire pot temperatures which distill the gases from the fresh coal too rapidly and heavy black smoke is produced.
5. It is possible to maintain a uniform temperature in the home during normal winter weather by disconnecting the operating chain from the ash pit air damper and using a modulating control with the check draft damper. If it is found that the leakage of air around the ash door is not sufficient to support the required combustion rate, a piece of wire may be inserted under the lower edge of the ash pit air damper to hold it open a small crack.
6. The combustion rate may be limited in mild weather by reducing the effective grate area instead of accumulating a heavy ash layer over the entire grate. The oblique angled poker may be used for probing a small area next to the coals before placing a charge so that burning will take place freely on that portion while a heavy accumulation of ash on the remainder of the grate prevents leakage of air through the portion not in use. As a result this procedure the fire is nearly as responsive to the controls as in cold weather.
7. While a uniform combustion rate is the optimum condition in normal winter weather, it cannot be achieved with bituminous coal in the mild weather of early fall and late spring. Because of the high temperature required for the ignition of the gases, they do not burn at all when the combustion rate falls below a required minimum which cannot be maintained without overheating when

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the heat required from the furnace is a very small amount. The procedure which gives the best results in mild weather is to fire small amounts of fresh fuel at times when there is some demand for heat, then burn the fuel at a maximum rate until the demand is satisfied after which the fire is checked as much as possible to hold fire until heat is again required.

8. The temperature of the coke or coals left in the fire pot of the furnace drops very rapidly when the door is opened for recharging particularly if the mass is disturbed with a poker. Since the coke must have a high surface temperature to ignite the gases from the fresh coal, the door should be open no longer than is absolutely necessary, the main body of the coke should not be disturbed until after the fresh charge has been placed and, if necessary, a few pieces of kindling or crumpled paper should be placed in the center of the fire pot after the main body of left over coke is broken up to start the initial gas flame. Never leave a smoldering fire as it may persist for hours, wasting much fuel and producing much unnecessary smoke. Explosions of furnace gas are usually caused by smoldering fires.

Every custom which has been adopted by man in his development of what we call our modern civilization has required the expenditure of time and energy for its maintenance. Probably every man in this audience has spent at least ten minutes of this day removing the whiskers from his face to improve his appearance. Every home owner spends many hours every summer mowing the grass in his lawn though it would be much easier to let it grow.

Reduction of smoke from hand fired heating plants burning bituminous coal can be achieved by any intelligent person willing to apply a few simple rules. Unfortunately, many of our citizens do not know the proper firing methods and many others have not acquired a consciousness of the smoke they are producing. Though every housewife deplores the dirt and soot she has to contend with, she does not realize that she is obliged, as a citizen of a civilized community, to see that her own furnace is fired in a way that will reduce the smoke produced to a minimum.

If air pollution from hand fired heating plants burning bituminous coal is to be reduced to a minimum, every citizen involved must be instructed in the proper methods of firing the coal and he must be made to feel that it is just as disgraceful to produce unnecessary smoke as it would be to dump his garbage in the street.

Reduction of smoke can be accomplished immediately through a persistent program of education sponsored by coal operators, coal dealers, the public schools, civic organizations and civic authorities.

(PLACE NEAR FURNACE)

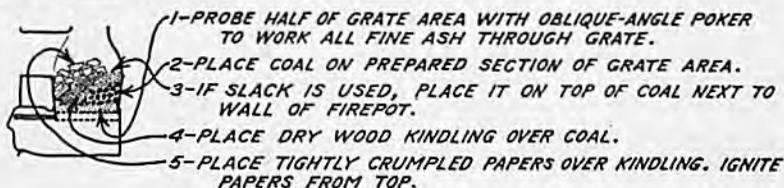
HAND-FIRING BITUMINOUS COAL

BRIEFS FROM CIRCULAR No. 46
UNIVERSITY OF ILLINOIS ENGINEERING EXPERIMENT STATION
URBANA, ILLINOIS

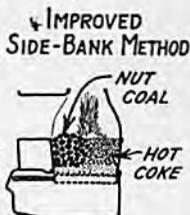
I-USE OBLIQUE-ANGLE POKER TO REACH ANY PORTION OF GRATE

(SEE PAGE 16)

NOTE: MOST CONVENTIONAL POKERS CAN BE CONVERTED TO THIS TYPE.

II-TO KINDLE FIRE (SEE PAGE 27)**III-FOR COLD WEATHER OPERATION (SEE PAGES 17 & 21)****TO APPLY EITHER METHOD:**

- 1-MOVE ALL HOT COALS FROM ONE SIDE.
- 2-PROBE EMPTY SIDE TO REMOVE FINE ASH.
- 3-PLACE CHARGE OF FRESH COAL.
- 4-BREAK COKE FROM PREVIOUS CHARGE WITH OBLIQUE-ANGLE POKER TO PROVIDE COKE BED OF UNIFORM DEPTH AND CONSISTENCY.

**IV-FOR MILD WEATHER OPERATION (SEE PAGE 19)**

APPLY EITHER METHOD AS FOR COLD WEATHER OPERATION, EXCEPT:

- 1-REDUCE EFFECTIVE GRATE AREA,
- 2-FIRE SMALLER AMOUNTS OF COAL.



TO REDUCE EFFECTIVE GRATE AREA MAINTAIN A DEEP ASH BED EXCEPT AT CENTER.

USE OBLIQUE-ANGLE POKER TO KEEP CENTER OF GRATE FREE OF FINE ASH.

DO NOT SHAKE GRATES.

NEVER COVER HOT COALS WITH FRESH COAL

Chairman Hayden: Thank you, Professor Fellows, for a very interesting presentation of a new development.

The small stokers and their further perfection to a large degree moved the smaller coal on to the ultimate consumer through the dealer. That movement in a way has decreased the percentage of coarser coal moving through dealers to the ultimate consumer. The development referred to here should help the further movement of the nut sizes or the prepared sizes in their use in the home.

I know that there will be a number of questions and further discussion on this paper. Who has the first question?

Mr. H. H. Taylor: You said something about the placing of ashes on top of a bed of coals under certain conditions. That is contrary to what is generally recommended, and I wondered about that when you said it?

Prof. Fellows: That is only to be used in case of necessity and you put it on as few coals as possible. In other words, what we recommend is to push the coals over to one side just as far as you possibly can. Suppose a person is ready to retire and he wants to put in a charge for night banking before he retires, he may go down to fix the fire and find so many coals in the furnace that it is impossible to clear the hot coals from one side of the grate area. Then I would clear it insofar as it is possible to do so. In other words, pile the coals up on one side just as high as you possibly can. Then put ashes on the thinnest part; that is, the part that you can't get rid of, to prevent those hot coals from igniting the charge from the underside. You see, unless you do that, the hottest part of your fuel bed will be right there where you put your fresh coal, because that is where the fuel bed is the thinnest and resistance to the passage of air the least, it will start the volatilization of your fresh charge at a very high rate and may even result in an explosion. We have had terrific explosions in such a situation in the laboratory.

Mr. Taylor: What is worrying me is the idea of giving that sort of instruction into inexperienced hands. If I were a retail producer's engineer, in giving those instructions to the ordinary householder I'm afraid that he would get into a lot of trouble.

Prof. Fellows: We haven't found any serious difficulty with this procedure. You will get some clinker formation from the ash that is added and it is a situation that is to be avoided, if possible, but in that situation, it is the only thing you can do. In other words, the formation of clinker wouldn't be as serious a trouble as an explosion if you had a choice between one and the other.

Chairman Hayden: Gentlemen, are there any further questions? Does anyone wish to add anything further to this subject that has just been discussed?

Mr. Crawford: Mr. Chairman, I would like to ask one question. Isn't this the first bulletin on how to burn Southern Illinois coal without smoke since Professor Breckenridge's circular, which applied to forced draft furnaces or power plant furnaces, that was issued probably thirty years ago?

Prof. Fellows: As far as I know, it is, yes.

I might add one word. In case any of you have not received a copy of this circular, I have a supply with me in addition to those I have left for you on the tables, and if any of you would like to have additional copies, I shall be very glad to supply them. As I said before, I wish that you would cooperate with us in helping us to get these out to the householders. Therefore, I wish that you would urge your dealers to write in for them for their customers. We want to get them ultimately into the hands of the individual householders. We have printed quite a supply of them and they are free. We have put a lot of effort into getting them out and in accumulating the information contained therein. I wish that you would all cooperate with us in helping us to make them effective.

Chairman Hayden: Are there any further questions or is there any additional discussion? If not, we will move on to the next speaker of this afternoon.

Probably the most important problem of our industry for the immediate future and probably for the duration is the securing of the proper amount of material and supplies needed in order to keep going. A large part of what we use in the way of supplies and materials is made up of those materials—these critical materials—of which the country generally is very short. It has been difficult to secure these materials. The War Production Board in Washington, in my opinion, has done an exceptional job in allocating and distributing these critical materials.

I think the Program Committee and Mr. Schonthal, our Secretary, are to be congratulated on having brought here today Mr. McElroy, Technical Adviser for Coal Priorities of the War Production Board, Washington, D. C., who will speak to us on this particular subject in which we are all interested, namely, "Priorities for the Coal Mining Industry." Mr. McElroy!

Mr. D. L. McElroy: Mr. Chairman and Gentlemen: I want to say, first, that I am particularly glad to attend your meetings here today, for three reasons. In the first place, I am certain that we have a group of people in this room who want to get this war over, get it won and get it done as quickly as possible. That this is the attitude of the people in the coal mining industry, I think, has already been demonstrated.

In the second place, although some mining men usually visit my office every day, it makes me feel particularly good to get out where there is an entire group of them, and particularly to see some of my old friends that I have not seen for a while.

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In the third place, I am glad to attend this Fiftieth Anniversary meeting of the Illinois Mining Institute because, at least in theory, I happen to be Secretary-Treasurer of the West Virginia Coal Mining Institute. I know from my own experience what an Institute of this kind can do for the people in the coal industry, and I know that this Institute has done a wonderful job over the past fifty years.

PRIORITIES AND THE COAL INDUSTRY

By D. L. McELROY

Chief, Coal Section, Mining Branch, War Production Board,
Washington, D. C.

All of us know, that to date, the coal industry has done an excellent job in providing coal for our war effort; for industrial fuel, coke making, gas manufacturing, railroads, power plants, domestic consumption and chemical plants. Our main problem is to continue that job as successfully, until the Axis powers are crushed. If we are to continue to do a good job, we must have the minimum manpower and materials required to do the job. Along with the request for adequate manpower and materials goes the obligation, and the necessity, to utilize to the maximum what is available to the industry. With the great demand of the armed forces for manpower and materials, we must make the ultimate use of all of our facilities. These obligations fall on the coal industry in the face of an increasing demand for coal due to increased industrial activity and additional loads due to conversion from oil.

The Coal Section of the Mining Branch of WPB has the responsibility to make sure that the coal industry obtains the amount of supplies, materials and equipment necessary to produce the coal required for our war effort — that amount but no more. There is not enough material for everyone's needs in all military, industrial and civilian categories; therefore some procedure must be used to control the flow of materials to the most essential uses—hence, to date, priorities.

The cooperation of the industry has in general been excellent. This help and cooperation has had a great deal to do with the results obtained to date and the status of the coal situation at the moment is the answer to the question as to what the result has been. We all hope that the future results will be comparable. With our war plans culminating in victory the results *must* be comparable. Production from "The Arsenal of Democracy" depends too much on coal for it to be otherwise.

All of us are now well aware of the fact that industry cannot get everything desired, in the time desired, or in the quantity or quality desired. The coal industry is no exception in the matter. Many things are not done and many materials are not used that in normal times, at many mines, are considered good practice. Examples of such cases are

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the use of steel mine cars, use of steel roof support, use of copper wire return circuits and refinements in preparation for customer satisfaction. Many of these changes are inconvenient, some increase costs but unless it can be shown that they adversely affect needed coal production, they must be made. In nearly every case involving such changes, an explanation to the applicant has brought forth a response which leaves no doubt as to the patriotism of the men in the coal industry.

A company which holds a serial number under Order P-56 can initiate an application for new equipment by sending the information outlined in the following paragraphs to the Coal Section of the Mining Branch. This information can be in the form of a letter or on any one of several forms which have been prepared by various coal associations and some coal companies. Mines which do *not* hold serial numbers under Order P-56 should apply for preference ratings on orders for new equipment on PD-1A application forms. These forms may be secured from the Mining Branch or any field office of the War Production Board.

Predicated on the fact that we are not operating on a "business as usual" basis—and we certainly are not—coal operators should ask themselves the following questions before requesting priority assistance for equipment or materials:

- 1) Is it absolutely essential to proper operation of the mine?
- 2) Are present facilities being utilized to the maximum?
- 3) Have I exhausted by engineering ability and ingenuity in providing a substitute or other methods that will eliminate the need for new facilities?
- 4) Is a substitute or second-hand equipment available?
- 5) Do I have sufficient labor to use the requested materials or equipment to the maximum?
- 6) Am I scheduling my request as near as possible to give delivery when needed, on the ratings generally available for such materials?

In making an application for priority assistance on new equipment, proper answers to the above questions should be a part of the application. The most important information to be included in an application is a clear concise explanation as to why the equipment or material is essential to the production of the mine. If necessary to make the explanation clear maps or sketches should be included. The experience of the Mining Branch indicates that this phase of the application should be prepared by the engineering or operating departments. Also the following routine information should be a part of the application.

- 1) Name and address of applicant company, and serial number (or numbers) under P-56, for the mines involved.
- 2) Daily tonnage of mine or mines, number of men employed, shifts worked preceeding month and shifts worked per day.
- 3) List of items required with specifications, value and your order number.
- 4) Name and address of supplier.
- 5) Lowest priority rating required for delivery needed.
- 6) Percent of production going to industrial and defense customers with list of customers taking bulk of production.

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- 7) Any other information pertinent to the case, including possible second choice in items.

Ordinarily the above information will be sufficient to enable the man handling the case to recommend or non-recommend a rating on the order for the material. When special or unusual cases require additional information the analyst will request it of the applicant. There are of course, numerous consultations on special or some particular cases. In some instances field investigations are made by the field staff or men of the Washington staff. All of the men in the Coal Section are trained and experienced in coal mining.

If a recommendation for the requested rating cannot be made, based on the facts of the case and the scarcity of the material, the applicant is so notified. If a recommendation is made, the letter or telegram of authority as well as a report explaining the reasons for recommending are prepared by the analyst. After signature of approval by the branch chief is attached, the case is forwarded to the proper reviewing authority and if approved, the letter or telegram is sent to the Issuance Office where the proper signature is made and the authorized rating is sent to the applicant. This letter or telegram is the authority to use the specified rating in accordance with the procedure outlined in the letter or telegram. A copy of the letter or telegram is mailed from the Mining Branch to the specified supplier. The Coal Section has always operated on the principle that it was to carefully analyze each case and only make recommendations when full justification could be substantiated. As a result of this policy, very, very few of the Coal Section recommendations have been returned with non-concurrence and most of these were subsequently approved.

All project applications for the opening of new coal mines or reopening of closed mines are cleared through the coal section of the Mining Branch. In order to initiate a project application, the applicant should first communicate with the Mining Branch outlining the proposed project. The Mining Branch will then advise the applicant of the proper procedure to use.

Any application for which no recommendation is made can be reopened at any time by the presentation of any additional facts relating to the case. In cases where no priority rating is secured the applicant should so notify his supplier. All applications, whether new or revised, are handled, and a decision reached, entirely on the merits of that particular case. Each application is reviewed on the basis of the need of the requested material to the production of coal which is essential to the war effort. Emergency needs for breakdowns are so recognized and handled as emergencies in preference to regular applications. In any cases involving breakdowns of equipment the applicant should communicate directly by telegram or telephone with the Coal Section of the Mining Branch. The address is 1404 Temporary Building R, Washington, D. C., and the telephone number is Republic 7500, Extensions 3335, 4615 or 2501.

The use of quota certificates under P-56 and PD-25a certificates under the Production Requirements Plan are both relatively new to coal mine

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operators. The quota certificates and PD-25a forms are mailed to each coal company under Order P-56, usually fifteen to thirty days before they are due to be filed with WPB. Instructions as to procedure are always included in covering letters or on the forms themselves. If at any time these two forms are not received fifteen days before the beginning of a quarter, the Mining Branch should be notified of the fact. Of course, mines which do not use \$5,000 or more of raw materials as outlined on Schedules E and F of PD-25a will not receive that form. All mines under Order P-56 should receive the quota forms. Copies of these forms can be secured from the Mining Branch or any field office of WPB.

The quota certificates under P-56 have been in use since the second quarter of 1942 for repair parts and the PD-25a applications were first filed by coal mines for the fourth quarter, the latter by all mines using over \$5,000 of the raw materials shown on the PD-25a form. Although both of these procedures may seem burdensome, they are necessary for proper control of raw materials and repair parts which in turn means the equitable distribution of a proper share of the total amount to the coal industry and in turn to the individual mines. It would surprise many coal operators how many times data submitted on quota and PD-25a applications have been used to justify material needs of the coal industry.

Mines which did not qualify to file PD-25a on basis of using \$5,000 of raw materials (approximately 50% of national coal tonnage) continue at the present to get all materials and repair parts by quota certificates or by individual ratings from the Mining Branch. The future will probably reveal a further shift to some procedure based on the Production Requirements Plan.

In filing both quota and PD-25A applications, operators should keep in mind the following points—they are important and the emphasis is based on the experience of the Mining Branch.

- 1) Read instructions fully, follow carefully and enter all information requested.
- 2) Keep requests to minimum required for proper mine operations.
- 3) Explain fully any unusual requests as to amounts of material.

Examples: unusual repair job which do not regularly or commonly occur; requesting rail or pipe when total inventory indicates ample supply but particular sizes are required or moving of substation equipment requiring unusual amounts of transmission wire.

If any emergency arises during a quarter, the company should file a PD-25f form, if a PD-25A had been filed, giving a complete explanation. If the emergency requires quota items, a request should be made to the Mining Branch for a supplementary quota giving a full explanation of the circumstances which make the material essential. Be sure the explanation tells what, when and why.

All quota and PD-25A applications are analyzed and certificates issued on the basis of the following facts.

- 1) Amount of material available.
- 2) Needs of the mine based on:

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- a. tonnage produced
- b. type of mining as; conveyor, mobile or hand loaded strip mined and method of mining
- c. other data in the Mining Branch files on the company operations
- d. type of coal and markets

Procedures are changed from time to time and the companies are so notified. However, if at any time any coal company is doubtful as to procedure or use of any order of WPB and will make inquiry to the Mining Branch, every effort will be made to give a concise simple answer to the question.

In the future there is little doubt that more complete inventory data will be required, particularly on raw materials and quota items. Such data is essential to give equitable distribution of these materials and coal operators should keep this fact in mind in preparing data for future applications.

The Coal Section of the Mining Branch, as stated before, has done and will continue to do all it can to provide the necessary materials—but no more—that are required to produce all the coal essential to winning the war. It is fully the belief of the Mining Branch that the continued operation of all present mines is essential to the war program. If the Mining Branch can be of service in regard to priority needs of the coal industry it will do its best to give that service a all times.

“If it won't help win the war—forget it.”

* * *

Chairman Hayden: Thank you, Mr. McElroy, for coming out here and for the very excellent presentation you have given us on what you are doing to help this industry get what it needs in the way of materials and supplies. I know that I can pledge the Illinois Mining Institute and all of its members to give you every bit of cooperation that we have to carry out what will probably be a very difficult job in the future in getting for us what we need.

I know that there will be a number of questions that you will want to ask Mr. McElroy. He is here and I know that he will be glad to answer any questions that you may care to ask him.

Mr. Heath: Mr. McElroy, if a question should arise as to trucks particularly for hauling coal, for which due application has been made through the Mining Branch, and we get an answer from Mr. Vaniman, Chief of the Automotive Branch, should we reply to him or to you?

Mr. McElroy: You should reply to him for this reason: Actual control as to the release of that equipment is in the hands of the Transportation Branch and not in the hands of the Mining Branch. I am certain that you will find that the Mining Branch will support you in every way they can on any justified case.

Mr. Joseph E. Hitt: We were given to understand that a certain number of trucks of certain sizes would be allocated to the Mining Branch for ultimate distribution.

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Mr. McElroy: To the coal industry?

Mr. Hitt: For the coal industry. Since then, apparently, ODT has assumed or taken over the authority which we thought was vested in you.

Mr. McElroy: No, the authority for trucks, to my knowledge, since the freezing of trucks has never rested with the Mining Branch. It must originate with ODT and, if I remember correctly, must be approved by them before it goes to the Transportation Branch. The final authority is the Transportation Branch. But it is my understanding that the case must come to them with the recommendation for approval from ODT. Of course, in all of those orders that have been put out you will find that there is always a provision in them for an appeal to the head of the War Production Board.

Chairman Hayden: Are there any other questions?

Mr. P. W. Beda: Speaking of the 25-A form which is filled out for the third quarter, that was new to all of us, of course, and in showing the quantities of materials used in previous quarters, in some cases the quantities were quite low in comparison with what we are asking for in the fourth quarter. It occurs to me that during some months, in fact, during almost every month, we reclaimed in our mines copper wire, rails, and so forth, which has not been charged in. In making out our new form, I am just wondering if it wouldn't be proper to include such quantities of critical materials used when we show the quantity used in the quarter? Do you get what I have in mind?

Mr. McElroy: Do you mean the recovered material?

Mr. Beda: Recovered along with the new material used.

Mr. McElroy: Well, that is the first I have ever heard about that.

Mr. Beda: The point I have in mind is that it would show a truer picture of the quantity of material used in that quarter.

Mr. McElroy: Yes, but it is a normal thing that more or less occurs every quarter and balances off over any period of time. In other words, it has pretty much of a definite relationship to that which must be purchased.

Mr. Beda: That may be true. All right, thank you.

Chairman Hayden: Any further questions?

Mr. Heath: If under PD-25a we ask for a specified length of cable that costs so much for the fourth quarter and the PRP authorization cut it from possibly \$1,000 to \$960, bearing in mind that the length we ask

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for was the commercial length applicable, should we consider ourselves compelled to abide by the \$960 instead of the \$1,000?

Mr. McElroy: We have had several cases like that. The solution of your problem is to file a PD-25F for the balance because it is a definite length of cable. If it takes 5,000 feet of wire to make a connection on a transmission line, there is no use giving a man 4,500 feet of wire, because it won't reach. Yet those things do occur.

Chairman Hayden: Are there any further questions?

Mr. McElroy: A good many of you men, I believe, know John Weysser. He is from out this part of the country. He used to be at the University of Illinois in the Mining Engineering Department and he has been in Washington since last November. As a matter of fact, John handles practically all the applications from Illinois, except when things pile up so that somebody has to give him a hand. John would have liked to have been here today, and he asked me to extend to all of his friends his very best wishes. I am certainly going to be glad to go back and tell him about the number of his friends that I seen here and the number of them that have inquired about him.

Chairman Hayden: Thank you. We all know Mr. Weysser and I know that you will carry back a message from all of us that we are sorry that he couldn't be here. We certainly all appreciate what he has been doing.

If there are no further questions, I want to again thank the two main speakers of this afternoon for the excellent presentations they have made on the individual subjects and also those members who took part in the discussion.

Mr. Hitt: It seems to me one of the subjects that ought to interest all of us right now to a very great extent is the question of the attitude of our respective draft boards as related to the key men that are operating in our organizations. Practically all of the key men in our own organization are young men, practically all of them are college men and particularly fertile material for these fellows to grab. The boys want to go, but our contention has been that they are more valuable to the national situation at this time right where they are than if they were in the army.

My impression is in talking to various people that the attitudes of the various local draft boards are not alike, which would indicate that they really have no instructions from any official source as to how to handle our men. They have told us—and I don't know where they got the authority for this statement—that 90 per cent of our coal must be for essential industries. Otherwise they don't listen to our plea to keep this man or that man in the organization. A lot of information has come out of Washington, much of it ambiguous, much of which I haven't been able to understand and which our local people don't understand, and which I don't believe our local draft board, at least, understands very well. It seems to me that it is a subject that ought to be of vital interest to all of us and I would like to hear it discussed.

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In working out our own figures for our production that could be designated as non-essential and essential, there was very little that could be eliminated. It seems to me to be all essential, even down to domestic coal for the retail consumer. We have got to keep the people warm. I really don't know what is essential and what is non-essential. If you include the retail coal consumption—I mean, the domestic coal—then the coal that we are producing is 100 per cent essential. In spite of this we are having trouble with our draft board.

There is one gentleman here who is a member of a local draft board in his community and I think he would be a good man to talk to us about this!

Mr. John L. Clarkson: My recommendation would be that you take the question up with the proper authority here in Springfield. There is one member of the draft service in the state who handles particular questions along the line of industry. If you write to State Selective Service department here at Springfield and state your case and the man's name that you have reference to, I believe that you will get action in regard to the individual.

We have found in the draft service that the Army is crying for men and it requires some action on the part of the employer to be able to take care of the case that comes up. I believe that if you will get in touch with Mr. Geo. Armstrong, Chairman of the State Selective Service, he may be able to help you.

Chairman Hayden: Gentlemen, does anyone else have anything further to offer on this particular subject? If not, I want to thank all of you for your kind and courteous attention this afternoon, and I shall now turn the meeting back to our President, Mr. Jefferis. (Applause.)

President Jefferis resumed the chair.

President Jefferis: Thank you, Carl.

Gentlemen, as you know, we have a wonderful program scheduled for this evening and I would like to ask all of you please to be here on time at six-thirty.

I say "Amen" to everything. The meeting is now adjourned.

The meeting recessed at four o'clock.

EVENING SESSION

6:30 O'clock P. M.

The Banquet Session convened at six-thirty o'clock, President Jefferis presiding.

President Jefferis: Will the meeting please come to order?

My old friend, Mr. John D. Hood, will lead us in the singing of the "Star-Spangled Banner." Singing.

Play ball with the Advertisers who play ball with us.

President Jefferis: You do not know, gentlemen, how happy it makes me to see so many members and guests here tonight. You do not know how happy it makes me to know that I am going to be able to sit down after I introduce the Toastmaster and listen to all these proceedings without having to do anything.

The first thing I am going to do is to introduce our Toastmaster. If it weren't for the fact that we have a number of guests here tonight, it would be absolutely unnecessary for me to introduce this Toastmaster to this organization. However, I shall go ahead in the usual manner. Ever since the boat trip last June, when I asked this gentleman if he would serve as Toastmaster tonight, I have lived in fear and trembling that he might not be able to be here at the last moment; but, gentlemen, I assure you that we have him here in the flesh tonight.

As you are aware, this is the Golden Anniversary of the Illinois Mining Institute and our Toastmaster is our oldest living Past President. Understand, I am not speaking of his age; I am speaking of his years of service in this organization. Speaking of age, however, I want to call your attention to how "young" this gentleman looks, yet I have the first man to find who can remember the time when he was not engaged in some way in the coal industry.

Personally, I first met him in 1906. At that time, of course, I was a very, very young man! But even at that time, I distinctly remember, I had him classified as a "big shot" in the coal mining game and I have never had occasion to change my opinion or the spelling of the word since. He has done so many seemingly impossible things since I have known him that it reminds me somewhat of the old story of the bumblebee. It seemed that all the scientists agreed that the bumblebee on account of its large body and heavy rear end, as compared with its wing spread, could not possibly manage to fly. But the bumblebee didn't seem to know that, so it started to fly, and it has been flying ever since.

I haven't time to enumerate the many "impossible" things that this gentleman has done. Suffice to say, he has skipped nothing. From the last reports that I have on him, he is now the retired vice president of the United States Steel Corporation. Gentlemen, your Toastmaster, Mr. Thomas Moses of Danville, Illinois and Pittsburgh, Pennsylvania. (Applause.)

Mr. Thomas Moses took the chair.

Chairman Moses: Mr. President, I want to thank you for the nice words you said about me, and I am only sorry that my wife wasn't here to hear them! (Laughter.)

I feel greatly honored tonight at the thought that I am given the privilege of acting as Toastmaster at this, the finest gathering that was ever held by the Illinois Mining Institute. There are present tonight 395 members and guests. We have obtained 77 new members today, and four life memberships.

I have prepared no speech and no stories to tell you tonight, because I have 43 men, as you can see up here, who are going to make speeches to you this evening and it is going to take all the time that we can give

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them to get through before morning! (Laughter.) Johnnie Jones, Fred Pfahler, and several others have made an engagement with me for 2:00 a.m., so I want to get there! (Laughter.)

I would like at this time to announce the officers of this Institute at the present time:

Mr. J. A. Jefferis, the out-going President! (Applause.)

Mr. Carl T. Hayden, the incoming President! (Applause.)

Mr. Ben H. Schull, the incoming Vice President, had to leave. He is not present. (Applause.)

Mr. B. E. Schonthal, to my great surprise, is going out as Secretary-Treasurer and coming in as Secretary-Treasurer! (Laughter and applause.)

The new members of the Executive Board are as follows:

Mr. W. J. Jenkins, Consolidated Coal Company

Mr. F. S. Pfahler, Superior Coal Company

Prof. H. L. Walker, University of Illinois

Mr. James M. White, Franklin County Coal Corporation

(Applause.)

The carried-over members of the Executive Board in attendance are:

Mr. J. G. Crawford, Valier Coal Company

Mr. Howard Lewis, Old Ben Coal Corporation

Mr. Robert M. Medill, Director, Dept. Mines & Minerals

Mr. Byron Somers, Truax-Traer Coal Company

Mr. C. W. Woosley, Pyramid Coal Corporation

(Applause.)

The carried-over members of the Executive Board who are absent are:

Mr. B. R. Gebhart, C. W. & F. Coal Company

Mr. Lee Haskins, Bell & Zoller Coal & Mining Co.

Mr. Carl Lee, Peabody Coal Company

(Applause.)

We are going to call upon the ex-presidents of this organization and introduce them to you, but I serve notice on them now that if they attempt to open their mouths, I shall bring down the curtain! (Laughter)

From 1914-15, J. W. Starks! (Applause.)

From 1916-17, Fred S. Pfahler! (Applause.)

From 1923-24, D. D. Wilcox! (Applause.)

From 1928-29, John E. Jones! (Applause.)

From 1931-32, George C. McFadden! (Applause.)

From 1933-34, Harry A. Treadwell! (Applause.)

From 1936-37, W. J. Jenkins! (Applause.)

From 1937-38, H. H. Taylor, Jr.! (Applause.)

From 1938-39, Paul Weir! (Applause.)

From 1939-40, Roy L. Adams! (Applause.)

From 1940-41, Dr. M. M. Leighton! (Applause.)

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The living Past President who are absent from this meeting are

- From 1920-21, Frank F. Tirre!
- From 1922-23, John G. Millhouse!
- From 1926-27, William E. Kidd!
- From 1927-28, James S. Anderson!
- From 1929-30, Prof. A. C. Callen!
- From 1935-36, T. J. Thomas!

We have present tonight our scholarship students, as follows:

- Marion B. Walls of the I.M.I. Scholarship! (Applause.)
 - Robert N. Morris of the I.M.I. Scholarship! (Applause.)
 - Robert R. Lipe of the Peabody Scholarship! (Applause.)
 - Robert M. Stephens of the Peabody Scholarship! (Applause.)
- Our guests tonight are as follows:
- Ivan A. Given of "Coal Age"! (Applause.)
 - P. D. McMurrer of "Mining Congress Journal"! (Applause.)
 - Cloyd M. Smith of "Mechanization"! (Applause.)

As distinguished visitors and guests tonight we have the following

- J. G. Bristow, Executive Secretary of the Illinois Coal Strippers Association! (Applause.)
- Mr. George F. Campbell, President of the Illinois Coal Operators Association! (Applause.)
- Mr. Walter C. Gill, President of the Illinois Coal Producers Association! (Applause.)
- Mr. D. L. McElroy, Technical Adviser for Coal Priorities, War Production Board! (Applause.)

We have with us as a speaker tonight a man who needs no introduction to this body of men. He is well known and loved by the mining industry as a whole in the State of Illinois. Without further ado or comment, I want to introduce to you Dean Charles M. Thompson of the College of Commerce & Business Administration, University of Illinois! (Applause.)

SOME FUNDAMENTAL ECONOMIC TRUTHS

By DEAN CHARLES M. THOMPSON

College of Commerce and Business Administration,
University of Illinois, Urbana, Ill.

Dean Charles M. Thompson: Mr. Chairman and Gentlemen of the Institute: I cannot find words sufficient to tell you how much I am pleased to be invited to your meetings here year after year. It is no trick at all to get a first invitation to any group. It's like a proposal of marriage: there's no background to it. But by being asked to come back again and again, why, that to me is a real compliment.

When we were on the boat trip last June, your Secretary asked me if I wouldn't come to this meeting, and he really wished the subject on to me, which is the subject advertised. Five or six or seven or ten years

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ago, in my own mind at least, I thought that I was an economist. But during the past few years I have not been so sure about that. In fact, I'm not so sure that there is any such person.

It reminds me of the old story that no doubt most of you have heard but it is so apropos of my feeling at the moment that I am going to tell it to you. Then you will understand how my mind is operating. Down in my home town many years ago we had a teacher in the fourth grade who made her first trip abroad. You have seen them come and go, and come back again, and after they come back the memory of it for a number of weeks or months or sometimes years never seems to wear out. They must tell about their trips and impressions.

Well, this woman taught fourth grade in school. Upon her return, she spoke to the various women's clubs and the service clubs about conditions in Europe, with emphasis upon European culture and background, and one day in school she thought she would try it out on the children. She had been berating the American mind—how weak it was in comparison with the European mind, particularly among children. And so she put this problem up to them, saying: "Children, last summer I went abroad in a Swedish boat. It was 600 feet long and 80 feet in the beam, the captain had a hairlip, and the mate had one finger gone. How old am I?"

Nobody could answer the question and so it gave her an opportunity to berate the kids again. She repeated the problem to them and finally a boy in the rear of the room raised his hand rather timidly. She saw it and said, "Come up here, George." Then turning to the rest of the class, she said, "Perhaps we can now get this question answered. We may perhaps be able to demonstrate that the American mind isn't altogether lost." So she asked George how old she was, and he said, "Teacher, I think you're 36 years old."

She really wasn't far from that age, and she began to commend the boy for his ability, and then she remarked, "George, will you please explain to the rest of the pupils here how you were able to figure out how old I was?"

"Well, I'll tell you," said George. "You see, teacher, I've got a crazy brother at home who is eighteen years old, and I figured that you're twice as crazy as he is!" (Laughter.)

I want you to know that I regard myself as an uplifter and not as an iconoclast, and although my subject is entitled, "Some Fundamental Economic Truths," I am not pretending to stand up here and tell you that I have the last word on any of these subjects. However, if I can just stimulate your thinking for a few moments and have you go along with me, I would like to say something about it.

In the first place, I would like to differentiate between wealth and welfare. There is great confusion with respect to those terms in the minds of many people. They are confused by wealth and they are confused by welfare and they are inclined to believe that they are exactly the same thing. It has been my policy—certainly during my adult years—that whenever I want to solve a problem like this, I endeavor to follow it through to its final conclusion.

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When I thought over this subject of wealth and welfare while I was thinking of coming here, I thought of a city which has been beset such as Stalingrad has been for many weeks, and in the history of our peoples we have had cities that have been beset like that not only for months but for continuous years. I know that within those cities food gets so scarce that the people eat the dogs and even the rats, and measured in monetary units, a people could be eating the rats and the dogs and the sewage out of the streets and yet be swallowing wealth at the same time because of the value placed upon the little food that is there. So there is no relationship necessarily between wealth and welfare, because it depends on the measuring unit. If we could get that point clearly in mind, I think we would be greatly disabused of some of our conclusions.

The practical thing about it is this question of real wages and real income. We are so prone to belittle the small incomes of Oriental peoples particularly, measured in our own units, and on that basis we conclude without giving it further thought that what they are able to acquire by those pennies—we say so many pennies a day instead of dollars an hour—is very, very little. Well, it's little enough but it isn't as little as we might think it is because there is a difference between the welfare and the wealth.

I think the same thing confuses us a great deal about another subject that enters in there. Many of us think that high wages and welfare go together. That may or may not be true. A high hourly wage is no indication of welfare. There is no relation between standard of living and an hourly wage. Let me ask you this question: "How much per hour should Santa Clause get in order to keep his family in ease and comfort?" The answer is, "Too much, because no one could afford it. He doesn't work enough hours."

I may say in that connection that if my observation hasn't misled me, I have never known a street car conductor or a mail carrier who hasn't been able to own his own home and rear his family with a good deal of decency and send his children to school, whereas I have known many people whose wages have been a lot higher than the wages of such persons who haven't been able to do what they have done. The secret is that there hasn't been enough hours. It doesn't matter how much one gets; the point is that he must get it.

One more thing and then I pass on. An hourly wage enters into the cost of goods but it does not enter into the standard of living. The main factor of standard of living is annual income, because we live by the year instead of by the hour. Someone might get an excessive hourly wage and yet be poverty stricken at the same time because there aren't enough hours.

I would like to point out another matter that has been running through our thinking particularly during the last year or two; I am thinking more particularly of the last six months. We are inclined to set off the consumer against the producer and we talk about the consumer or the consuming classes. Well, all producers consume and most consumers produce and they are exactly the same class, as a class goes. Of course, they could be distinguished when it comes to individual

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commodities or individual services, but there is no such thing by itself as a consuming class, because the consuming class is the producing class. But I suppose that is one of the methods involved on the part of anyone who would care to set class against class. While everybody is in the consuming class, most people are in the producing class. However, you have more of them in the consuming class and they don't stop to think of the consuming class at the same time. I think that is perhaps one of those places where we have done some faulty thinking. We have talked as if a consumer were set off by himself and has no organic relation with the producer, whereas they are the same people actually.

Not very many years ago we heard a good deal about sharing wealth and income. We may be doing it more and more. I think we are, although we are not talking much about it because—well, we just don't. I would like to call your attention to one more consideration in relation to that subject. When men talk of sharing either wealth or income or both, they are speaking only about present income and present wealth. Perhaps they don't know it, but that is true. There isn't any question that any government, even in a democracy, where the majority of the people would decide to do it, could take the wealth that they have and share it equally and share it any way they please, because they would do it by force. Nor is there any doubt in my mind that under the same conditions we could take income that is now flowing and share it. But there is no assurance that there would be any new income to share, and there is no assurance that there will be any future capital to share. That is the dangerous part of our sharing capital and income, because we are not sure that there is going to be any in the future to share. I think that those people who have advocated it, particularly the late Senator Long, were overlooking the vital point that having once shared, there would be no assurance that there would be any more to share. The people would perhaps find themselves in the same sort of condition as did those well-meaning people in Africa who took along with them a lot of cattle for the purpose of providing the natives down there with milk and all that, but the difficulty was that they ate the bulls. So there wasn't anything to share. There wasn't any milk! (Laughter.)

I would like to call your attention to another consideration. We talk a great deal about credit these days. We are very glib in our discussions about credit. We are confusing it with mere gifts. I don't believe that any proper definition of credit could leave out of consideration the fact that credit is something that is on the inside. It isn't something that you put on or take off like a coat. I can't give you credit. You can't give me credit. I may give you the privilege of possessing without paying cash on the line, and you might give me the same privilege under similar circumstances, but you are not granting me credit. Credit is something based upon past experience. Every one of you men know as business men that when you grant credit, you try to grant it upon the basis of the experiences of the past and of the character which the debtor has, and what he has been able to do in the past, and what you have a reasonable right to expect him to do in the future. It isn't that you are just giving him something.

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To illustrate, let's take this last fund that was set up of \$150,000,000 for small business by our Government. Congress made it perfectly clear that they never expected to get back very much of that money. They said, "We want goods produced and so we are going to extend credit." They gave them funds for the purpose of manufacturing and producing war goods with no great expectation of getting the capital back. What they want is goods.

That leads to a collateral consideration that is very close to it. There isn't a man who has read any economics at all who doesn't know (college sophomores have taught it) that economic demand is nothing more nor less than effective desire. That demand is desire elevated to the nobility of being able to acquire something. Yet in my opinion we perverted the whole idea of economic demand and now, instead of waiting for the individual to get the desire and then, through efforts on his part, to elevate it to the nobility of demand, we are more likely now to say, "Sign on the dotted line, take the goods, and we hope you'll like them." We have perverted the whole idea of economic demand because we have been working at it from the wrong end. In my opinion (if I may be permitted to express an opinion), I think that the real secret of the movement upward of civilization over the years has been this effort on the part of mankind to elevate this desire to the dignity of a demand. And I think that when we turn it in the other direction and pervert it, we are likely to be desroying the very thing that has made us what we are.

I think that it was about two or three years ago, in discussing our public debt, that some of our men in high places made the point that the public debt plus the private debt of that particular day wasn't any worse, generally speaking, than it had been 15 or 25 yeads previously, drawing the inference thereby that a public debt and a private debt are exactly alike; that a nation, say, with 100 billion dollars' worth of debt, three-quarters of it private and a quarter of it public, would be exactly the same as if that same nation had three-quarters of it public and a quarter of it privtae. I would like to call your attention to the fact, gentlemen, that practically all private debts are producers' debts and that they represent wealth and confidence and character and credit. They are not negotiated for the purpose of wasting or destroying but rather for the purpose of creating. There is a tremendous difference between a private and a public debt. Our concept of debt when we use it in that sense is the concept of the debt of India where they borrow money in order to buy wives, in order to hold sumptuous wedding, and where they borrow money from the userer in order to buy food. But that is not the American concept of private debt, which is contracted for the purpose of creating goods and thereby recreating itself plus something else. It is a producer's debt and not a consumer's debt, and there is a lot of difference between them, and we ought not to be misled (really its down-right sophistry, which is usual, of course) by inference rather than by direct statement.

I would like to make two other points because I know what is coming and I would like to come back here again, I hope, next year or some other time. A very curious thing has happened lately which I haven't

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heard much discussed in Congress. I haven't read much about it, but we have had a curious situation and there is a curious inconsistency on this question of corporate taxes. At the same time those people who are advocating corporate taxes—such individuals as Senator LaFollette—are also the godfathers of the program of progressive taxation: that is, the more income you have, the larger your rate of taxation.

You know, I suppose it is one of the curious things of the human mind, I suppose, rather than of the American mind, if you don't stop to analyze it, and there is a good example of it. We say that a corporate debt or corporate taxation should be of a high rate, the assumption being that corporations are owned exclusively, certainly mainly, by people of very, very large returns—of very large incomes—people who can afford 70 and 80 per cent taxation against them.

Why, God bless the hearts of those people who advocate such a thing by inference! There are literally millions of people of small circumstances in this country who own the shares of those corporations who are being taxed 50 or 60 per cent, or whatever the percentage is, more than they would be taxed if their income were permitted to flow into their own hands, instead of permitting the income to flow at the other end and then taxing it. I am not opposed to it. I am just pointing out the inconsistency of it. After wiping their eyes about the poor orphan and the few persons who own a few shares of A.T.&T. and General Electric and General Motors stock and after protecting them all the way through, they then turn around and take his little investment in the form of stocks and tax the life out of them, and they are doing it because the corporation is supposed to be nothing but a tool of the rich people. That is one of the curious inconsistencies which we are constantly running into, and I think it is worth while giving it some thought.

Finally, I want to say something about this inflation business. For the last seven or eight months, ever since I was on your boat trip, I have been doing what I would to keep down what we call inflation. But, you know, I haven't been actuated by the same arguments that even Mr. Henderson puts up, because I don't think the arguments are very sound. I think the ground on which I stand is safer and more solid. I am against it because it would destroy what we have come to regard as something sacred in this country. It always has been and I think it always will be. The mere matter of price rise is of no consequence. If all prices would rise the same way, it would be just like cutting them in two, three or four parts; it wouldn't make any difference. But the difficulty comes, the tragedy comes, when it catches all these people who can't be moved along; when we wipe out savings banks and building and loan and life insurance companies; when we wipe out pensions of all kinds and annuities; when we wipe out funded incomes of every nature, the great middle class is caught, and even many of the lower classes with these small incomes which are funded and fixed and can't be moved. That is one reason why I am against it. Of course, another big reason is because of the excessive costs of governmental activity, which would ruin us.

I have tried to point out some of these things to you not, as I trust

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you will understand, as a schoolmaster, for I am not that. Speaking of being a schoolmaster, you know, I have lived a rather discouraging life. Gladstone was a great philosopher when he was among statesmen, and he was a great statesman when he was among philosophers! For 35 years I have tried as hard as I could to make a place for myself both on the campus of a university and down among the people, and I can say to you frankly and it is no secret that on the faculty of the university with which I am connected I am regarded as a very astute businessman, and among a lot of business men I am regarded as being a good college professor. If I could only bring those two things together, I think I would have a great combination! (Laughter.)

So you see, I am not talking to you as a school man; I am talking to you, I hope, as one of your business associates. I am only making a plea that we do not take these matters too much for granted. I don't want to be skeptical, but I do want to be sure that I analyze whatever comes before me.

As I sit down and as I go back home and wait for another opportunity to be with you, I know that I shall be worrying all evening and perhaps part of tomorrow over what I didn't say, or perhaps at the thought of not having been able to use the right word. For words are signs of ideas, and if a speaker doesn't use the right words, then of course his hearers don't understand his ideas. Let me tell you what that reminds me of and then I shall close.

When I was growing up in Southern Illinois as a boy, being a school director was a great honor and our neighbors coveted that honor. I remember a certain gentleman (I thought he was an old man then) who had been a colonel in the Civil War, and he was rather jealous of his position in the community. He had been a school director for a good many years, and he used to come down to the school and took great delight in testing out the pupils. Of course, his idea was to test out the teacher, but he could do it better through the pupils. I suppose it was on that basis that they determined whether or not they would hire him again the next year. I say that because we had all men teachers. Women couldn't teach school in Southern Illinois in the days when I was growing up.

Well, one day he came down and he conducted one of his favorite means of test, a spelling match, and about the fourth word he gave them was the word "egg-wiped." When they couldn't spell it, he berated them rather liberally. But then the teacher couldn't spell it either. Well, of course, there wasn't anything particularly wrong about it; I mean, it turned out all right. The difficulty, you see, lay in the fact that there was this lack of contact of minds. All he wanted the children to do was to spell "Egypt"! (Laughter and applause.)

* * *

Chairman Moses: Thank you, Dean Thompson.

The management of this Institute has brought to us tonight a very fine treat. Our next speaker will talk to us about some of the things that, *Mentioning this publication when writing Advertisers puts friendship into business.*

I am sure, you would all like to hear. We have as the next speaker Dr. Wilbur A. Nelson, Administrator of the Mining Branch of the War Production Board.

Doctor Nelson was born in Nashville, Tennessee. He is a graduate of Vanderbilt University. He ran coal mines in western Kentucky—before priorities! (Laughter.) He operated manganese mines in Georgia and Alabama during the last war. Then he became state geologist for Tennessee. During that time he was Fuel Administrator in 1921. In September, 1925 he was made head of the School of Geology at the University of Virginia. He also became State Geologist, which position he held for three years until the organization could be perfected to carry on the work.

On June 2, 1941, at the instigation of Mr. Stettinius, he came to the OPM in Washington. This was later changed to the WPB in September of the same year.

I take pleasure in presenting to you Doctor Wilbur A. Nelson, who will now be your next speaker! (Applause.)

Dr. Wilbur A. Nelson: Mr. President, Mr. Toastmaster, Members of the Illinois Mining Institute: For the first time in my life I have to follow a prepared speech because we have to have them cleared before we give them, and I have always heretofore given them extemporaneously. So let me say that when I get through with this prepared speech I shall be glad to answer any questions which you wish to ask.

ADDRESS

By DR. WILBUR A. NELSON

Administrator, Mining Branch, War Production Board,
Washington, D. C.

Did you hear the President of the United States last week when he said “. . . Some of us are fighting the war in airplanes five miles above the continent of Europe or the islands of the Pacific, and some of us are fighting it in mines deep down in the earth of Pennsylvania or Montana . . . ”

In making this statement the Commander-in-Chief of our Armed Forces put his finger on one of the most urgent necessities of this war. He put into words what we in the War Production Board have known for a long time—that the men in the mines are doing a job of first-rank importance in helping win this war. If the President had had time when he spoke that night, he might have expanded his analysis to give you details of the problem imposed on our war machine by materials shortages, of the need for increased coal production, and of the important part the miner and mine operator play in this war. Your job is equivalent to that of the general on the field of combat: you must so handle your men and your facilities that a steady and increasing stream of coal

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flows forth to war industry, transportation, and power plants. A failure in this generalship of yours would be more serious than the failure of a military commander, for yours is the job that must be done before any production can be started, before any fighting can be done.

The President said this in his speech last week, though, of course, he was not in a position to be specific. My particular responsibility in the war effort is to look after mining in the War Production Board, so perhaps I can interpret for you some of the over-all war production problems that touch on you directly.

We would have no electric light, no power, no heat, no transportation, without coal.

But I do not have to tell you this. You know it.

Let's take the example of copper production. It is obvious that no copper could be mined if there were no coal to provide in whole or in part the power to operate the mine, the fuel for the smelters, and the power for the refineries.

About 100,000 man-hours are required to make one of our big four-engine bombers. This bomber requires about 3,000 pounds of copper and 15 tons of steel. I should estimate that one man must work in a copper mine for 84 hours to get this amount of copper. The ratio is 84 man-hours of labor for the copper to the 100,000 man-hours for the completed bomber. Now, if the coal is not provided by you for the copper mine to operate at full blast, just the closing of that one mine will stop the whole production chain entering into the bomber. The coal needed to make 15 tons of steel will take 3 men working one day to mine. The failure of 3 men working one day could be the cause of failure to produce this bomber.

The same thing happens in every industry, for every material and product that goes into that bomber was made, from the very ground up, with the help of coal.

There is one concept of mining which you must have, and which many of you do have, before you can understand fully the present raw materials problem. Like the trunk of a tree, mining is the parent process out of which flow, as branches, the thousands of subsidiary processes which depend upon the product of the mines.

Just as a wound to the trunk of a tree will kill all life in its branches, so will a defect in the mine production schedule cripple our manufacturing industry.

Coal is probably the most fundamental raw material we have, and for that reason its importance cannot be overemphasized. Coal is at the very root of the whole complex tree of production. The skill of organization, the leadership of your supervisors, and the industry of your miners cannot, likewise, be overemphasized when we evaluate the efforts of all who contribute to the war effort.

Coal is fundamental because it must be available for the mining of other metals. We couldn't smelt and refine various raw materials without coal.

I want to make it just as clear to you as I possibly can that continued full production of coal is absolutely essential to this country's existence.

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Our war effort would collapse like a punctured balloon if anything seriously impaired our coal supply. It is your job, with our help, to prevent anything interfering with coal production. This year we will need ten percent more coal than we produced last year, a total of six hundred and twenty million tons. This 560 million tons of bituminous and 60 million tons of anthracite are the largest production of coal in our country's history. So far this year we have fallen short of the eleven million ton weekly requirement seven times.

It should be perfectly clear when presented this way that any defect in mining production is a most serious matter and it seems unthinkable that we should permit any impairment of mineral production.

I need not further stress the point. Your business is getting coal out of the ground, and you know perfectly well what happens to our whole war effort when we don't get it. Everything slows down — I simply want to point out to you that if we are to continue to get munitions and implements of war the mines must produce the coal.

The only way materials production can be maintained at anything like the level required to sustain munitions output is to achieve a balance in the expenditure of all our resources—human as well as physical.

All production is a combination of three things: raw material, labor and plant facilities. The relation between these factors has changed sharply as our whole war program has developed.

As long ago as 1939, our productive machine started to expand in response to orders for war materials from the embattled nations of Europe. You were part of this, and you know how war orders gradually seeped into all kinds of manufacturing at this time. As the international situation deteriorated, concern for the security of the United States started turning the wheels of our own war machine, and before 1940 was finished, we had a small but booming war industry.

Every day since then has seen a rising crescendo of war production. First was the scramble to convert peacetime plant facilities to war production. Contracts were placed, sometimes indiscriminately, all for the sake of filling our industrial pipeline with war work as rapidly as possible so that these pipelines would gush forth finished combat instruments at the earliest possible moment.

Millions of tons of coal and other raw materials went into the building of new plants, new machine tools, new power and transportation units. So much material was consumed in this building that shortages cropped out here and there. You know how this works and behind every move made by industry was the demand for more coal.

Then came Pearl Harbor.

If our conversion to war production before December 7 was intense, it became incalculably more so after that date, so great was our need for exerting all our energies to produce for war. It was shortly after the first of this year that we began to discover that there could be such a thing as a shortage of basic raw materials. We in Washington knew last year this would happen and so stated. Plant facilities soon equalled and

surpassed our ability to furnish raw materials to keep every plant running at capacity.

Within the last six months we have learned all too clearly that we have a limited amount of most important raw materials. It is a larger amount than our enemies have, it is forty percent of all the materials in all the rest of the world put together; but it is not enough to produce all of everything we want in a war economy.

When I tell you that over 60,000 tons of coal are needed just to make the steel in a battleship, you get some idea of the demands upon your efforts that the war is making. It would take about 11,600 men working one day to mine this much coal, though your per-man productivity in this Illinois area is higher than the average. I guess you could do it with 8,000 men!

One of the first problems to arise after materials shortages first became severe was the matter of distribution. We've been through rough ground with priorities, we are now working under allocations of many important materials. The final answer has yet to be found, but it is no secret to anyone that the materials control must be established with a clear understanding of the relationship between distribution and total available supply. Many shortages existed because enough minerals were not coming out of the ground. Other shortages hit because of maldistribution—because someone else had more than he needed. The only answer to this is control of both raw materials sources and inventories so that each phase of the whole war program may balance with each other phase, and so that we shall not have feast in one section and famine in another. The recent realignment of responsibility in the War Production Board had as its principal aim the solution of this materials distribution problem, and I think I can tell you that we are on our way to an air-tight control to get all possible materials where we need them, and when we need them. It is my job to see that you get the materials and equipment you need to keep in full operation. Not all the stuff you want—not all I'd like to see you have—but enough to keep your mines running full blast. That's my job and I can promise you that we will do whatever is required to keep you men busy producing coal.

My particular responsibility in this materials problem is the production of minerals. Because there is no materials problem that sufficient production would not cure, mining is the number one job. So we must get out the coal and metals which the war industry needs.

Let's look for a moment at some of the factors surrounding our mineral production.

The United States has the reputation for having unlimited mineral resources. This is a very pleasant thought, but it is far from being strictly true for there are a number of strategic minerals we do not produce, or produce in small amounts. It is important for you to realize that this is not true. We have more ore, more coal, more oil, more timber and more of nearly everything else than most countries in the world. But the tragic fact has overcome us at last with the realization that our natural resources are not inexhaustible, and even cannot be produced in quantities needed by our fabricating plants.

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Detailed figures are secret information, but I can tell you that in many important non-ferrous metals our production this year is well over double that of a normal year. In certain other metals, where we have never before had sufficient domestic production, we are becoming substantially self-sufficient. The fact remains that we can fabricate more metal than we can produce. The American manufacturing machine, and the men who run it, is the greatest thing of its kind the world has ever seen. Our true genius finds fulfillment here. It is the most significant advantage that we hold over our enemies.

The amount of ore in the ground is not necessarily the limiting factor in mineral production. First you need a mine, but finding a mine is not an easy task. Then you need some men to develop and work it, and then you need equipment and machinery for these men to work with. We are doing everything we can to find new mines, and to increase the capacity of existing ones, and we're trying to do everything under the sun to get the men to work them. We have had reasonable success in providing the materials and machinery necessary to keep the mines in operation through the assignment of preference ratings for this purpose. Only this week a rating of AA-2X was given to mine maintenance materials.

Each day that passes is bringing to us concerned with the problem a realization and a graver concern of the one thing that is doing most to restrict minerals output.

That thing is manpower shortage.

I am sure you have read a great deal on the subject; you have read that the War Production Board found it necessary to close down the country's gold mines for the sake of the few thousand men who they hoped would thus be freed for work in critically needed base-metal mines. Figures are coming in to us daily reflecting the effect of manpower shortage on mineral production. Between five and ten thousand tons of copper are being chopped off our monthly production because of labor shortage. Estimates of the shortage of men in copper mines and smelters runs between seven and ten thousand men. My own estimate is rather closer to the ten-thousand figure. Now the Army has released 4 to 5 thousand men from the Army to work in non-ferrous mines. These experienced hard rock miners will do more to help win the war—the Army feels—by working in the mines than by staying in the fighting forces. This shows you at least two things: (1) the urgency of the non-ferrous metals shortage, and (2) the realization on the part of military leaders that mining industries must operate at capacity. In war time there is no more extreme step we can take than to move men out of the Army.

The head of our zinc branch tells me that production of zinc ores and concentrates in the Western States is being reduced from 30 to 40 per cent below easily attainable levels because the men are not available to work in the mines.

Tungsten and molybdenum are in the very front ranks of critical war materials; yet we are 1500 men short of the number needed to maintain fullest possible production.

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A similar picture is presented in the fluorspar industry, with a serious deficiency of men expected within the coming six months.

Equally important is mercury, obtained from many comparatively small operations, yet one in which more than 350 men are currently needed.

With production restricted by insufficient manpower, remember that present output, while enormously greater than normal, is still much smaller than the amount we would like to have and need. Coal is in the same position. This year, as I said before, we need six hundred and thirty million tons of coal for processing, for fuel, for power and for transportation. Conversion of many fuel oil installations to coal may raise this demand even further. Exports are having to be increased to supplant the amounts formerly supplied to our friends by other countries.

Here is an example of wartime necessity. To move a 20-car troop train from New York to San Francisco takes all the coal one miner can mine in eleven weeks. Is this miner a part of the war effort? Is his job important? The answer is obvious.

All these things add up to the necessity for doing something about the labor problem. The War Manpower Commission has issued a stabilization order restricting the transfer of workers in the mining and lumber industries of the West to other jobs. The Commission has asked other industries in the West not to hire these men unless they can show that they have clearance from the U. S. Employment Service. The War Production Board has closed the gold mines and the War Manpower Commission is undertaking to transfer the gold workers to the non-ferrous mines. Just last week the Manpower Commissioner set up trial labor controls in Oregon and Washington and in ten other cities to attempt to find a means of supplying men for which industry is crying.

But you know the problem here as well as I do. These gestures are a step in the right direction, but they have no power; I can't tell you the answer to this manpower problem and I doubt that *anyone* can at this moment. Drafting labor is a deadly serious matter, and its implications go deeper than any of us realize. How would *you* do it? Do you make all men's wages equal? Do you remove the opportunity for advancement? Do you remove incentives to skill? These questions are being considered; but they have yet to be answered.

Yet on the other side of this picture is the realization on the part of informed men that this country is struggling for its very life. I think I realize, and I think you realize, what it would mean to us to lose this war. I know we cannot take any chances. I do know we cannot leave unturned any stone the turning of which could make a contribution to the winning of the war.

Being mindful of the great need for men in the mines, on the farm, in the forests and in the factories; being mindful of the central problem of any army of fighting men of sufficient size to overcome all before it — it seems impossible that we should let a maldistribution of manpower restrict our war effort.

It is no secret to anyone that the whole question of manpower is uppermost in the minds of our leaders in Washington. We must decide

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whether we are going to continue to lose twenty to thirty per cent of our manpower through the maintenance of a work-week averaging about forty hours. We must decide very soon whether we can permit the exigencies of labor organization to enforce production losses of many thousands of manhours. In short, we must tackle the manpower problem and do it at once.

Now coming back to the materials problem and following the same train of thought we have just developed. If we are considering any control over men it would certainly seem necessary that we exercise the most rigid kind of control over materials. By rigid I mean a degree of severity in restricting consumption far beyond the point we have yet experienced. When we are fighting a war for our very existence, and while we have very little assurance that we are winning that war as yet, can you conceive of a more sensible course than to devote our whole energies to ending the war quickly and successfully?

By this I mean that every one of us and everything must take an active part. The so-called essential civilian needs that are consuming materials must be re-examined. In this kind of war, essential civilian needs means food to eat, clothing to wear, and shelter to live in. It does not mean comforts, convenience or luxury.

I think there are ways you can do even more to step up production. Can your labor management practices be improved? Yours may not be any worse than anyone else's, but I do believe that the average situation in this country can be improved. Can you cut down absenteeism—both that arising out of injuries and disease, and that arising out of wilful absence?

You must keep everlastingly at the job of preventing accidents and controlling occupational hazards and disease. You must use the engineering methods and equipment that have been developed to make men more effective in hazardous jobs. Coal miners have done good work here, but you must not rest on your laurels.

Every time you lose a man and have to hire a new one, many effective manhours are lost. Can you not devise increasingly effective means of reducing labor turnovers?

One way you can reduce labor turnover, at least in other people's plants, is to stop pirating their labor. Of course, you don't hire a man away from someone else for the sheer joy of doing it; you hire him away because you need him desperately. But you must realize that when we all do this we do nothing but demoralize the labor market and start a vicious upward spiral of wage costs which can lead to nothing but inflation of the wildest sort.

I should like to make an urgent appeal to use your technical skill to conserve materials. Rather, should I say, to continue to conserve materials.

We are going to find that we can do a good job of engineering with less critical materials than we ever thought possible. Germany's copper supply is only a drop in the bucket to ours, but she continues to produce. If she can do it, so can we. The same can be said of many other metals.

Conservation is one way to save materials, recovery of scrap is another.

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You can all lend your active participation to scrap collection. The scrap pile is expected to supply over 15 per cent of our copper and tin this year, and next year it is even more important. Steel production cannot continue at present high levels if scrap is not shipped to the mills.

What is being done to increase our supply of critically needed minerals? Many of our important mines are working 168 hours a week. Priority assistance of the highest order is being granted mines for maintenance and repair supplies. Every conceivable effort is being made to encourage men to go into the mines and to get miners to stay at work. Constant searching by the Geological Survey, the Bureau of Mines, and representatives of the War Production Board, is uncovering new deposits of vanadium, tungsten, chromite, and other metals. Liberal financing by the government is removing whatever fiscal burden might inhibit fullest mineral production, and we feel that mine taxation in the tax bill just completed will help to some degree mineral production.

Assistance is being given to mining proportion in Latin America, Africa, and elsewhere, so that maximum productin may be obtained. We depend for important quantities of metals on these friendly countries, and we are actively helping them to reach maximum output.

Of the two questions concerning raw material supply—production and distribution—I think the most important matter in production is manpower. You know what has to be done, but you also know the obstacles to be overcome. I think I may say, however, that metal output will respond immediately to improvements in the labor crisis.

Perhaps the biggest general question is distribution of the materials we do have. Let me remind you, first of all, that distribution of materials and production of war implements is handled to give the fighting forces the equipment they want. The Chiefs of Staff are planning the strategy—I am not, the WPB is not. The Chiefs of Staff decide what kind and how many of each weapon we shall have.

We in the War Production Board are dedicated to getting materials for equipment the fighting services want. But in order to supply the needs of the forces, we have to restrict the uses of materials for other things. Which, of course, you know.

I think you men can look forward to a much more stringent prohibition on the use of materials for anything but direct war work, but there cannot be any prohibition on essential materials needed by mines. I don't mean to predict the future I can't tell you what the War Production Board is going to do, but I can tell you that I think you would be very foolish not to see the handwriting on the wall. With materials and manpower shortages limiting the output of combat instruments, would you guess that control and restrictions on materials would get tighter or easier?

I can promise you one thing: the War Production Board is fully alive to the gravity of our military condition at this moment. We are not depressed, we are not discouraged, we are not pessimistic. But neither have we any illusions about the ease with which our enemies can be overcome. We know the war is not yet won.

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Mineral production will be the key to Victory. In this gloomy hour let us consider the seriousness of our position, but let us also keep everlastingly before us the faith in the power of our production machine. Let neither our determination or our labor, or our hope be dimmed, for we have in our mineral production the key to Victory.

* * *

Chairman Moses: We thank you, Doctor Nelson, for your wonderful address.

When I was assigned this task of presiding over this meeting, it was because they thought I would use the hurry-up system to get through. So I am done with my job, I want to thank you all for your attention, and I shall now turn the meeting back to the President, Mr. Jefferis. (Applause.)

President Jefferis resumed the chair.

President Jefferis: Thank you, Mr. Moses.

President Jefferis: Dr. Nelson, on behalf of the Illinois Mining Institute, its officers and members, I want to express our sincere gratitude for your willingness to come to us and give us a message such as we have listened to tonight. I assure you that we greatly appreciate it.

Dean Thompson, I am glad that you realize that we would not invite you to return to us each year if we did not appreciate you and what you have to say to us. We thank you for being with us again this year.

Mr. Moses, I also want to express our sincere thanks to you for the great part you have played in making this meeting such a splendid success, to say nothing of the dignity you have added to the occasion.

At this time I want to say that I talked with Captain Buck Leyhe and his brother, Captain Henry, before coming up here. Captain Buck had expected to come with me but on account of his rheumatism, from which he is suffering severely right now, he said that he could not make the grade. However, they both asked me to extend their sincere best wishes to all of you.

As we come to the close of our Fiftieth Anniversary, I believe it is fitting to call your attention to our loyal supporters, the exhibitors and advertisers, who have supported us so loyally. If it were not for them we would be unable to publish the Year Book setting forth the proceedings of our Institute. Our Golden Anniversary Year Book will soon be out and I wish you would pay particular attention to the advertisements in same. I would like to further call your attention to the fact that six of the advertisers who are in this book were in the first issue of our Year Book fifty years ago. I say this is real loyalty.

I wish you could know how very much I enjoyed the past year as your President, and I want to express to the Executive Board, the officers, the various committees, and to every member of this Institute my heartfelt thanks for the loyal support and cooperation you have given me.

It might not be cricket to mention any individual's name at this time, but I would feel ungrateful if I did not mention the name of Mr. Schonthal, our Secretary-Treasurer, and express to him the thanks

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of this Institute and my personal thanks for the great support and help he has given me throughout the past year. I certainly want to thank him. (Applause.)

It is now time for me to turn over the honor and the responsibility of the office of President to my successor. Before doing so, however, I would like to say that if there is anything that I have forgotten to do or say which should have been done or said, I am sorry.

Here is a message that has just been received from Washington, D. C. It is addressed to Mr. Schonthal, Secretary of the Illinois Mining Institute, Springfield, Illinois, and reads as follows:

“Heartiest congratulations to the Illinois Mining Institute on this, your Golden Anniversary. The mining men of the United States are most appreciative of the excellent work which you have done for the industry and particularly so in recent years under your most efficient stewardship.”

It is signed by Julian D. Conover, Secretary of the American Mining Congress. (Applause.)

Carl, I now present you with the gavel, which is a symbol of your office, and I pledge you the support of the Directors, officers and every single individual of the Institute, and I wish you every success in this new honor.

Gentlemen—Your new president, Mr. Carl Hayden. (Applause.)

President-Elect Hayden: Mr. President and Members of the Institute: It is indeed a pleasure for me to have the opportunity of serving as your President for the coming year. The Institute has just completed the first half of the first 100 years, which everyone says are the hardest. However, the coming year appears to be one that will be most difficult and that at times may be pretty black. Consequently, I ask for myself and the other officers and the Executive Board the same hearty cooperation which you have always given your officials, and I know that with that support we can carry on.

When Doctor Nelson told the story of the large low-grade mine in the West, I thought he was going to tell the story that I heard years ago regarding a certain promoter who had what he thought was a large deposit. He was being questioned very carefully about the size of this particular mine. In answer to the question of how big this mine was, he replied something like this: “If you had Niagara Falls for power, the State of Texas for a dumping ground, and hell for a smelter, you couldn’t work this mine out in a million years!” (Laughter.)

Dr. Nelson: It must have been low grade!

President-Elect Hayden: That is the one I thought you had reference to.

Gentlemen, is there anything further to come before this session?

Secretary Schonthal: I have a resolution to present here. I would like to offer this resolution for adoption and to ask for authority to have

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it sent out. It is addressed to Donald M. Nelson, Chairman of the War Production Board, Social Security Building, Washington, D. C. and reads as follows:

“Recognizing the vital war importance of adequate coal production for the growing demands ahead, and realizing the coal industry’s responsibility to help meet our national shortage of manpower by obtaining maximum tonnage from men and machinery now employed, and with the full knowledge that machinery and supplies must continue to flow to our mechanized mines throughout the critical period ahead, the Illinois Mining Institute respectfully submits the following resolution adopted by its entire assemblage at its Fiftieth Anniversary meeting in session today at Springfield, Illinois:

“BE IT RESOLVED, That an intimate knowledge of the coal industry’s problems and needs is vitally essential in determining and applying necessary allotments of critical materials, and that your timely appointment of Dr. Wilbur A. Nelson as Administrator of your Mining Branch, and Doctor Nelson’s able direction of this responsibility to date entitles him to an expression of appreciation from America’s entire mining industry of which we are proud to be a part.

(Signed) “ILLINOIS MINING INSTITUTE,
“B. E. Schonthal, Secretary-Treasurer”

I move the adoption of this resolution.

(The motion was regularly seconded.)

President-Elect Hayden: Gentlemen, you have heard the motion, which has been regularly seconded. Are you ready for the question.

(The question was called for.)

President-Elect Hayden: All those in favor will signify by saying “aye”; opposed “no.” The motion is carried.

Is there any further business to come before this session?

(It was regularly moved and seconded that the meeting be adjourned.)

President-Elect Hayden: You have heard the motion for adjournment. All in favor will signify by saying “aye”; opposed “no.” The meeting is adjourned.

(The meeting adjourned at nine-thirty o’clock.)



The following advertisers in the 1941 Yearbook displayed merchandise of their manufacture in the Exhibit Hall at the Fiftieth Annual Meeting. The exhibits were very well attended and created a great deal of interest.

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FUELS AND METALS IN WINNING THE WAR

By C. C. DICKINSON

President, National Coal Association

Chamber of Commerce of the United States—30th Annual Meeting
Group Luncheon Meeting

Stevens Hotel, Tuesday, April 28, 1942, 12:30 P.M.

The bituminous coal industry has, until this time, supplied every requirement of the nation during this emergency. No priority order has been required to secure the needed requirements of coal of anyone. There has been no coal problem since the unfortunate coal strike of a year ago.

While the industry looks upon this record with no little sense of pride, we are, for reasons beyond our control, much concerned, if not alarmed, about the future, particularly during that period commencing about September 1, next, and feel that we should now make the consumers of coal and our governmental authorities fully cognizant of its seriousness. Let us, as briefly as we can, try to make that situation clear.

We have repeatedly stated and still believe that our mines have a producing capacity of 12,000,000 tons per week, provided we can have:

- (a) The necessary equipment and material to maintain the repairs, replacements, and equipment to retain the present productive capacity.
- (b) The necessary labor to operate our mines at full capacity.
- (c) The required open-top railroad cars in which to load the coal.

During the past eleven months there has been a reasonably adequate supply of these essentials. The priorities division has been alert to our necessities, the railroads have done a remarkable job, and we do not believe that the drain of the draft upon our labor has as yet crippled our man power sufficiently to prevent us from producing the 12,000,000 tons per week. Please note, however, that we are today shipping at the rate of over 11,000,000 tons per week, or over 91% of our productive capacity.

This margin of approximately 9% between productive capacity and consumption is altogether too narrow under a war economy, especially so when we understand that our war production program will be reasonably well under way by July 1, next, and that steadily increasing quantities of coal will be required for sometime thereafter. We are concerned, because in the face of this steadily increasing demand for bituminous coal we anticipate a steadily declining productive capacity of our mines unless some solution can be found for the problems ahead of us.

Play ball with the Advertisers who play ball with us.

Briefly, we expect this reduced productive capacity, unless alleviated, to come about from the following causes:

1. *Materials*

The initiation of the defense program found our mines reasonably well supplied with materials and equipment and during the past year they have been drawing upon a large supply of second-hand rails, copper, and other materials. As these inventories and this supply of used materials are reduced our mines will need increasing quantities of new materials in order to maintain their production. As underground entries are extended additional rails, spikes, and copper are needed in order to maintain required working places for the miners. Moreover, mining machinery is wearing out and in many cases new equipment is necessary in order to maintain current capacity and these materials are becoming increasingly difficult to secure. Requirements of needed mine supplies to maintain productive capacity are estimated, orders are being placed in anticipation of those needs, priorities are secured and orders are accepted for delivery, say, sixty or ninety days hence only to find that when the time of delivery is reached the mine equipment manufacturers tell us they have not been able to secure the necessary steel, copper, and other metals because the same is being taken under higher priorities for other purposes.

We submit that unless these necessary materials can be secured the time will inevitably arrive when the present productive capacity of our mines will be materially reduced.

2. *Man Power*

A steadily decreasing supply of mine labor is expected to come about from the following causes, unless prompt steps are taken to alleviate this situation:

- (a) *Draft*: The mining of coal, particularly mechanized coal mining, is essentially a young and middle-aged man's job and as a result of this fact 60% to 80% of our coal mine employees are within the draft ages of 20 to 44.

The experience of some draft authorities is that there is a loss of about 45% of those called, on account of dependents and similar reasons. We have about 500,000 coal mine employees in the United States and if our information is correct, and we believe it approximately so, we have in our mine at least 300,000 men within the 20 to 44 draft age, of which about 135,000 will be exempted or deferred on account of dependents, physical disabilities, etc., leaving about 165,000 bituminous coal miners, or 33% subject to military service unless allowed occupational deferment of exemption.

Of this 33% or 165,000 men about 70% or 115,000 men are common laborers with no chance of occupational deferment. In addition to this, many of the 30% with higher occupational classifications are not deferred by the local draft boards and, as a matter of fact, only about 1% to 5% are

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deferred, thereby leaving a net loss on account of the draft of about 110,000 or 22% of the bituminous coal miners of the nation subject to draft under the existing policies and practices of the draft authorities.

This loss of 22% will be partially offset by men from other occupations but this source of supply will be relatively small and perhaps more than counterbalanced by the drifting of miners to industrial plants with longer hours and therefore higher weekly earnings.

The serious difficulty here is that men over 44 years are loath to enter mines; moreover, the principal coal mining states require licensing of miners. Even anthracite miners are not permitted to work in bituminous mines without a state bituminous mine license.

We may not lose 22% of our miners, or even 20% of them, but if we lose only 10% we will have reduced the nation's productive capacity from 12,000,000 tons to 10,800,000 tons from this cause alone, whereas we shall need the full 12,000,000 tons per week. We are pursuing our investigation of this important matter and may later submit to the proper authorities additional facts and suggestions but with the information now available we can see only two partial solutions of this problem:

- (1) A reclassification of mine workers by draft authorities whereby the miner will be raised from the non-deferred or non-exempt classification of common laborer to a higher classification that will permit the local draft boards to exempt or defer coal miners and other skilled underground men not now exempted or deferred. Coal miners or loaders alone represent over 50% of coal mine employees in two-thirds of the industry. These men should not be classified as common laborers. They are skilled, experienced miners who know how to handle and place explosives and to protect their bodies from slate and rock falls and the hazards of mining. The use of inexperienced miners, even if available, would inevitably materially increase the loss of life in coal mines and decrease their productive capacity. We believe the United States Bureau of Mines will fully corroborate this statement.
- (2) Miners within the draft age are hesitant about asking for deferment because of the fear that their patriotism may be questioned or they may be called a slacker and mine superintendents are not insistent for the same reason. The local draft boards should be advised of the necessity of maintaining adequate supply of coal miners and be asked to take their share of the responsibility of retaining the men necessary for the mining of coal. Even some of our coal operators seem impelled by a feeling of false patriotism that distorts their sense of the practicalities

of the situation and endangers our nation's fuel supply.

In this connection we quote from a recent statement made to the Associated Press by Chairman May of the House Military Affairs Committee:

"Large numbers of volunteers and the drafting of thousands of others from the mine fields for war service have resulted in 'a present loss of (coal) production because of a shortage of needed manpower,' Chairman May (D., Ky.), of the house military affairs committee declared.

"Unless manpower can be maintained," he said, "production losses will increase . . . England's example should be remembered. It made the fatal error of making soldiers out of coal miners, and has paid for it in shortages of heat and power and of war materials."

"Describing coal as 'the most important war material,' May said that 'it is essential that the present labor supply be left undisturbed.'"

We do not want to repeat the mistake of England.

- (b) Effect of rubber shortage: A large percentage of the coal miners of the nation are located in more or less isolated regions and rely upon their own automobiles to reach the mines. During the past twenty years many of the higher cost mines have been forced into liquidation and miners living around these abandoned mines must drive from five to twenty-five miles to the nearest mine for work. Many of the existing operations must rely largely upon these men to produce coal. Where busses or trains are available they are oftentimes too expensive or do not have schedules meeting the mine shifts. As the months go by and tires become scarcer this will become a steady drain upon the supply of miners. At some mines, particularly those near sizeable towns, little loss of labor will be incurred, whereas in the case of an isolated mine with only a few neighborhood houses the loss may be as much as 50%. Perhaps 10% may be a conservative estimate of the loss from this source by next fall.
- (c) Loss of Labor to near-by industries: The standard wage of the miner is \$1.000 per hour but the fact that coal miners under the union contract are not permitted to work over 35 hours per week, even at time and a half for overtime, as in other industries, is not generally recognized. Many of the war industries have a base rate of \$1.00 to \$1.25 per hour, and with time and a half for overtime and unlimited hours per week are earning from 25% to 50% more per week than coal miners under the 35-hour week; therefore, many of these miners are drifting to places where abnormal overtime weekly earnings are obtainable. This inflation of wages as the result of overtime is steadily reducing the supply of experienced miners. Unfortunately for the mining industry many of these war industry plants have been located near coal mines in order to secure cheap transportation costs. It is difficult to estimate the loss of labor from this cause but it will be considerable unless labor is frozen to present jobs in essential war occupations, including coal mining.

Buyer meets Seller in the back of this book.

3. *Transportation*

The burden upon our coal carriers is becoming heavier each day. The sinking of tankers supplying our eastern seaboard with oil and the interference with the transportation of water-borne coal to that territory seems certain to result in increased all-rail haul of coal to the eastern seaboard and particularly New England. The restriction in the use of oil and gas for some uses must result in the substitution and increase of use of coal. The many new industry plants under construction throughout the nation suggest that the increased use of coal by these plants will more than compensate for the non-essential plants that may be closed down. Can there be any doubt that a full wartime economy will use consistently more coal than under normal peacetime conditions and that the demands on our coal carriers will steadily increase? Moreover, the construction of war plants immediately west of the Mississippi River with the limited facilities for delivery of oil and gas in that territory may overtax the mines in that section to the point where longer hauls will have to be made from the mines east of the Mississippi, resulting in increased transportation and requirements for open-top cars. In addition to this, there is an estimated increased use of open-top cars for sand and gravel of about 15% and there will be an increased use of open-top cars in Michigan, Northern Ohio and the West for the beet sugar plants on account of the cane sugar shortage.

If we add to the above factors the normal increase in demand for coal during the fall and winter months and the enormous increase in transportation of war materials expected by September we have and Herculean, if not impossible, task for our railroads even under its existing highly efficient management and rapid movement of freight.

Since coal represents some 25% or 30% of the railroad tonnage, it seems imperatively necessary that our governmental authorities use every facility at their command to increase the present stocks of bituminous coal above ground from 60,000,000 or 70,000,000 tons to at least 100,000,000 tons during the next three or four months and thereby have this 100,000,000 tons of coal as a backlog during next fall and winter. Some railroads and industries now have as little as a week's supply of coal on hand although coal has been readily available at all times. The railroad or war industry that permits its stocks to run low in times like these on the theory that it can confiscate coal or demand a priority in order to operate in the event of a car shortage is guilty of unpardonable short-sightedness, if not of actual disloyalty to its government. We believe that our Government should use every resource at its command to increase our bituminous coal inventories up to 100,000,000 tons and those necessary war industries and railroads refusing to cooperate should be made the subject of governmental order.

Let our Advertisers' products help you to profit from your business.

4. *Maximum Prices*

The Office of Price Administration now has under consideration the matter of maximum prices on bituminous coal. The cost of producing coal at some mines is 50% to 100% over that of others. These higher cost mines have only been able to survive by reason of the higher prices secured for a part or all of their product because of its special quality or geographical location and the ability to sell such coal at prices above the fixed minimum prices of the Coal Act. The Coal Act provides that the average minimum selling price for a given area shall return to the mines within 2c per ton of average cost of mines for that area; therefore, the minimum code prices returns a profit for about half the mines and a loss of the other half. The latter class must sell at above the code price in order to prevent loss. Moreover, the Coal Act provides that if maximum prices are established a reasonable average profit must be returned to each and every mine.

If an arbitrary maximum price is fixed by the Office of Price Administration that does not return at least cost to every mine, many mines will be forced out of business with consequent loss of national productive capacity that is already working on a dangerously thin margin.

As a matter of fact, there has been and is no price inflation of bituminous coal, complaint as to mine prices, nor public demand for maximum prices, and public interest and our war effort will be best conserved by adherence to the provisions of the Coal Act and, as a practical matter, the publication of maximum prices, unless substantially above current market prices, will bring about a feeling of security and complacency on the part of the consumer that will seriously impede and counteract the "Buy Now" movement that is proving so helpful to the building up of above ground stocks of coal.

This situation is fraught with immediate danger. We are concerned primarily with winning the war and not with prices, but in this instance the production and shortage of the needed coal will be seriously affected if such maximum prices are fixed as will not permit all of our mines to operate and encourage consumers to continue to build up their coal inventories; therefore, this is a matter with which our government is deeply concerned.

We regret the length of this talk. It has seemed necessary in order to properly present the necessities of the situation as relates to materials, manpower, transportation, and the effect of maximum prices on production. The narrow margin of 9% between productive capacity and actual production at this time is so thin that any one of the factors we have mentioned may bring about a shortage of coal and a shortage of no item so vitally and materially affects and disrupts our entire national economy as that of coal. Our coal mines are now geared to produce 12,000,000 tons per week but we need every pound of this in the days ahead of us and we confidently believe that unless the proper authorities immediately recognize the seriousness of this situation and promptly take such steps

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as, in their wisdom, may be necessary to avoid the shortage of coal next fall, that we shall have all of the confusion that inevitably comes from such shortage, including an actual reduction of production of equipment and materials so imperatively needed for the winning of the war.

The bituminous coal industry is anxious to do its full part and to make such sacrifices as may be necessary to win this war. If our government decides that the manpower and the materials required to maintain an adequate supply of coal are more necessary elsewhere it will cheerfully acquiesce in that decision. On the other hand, we feel it our duty to make known the situation as we see it. We renew our pledge to help in a solution of these problems.

(Reprinted by courtesy of Chamber of Commerce of the United States)

FUELS AND METALS IN WINNING THE WAR

WHAT ABOUT YOUR COAL PILE?

By H. A. GRAY

Acting Director of Solid Fuels Coordination
Washington, D. C.

Chamber of Commerce of the United States—30th Annual Meeting
Group Luncheon Meeting
Stevens Hotel, Tuesday, April 28, 1942, 12:30 P.M.

You have asked me to come here and speak on the topic of "What about Your Coal Pile?" I have brought with me several charts and maps that I have asked to have distributed. They present this story more clearly than anything I could tell you.

The coal problem, serious as it is, has a relatively simple remedy. We must spread production and transportation of the year's supply more evenly over the 12 months. This can be accomplished only by purchasing coal now and storing it for future needs. That would relieve the seasonal peak pressure on mines and carriers and make it less likely that shortages would result from overtaxed facilities. A full coal bin is the best possible insurance anybody can have against a wartime coal shortage.

As you well know, coal customarily is bought only as it is needed. Usually, only a minimum amount is carried in storage, and consumers depend upon the mines and carriers to maintain a continuous flow of fuel to meet current requirements. Such a practice causes seasonal peaks and depressions in coal production and transportation. This is a dangerous practice in wartime, when disruptions in the flow of coal can be expected.

Our Advertisers, who make this volume possible, will appreciate your inquiries.

The war is handicapping both the production and transportation of coal. In production, mine operators are confronted with reduced labor supply and shortage of such materials as steel, copper, and rubber, which are used in large quantities by the mining industry. In the transportation of coal, which appears to present the more pressing problem now, we are confronted by the possibility that the Nation's carriers may be unable to meet peak demands this fall and winter.

You will note that one of the charts is entitled "Seasonal Variation of Coal Production." It shows the production rate for each particular month as compared with the average monthly coal requirements for the year. The chart is based on the average production during the years of 1936, 1938 and 1940. A brief study of the seasonal variations reflected by this chart will show you that during the fall and winter months, coal is produced at a peak rate greatly in excess of the average monthly requirement for the year. On the other hand, during the spring and summer, when a large part of the mine capacity is idle for lack of coal purchasers, the production rate is considerably lower than the average monthly requirement. This chart indicates that coal customarily is produced and moved on a hand-to-mouth basis, as people buy it. And, as I have said before, people ordinarily buy their coal only as they need it, with some few exceptions, of course. Coal transportation follows this same general pattern.

The small chart, at the bottom of the first page of the report issued by the Association of American Railroads, illustrates the seasonal variations in the loadings of all railroad freight. You will note that freight traffic is lower during the late winter, spring, and early summer and that it builds up to a peak in late summer and fall.

A comparison of the coal production chart with the railroad car loadings chart will show you that the seasonal peak in coal production and the seasonal peak in general freight transportation generally coincide. In fact, the heavy coal tonnage during the production peak is one of the important factors that build up the seasonal peaks in total railroad car loadings.

The 1942 coal production and transportation requirements are expected to exceed those for any recent year. No one can predict definitely how much coal will be required this year, but it now appears that from 550,000,000 tons to 570,000,000 tons of bituminous and approximately 60,000,000 tons of anthracite may be needed. This would necessitate a production rate averaging around 11 million tons per week for bituminous and about 1,150,000 tons per week for anthracite. Every week that the production and transportation of coal falls below those figures means that additional coal must be mined and hauled during some other week to make up the deficit.

If the 1942 fall production peak is built up to customary proportions, based on this year's war-increased needs, the railroads may find it difficult to move coal as required. You may expect delayed coal shipments, and if you are not adequately prepared to continue operating out of the coal in your storage pile, you may expect a fuel shortage.

We cannot expect the mines and the carriers, in the face of the handicaps imposed by this war, to keep on supplying coal in the unin-

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errupted flow to which we have been accustomed at all times in the past. Already they are experiencing difficulties, and conditions will get much tighter than they now are before we win this war.

In considering what is confronting the railroads this year, it is well to bear in mind that they will have to move a still greater part of our coal than they have in the past. This is due to the effects of the war on shipments by other types of carriers, such as ocean colliers and motor tracks, and the increase in coal demand occasioned by conversion from the use of other fuels to the use of coal because of the shortage of the other fuels.

It might be interesting to give you some figures to illustrate how increased railroad burdens resulting from changes in the movement of fuel are eating into the limited transportation facilities. For instance, it now requires about 600 more freight locomotives every day to haul oil into Seaboard states than it took before the present petroleum emergency. Furthermore, it has been estimated that it will take about 150 additional locomotives to haul coal all-rail from the Southern Appalachian field into New England than it would take to haul that coal via the rail and "Tidewater" collier route. The size of these figures which represent new demands upon rail equipment that were not expected heretofore, is emphasized when they are compared with the fact that one of the Nation's major coal carrying railroads has less than 600 freight locomotives in its entire engine ownership.

Furthermore, the 1942 railroad locomotive construction program called for 900 engines to be built. This is but 150 more engines than the additional 750 it since has developed will be needed to meet this new Eastern Seaboard fuel situation alone.

The locomotive situation is not all of the story. It will require 6,000 additional coal cars for the all-rail movement from the Southern Appalachian field to New England, than it would take if the usual rail-water haul were used. Consider this in the light of the fact that before these new situations occurred, railroad authorities had estimated that there would be a shortage of approximately 33,000 freight cars of all types under the amount of equipment that would be required to handle the 1942 traffic peak.

The coal movement pattern is a complex one. It requires careful planning and coordination to keep coal moving without delay. Two of the maps I have asked to have distributed will illustrate some of the complexities of coal transportation. These particular maps show the tonnage that are shipped from mines in the Appalachian region, via railroads and Great Lakes carriers, into the Central and Northwestern states, and Canada. The coal is moved by rail from the mines to lower lake ports, where it is transhipped by vessel to points along the lake system. There, some of it is consumed, or stored for future consumption, and the rest is reshipped inland by rail or truck to other places. Some of these inland movements from the docks travel as far west as the Dakotas. There are many ways in which difficulties and delays can occur in such a complex movement.

A no less complicated situation is presented by the shipments from

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the Appalachian field, via rail to Norfolk, and thence to New York and New England by collier.

This brings us to the question of why the Government is warning the country to buy coal now and store it as insurance against possible shortages that might result from the effects of the war on coal production and transportation.

The railroads move the bulk of the Nation's coal. In fact, about one out of every three tons of freight carried by them is coal. It is reasonable to expect that any major difficulty that hampers general railroad freight transportation will affect the movement of coal.

Although the railroads have done an outstandingly fine job in maintaining heavy transportation under war handicaps, there is a limit to the amount of freight that they can be expected to move in a given period. It appears that this fall and winter the war-expanded demands for rail transportation are very likely to be so great that railroads may have difficulty in meeting them in view of the limitations upon their manpower and equipment. That peak in general traffic as I have explained before, will coincide with the customary seasonal peak in coal production and movement. Therefore we may expect that coal shipments may be delayed. And if delayed shipments happen to be those destined for persons who have failed to maintain storage of enough coal to keep them going until they can get fuel, shut downs will occur. If such shortages should happen on a broad enough scale—and that is entirely possible—a serious coal emergency might develop.

Serious shortages of coal or transportation might materially impede the military program, and help to prolong this world conflict that we all are striving to end quickly with victory. Hence, it is imperative that we do our utmost to prevent such a shortage. The importance of coal in the war programs cannot be overemphasized. There is no other single commodity that is more basic. Half of the Nation's energy originates from this single fuel. Furthermore, any increase in energy must come from coal, and the present shortages of fuel oils, natural gas and hydro-power must be offset by coal. Aside from war requirements, coal also is vital to our civil life.

I cannot stress too strongly the importance of every dealer and consumer buying coal now and storing while there are ample facilities to supply it. This not only would protect them, but it would materially aid in reducing the seasonal transportation and production peak and thereby be an important contribution toward the success of the war. This is a contribution that nearly every coal buyer can make.

The storage of coal follows a peculiar pattern. As I have stated before, many consumers depend almost entirely upon a continuous flow to their furnaces. Others keep a month or more of supply on hand. Those who are heeding warnings and are stocking to their utmost, I consider wise consumers. It seems however, to be a most difficult task to change the habits of those who have been used to depending upon a continuous flow and who stock little or no coal.

As you know, the Office of Solid Fuels Coordination, the Bituminous Coal Consumers' Counsel, the Office of Defense Transportation, the Office

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of Price Administration, your own organization, the coal industry, the railroads, and others have been cooperating in urging the production and storage of coal during the offseason. Recent statistics indicate that many consumers are responding. At the same time, there are still many individuals who show little or no interest in protecting their own fuel supply. These persons and companies are not making the fullest contribution they could to winning this war.

A short time ago, Secretary of the Interior Ickes, who is the solid fuels coordinator, sent a telegram warning the head of a large public utility that its transit system had only about a week's supply of coal on hand. In another instance, a large Midwestern railroad had but six days' supply of coal. I could cite many other instances of dangerous lack of foresight, even to naming the individual coal users involved. It may become necessary to make public such information, in order to jolt people out of their complacent attitude toward this situation.

When coal shipments will improvident users who ignore warnings to take adequate precautions want the Government to seize and turn over to them to keep them going in an emergency? Will it be yours? Will you have enough coal in your own stockpit to keep operating if the coal you thought you had on the way to you is diverted to somebody else who had failed to stock up? Will you, too, have to ask for help, and want somebody else's coal? Such a chain of circumstances could quickly create a serious emergency.

As I have indicated, much valuable time has been lost. A great deal of coal that could have been mined and moved into storage piles has not been produced because people did not order it. Scarcely a day goes by but what my office receives a telegram or letter from some local mine union asking why their miners are working only part time—perhaps as little as three days per week—when they want to work full time to supply coal to win the war. The answer is always the same. The mine has no orders for coal, and it can't keep on working without them. People weren't buying. These men and their employers are being prevented from turning the full fruits of their efforts into production of a necessary war material. They remain in enforced idleness, even in face of strong indications that the time may come when consumers will need, but find it difficult to get, the coal that these men and mines could have supplied readily a short time previously.

Although in some instances, purchasers already are finding it difficult to obtain coal for their storage piles, time and facilities still are available to produce a great deal of coal for storage during the spring and summer, before the presently available surplus in facilities is wiped out by the effect of the war and the customary peak demand. It is imperative, in the interest of maintaining the drive to win this war, that every coal mine and coal carrier be enabled to operate at top capacity for the rest of the off-season. This cannot be done unless buyers order their coal now, and store it for future needs.

I cannot tell individuals how much coal they should store, but as a general rule I think that a supply adequate for 60 to 90 days is not too much for the ordinary industrial consumer to have on hand. Public

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utilities and vital war industries ought to carry coal enough to last at least 120 days. Householders should store their entire next winter's supply this summer, if that is possible. The coal in storage now generally does not even approach these figures.

I think protective storage of coal will pay big dividends. True, it costs more money to store coal and in a great many instances it is inconvenient. But, I think it will prove to be more economical and satisfactory to store coal, than it would be to get caught by a shortage, or to try to operate on the kind of coal you might be forced to use if the Government found it necessary to institute an emergency distribution system.

From time to time I have heard expressions attributed to coal users asking why they should go to the trouble and expense of storing coal when the Government would see that they got it should a shortage occur. Some people who have that idea may be due for a very great surprise. They may get an emergency fuel distribution system, all right, but I don't think they are going to like it or the kind of coal it might give them. The best zoning or allocation system that could possibly be devised would be unsatisfactory substitute for orderly, natural coal distribution. I want to warn coal buyers who may have forgotten the first World War fuel crisis that they may expect any kind of a Government emergency coal distribution system to be cumbersome and difficult to operate on an efficient basis.

Although the Office of Solid Fuels Coordination is now working out an emergency coal distribution system, it will be recommended for use only as a last-resort measure, after all other efforts to keep essential users supplied have failed. But, when the need for such a system is apparent, it will be recommended without delay.

The best and only way to delay or avoid the necessity for having to institute such an utterly undesirable system, which may become necessary, is to get the greatest amount of coal possible into the storage piles now, while it can be moved. Then keep the piles replenished, as fast as the coal is used.

We must use our coal production and transportation facilities at full capacity all spring and summer to give us adequate protection against a coal shortage.



(Reprinted through courtesy of Mining Electrical Group, West Frankfort, Illinois)

ALLIES OF TRANSPORTATION

By J. B. HASKELL

Sales Manager, Rail & Track Division, The West Virginia Rail Co.,
Huntington, West Virginia

Perhaps no word has a larger place in the thoughts of mankind today than the word, allies. News dispatches, magazine articles and radio broadcasts all use the word so much in effect or implication that we, as a people, are ally conscious. Webster says that an ally is anything or anyone associated with another as a helper or auxiliary.

With the nations of the world lined up in the tremendous conflict that is raging today, we well know the importance of an ally and how vital it is to our success that the resources and abilities of each ally be so correlated and combined as to work in one unified effort. To secure the best of results, the correlation of all physical and mechanical allies must be complete.

Throughout Ohio schools, a book known as McGuffey's Reader used to be very popular and many of the stories told in its pages are still well remembered. One story tells of a father who found that his seven sons were continually fighting among themselves, and that they were unable to carry on any joint enterprise with any degree of success. Calling them together, he showed them a small bundle of rods which he asked them to break. Each son in turn tried and failed. The father, taking the bundle, untied it and then easily broke each separate rod. "So it is," said he, "working together as a unit like the bundle of rods, you are strong and can accomplish much. Separately, you are weak." It is an old story, but one that I often think of when the thought of cooperation of men or materials is in mind. Thus, when I think of the allies of transportation, I think how needful it is that each ally, each helpful part of the whole, be combined into a single complete coordinated unit in order to make a strong, efficient system. We might almost say that the results achieved by the combined efforts of several allies or the combination of a group of mechanical forces, are equivalent to their algebraic sum. Those which are negative or out of proper relationship with the others, detract from rather than add to, the results achieved. I believe we have a rather far-fetched but nevertheless pertinent illustration of how serious the lack of one item from a composite group can be in the story of how Napoleon lost a battle because reinforcements did not arrive. The order calling for them was not delivered, due to the lateness of the messenger. The story tells us that due to the lack of a horse shoe nail, the partly shod horse delayed this messenger and so lost the battle. Perhaps were we to modernize this story we would say it was lost due to the presence of a nail in a rubber tire.

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Transportation has long been a problem of mankind. In speaking of it today, I will confine my remarks more to general observations rather than to technical data. Man's desire to move goods has always surpassed his ability to carry them or, as is commonly said in our State of West Virginia, "To tote 'em." Thus, comes about the problems of transportation. The field is so wide and its history is so lengthy that the time at our disposal forces us to confine ourselves to the transportation of coal alone.

From the time of the first mining of coal in the United States at the beginning of the nineteenth century, the means of transporting coal to the outside from the working forces has passed through the stages of manual tramping, use of oxen, horses, mules, and the various types of locomotives. The means of conveyance has included sacks, wheelbarrows, carts and mine cars. The primitive method of transporting material from underground workings was for men to carry it in some form of container, as a tray. The introduction of wooden sleds was an improvement over carrying. Such sleds, or baskets, provided with runners and usually drawn by boys, were extensively used in Great Britain in early coal mining. The introduction of wheeled vehicles was the next advance step.

By using a wheelbarrow, heavier loads could be moved with much less exertion than by carrying, especially if a plank road was used instead of the natural mine floor. The four wheeled truck soon replaced the wheelbarrow for general use. At first, wicker baskets or wooden tubs were loaded at the face and carried to the haulage road, but soon cars or In England the term "tub" is still used for a mine car, though very few real tubs are used. Pushing cars by hand is known as "putting" in England and as "hand tramping" in the United States.

Following the enactment of a law prohibiting the employment of women or of children under 10 years of age, Shetland ponies were introduced in English mines in 1843 as substitutes for the putters employed in conveying the coal. (About 100 years ago.)

In some West Virginia mines opened in 1857, the coal was taken out by sacks and baskets, and later by oxen pulling the coal on sleds. These oxen were replaced by mules in 1870. Slaves were used previous to the Civil War, who carried out the baskets or sacks of coal and rolled the coal over the hill side to get it to the banks of the Kanawha river.

Horses and mules were used in early coal mining for both gathering and main line haulage. In 1923, stock used in animal haulage in the state numbered 7954, but in 1932 the number had declined to 2013. In 1880, as mining became extensive in West Virginia, the haulage distances became greater and steam locomotives began to be used extensively. In 1905, ninety were listed as in use, but in 1932 only 15 were listed as being in use. In 1888 rope haulage was introduced into West Virginia mines. This type of haulage increased throughout the field until 1900, after which time the use of this system decreased. Both the endless reversible rope system and systems involving a tail rope were used. Some of these systems could handle as high as 100 cars per trip and entailed the use of as much as 22,000 feet of rope. Compressed air loco-

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motives were introduced in 1896. These locomotives averaged about 5 tons in weight, for 44" gauge track, and used air up to 800 pounds per square inch pressure. About this time 16 pound rails were used extensively. The use of compressed air locomotives increased until 1915, after which their use declined. The first gasoline mine locomotives were used in West Virginia in 1912. These were used mostly in outside tramping, although a few were used on main line haulage at some distance from the working face.

The first gasoline locomotive used in Illinois was probably the second successful one in this country. It was built by the Sagamon Coal Co. and put into its mine at Springfield in 1904.

They are practically non-existent in coal mines at present. Some of these locomotives operated over tracks that were crude compared with good mine track of today. Many haulage tracks up to 1890 used wood rails 2" x 4" in size set on edge in notches sawed in split post ties. The rails were held tight by wedges driven in place. On curves, the wood rails were lined with plates of iron. All parts of the track were of wood, except the forged iron switch points. This type of track left much to be desired and as time passed and iron rails were first imported and then manufactured here, to be soon followed by the rolling of steel rails, they rapidly passed out of the mining picture.

In 1887 electricity first became an ally of mine transportation. How electricity first originated has been told by a small school boy when he was asked to write an essay on the life of Benjamin Franklin. "Benjamin Franklin," said the boy, "came to Philadelphia when a small boy. He walked down the street carrying a loaf of bread under his arm. A girl looked out of a window and laughed at him. Later on he married her and discovered electricity." It is well that he did for without this universal agent of man, mining transportation as we know it would be impossible.

Many are the allies of transportation; a few to name them, being, good track, good rolling stock, well planned transportation systems, efficient power distribution, etc. Perhaps the most important of these is electricity itself. It is so hard to satisfactorily define, although perhaps it is man's most wonderful agent. Yet, efficient and potent as it now is, does the future not hold in store even more wonderful developments in the electrical field. Is it visionary to think we may transport electricity without wires? Is it visionary to presume that electrical science may do many things now thought impossible? We have seen in a lifetime the development of electric lighting, of the telegraph, of the telephone, of the radio, and of electric industrial heating. We have seen electricity transform an automobile from a machine lighted by gas lamps and one that only a strong man could start, into a well-lighted conveyance able to be controlled and started by a child. Due to its ease of transmission, application and control, electricity has become the greatest ally of transportation.

It was in 1879 that the first electric locomotive using current from a dynamo was built. It was manufactured and operated in Berlin, Germany, upon a circular track 1500 feet long. The introduction of electric

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locomotives into mining service followed almost immediately and in 1882 the first electric locomotive was installed in a coal mine in Saxony. On July 26, 1887, the Lykens Valley Coal Co. placed the first electric mining locomotive in this country in service at the Short Mountain Colliery at Lykens, Pa. This locomotive had a 30 horsepower motor using 400 volts direct current. The conductor was a 25 pound iron rail mounted along one side of the entry, the current being taken off through four contact wheels. The motor and running gear weighed 1500 pounds. It was built by the Union Electric Co. of Philadelphia, Pa., and was the first installation of any considerable size in the world. This locomotive hauled a load of 150 tons at a speed of six miles per hour over a road 6300 feet long and was still in service in 1915. The tractive power necessary to haul this load was developed by loading this extremely light locomotive with 7000 pounds of scrap iron. We might assume that present day demands for scrap might seriously impair the effectiveness of such a locomotive.

In 1888 the Jeffrey Mfg. Co. built the first electric locomotives used in a bituminous mine in the United States. The installation was in the mines of the Upson Coal Mining Co., Shawnee, Ohio. Instead of a wire or rail as conductor, two parallel 1" galvanized iron pipes were used. The rails were not bonded as one of the pipes was used for the return circuit. We still see this type of power transmission in such a double trolley system as is used in the street car system of Cincinnati, Ohio, and of course all of the electric trackless bus systems must use the twin conductor or double trolley system.

The first electric locomotive installed in Illinois was placed in the No. 3 mine of the Chicago, Wilmington & Vermillion Coal Co. at Streator in 1888. As far as the records show, this installation at Streator was the only really successful one for several years, though some locomotives had been used experimentally during this time at other mines. No further introduction of electric haulage was made in Illinois until 1899, when the Jeffrey Mfg. Co. shipped an 8 ton locomotive to the Centralia Mining & Manufacturing Co. of Centralia, Ill.

The modern electric mine locomotive has been helpful in solving many transportation problems. The difficulty of keeping up production as the workings advanced farther away from the mine opening was the chief problem many companies were facing before the advent of the electric locomotive. Animal haulage was too slow and was limited to very light loads, while rope haulage was not flexible enough and was difficult to extend. The electric locomotive, with a combination of speed, power, flexibility, and economy of operation has so largely overcome these difficulties that it is indeed an effective ally of transportation.

As we read the war news of the day, we are conscious that each and all phases of the program are interdependent. Without tanks, infantry is handicapped. Tanks without superior fire power are vulnerable. Armed forces without air control are doomed to defeat. We might have the best artillery ever manufactured, but unless all needed coordinating factors are efficiently supplied and used, we lose the value of our fine field pieces.

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And, so with this efficient electric locomotive of which we speak. To give the results of which it is capable, the other transportation factors, or as we might say, other allies of transportation, must be developed to their highest peak of efficiency.

One of these items is, of course, a modern electrical distribution system. A present day saying is that the battle goes to the one who gets there "furstes with the mostes." A somewhat similar fact is the one that efficient locomotive performance hinges upon a dependable current supply of the right voltage. This necessitates correctly sized and installed trolley wire, well placed feeders of adequate capacity, and a properly bonded return system. Not long ago I read a paragraph that summed this up rather well. It read, "The power distribution system of a mine should be so designed, installed and maintained that (a) low voltage will not exist at any point in the mine, (b) the energy loss in the system will be reasonably low, (c) the safe current carrying capacity of no part of the system will be exceeded, and (d) an economical use of copper will be made in obtaining the results just mentioned."

This outlined program may be a little hard to live up to, but it insures good results. Many of the electrical troubles with locomotives, cutting, and loading machines can be traced to poor bonding. The result of lax methods of bonding is continual trouble in the upkeep of electrical machinery. For example, if bonding has been carelessly done in a mine, there will be an excessive voltage drop in the far sections. Electric motor equipment operating in these sections must furnish the same mechanical power as if the voltage were normal. To get this power, the current must be increased. Hence, low line voltage means a continuous current overload on motors with corresponding maintenance troubles.

Quite obvious to all, as we think of the helpful points in transportation, is the importance of a well engineered shaft bottom; one that includes properly placed terminal tracks for loaded cars, storage tracks for empty cars, adequate shifting and runaround tracks, all of such length, and quality, and laid to such grade, as to remove all possible mechanical hinderance from the fast and economical handling of traffic. The shaft bottom is perhaps the busiest place in the mine and on its arrangement and equipment depends the efficient operation of the entire mine. To secure the most from a good installation, it is of course needful that a good system of controlling and dispatching trips be in use, for good main haulage depends even more on regular and continuous operation than it does on speed.

Time does not permit of more than a passing reference to the importance of well located partings and their length and switching arrangements. However, these items materially affect the efficiency of both gathering and main line transportation.

If we were to visualize all of the prominent elements of haulage and call this picture, "The Spirit of Transportation," something in that picture would of necessity represent the prominence of rolling stock. The design, quality and quantity of rolling stock is an extremely important part of the transportation picture. Many elements of rolling stock design are common to all installations, but due to the wide variety of

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conditions encountered in various areas, the locomotives and especially the cars must be designed to suit local use and conditions. You are familiar with the various types of wood, composite, and all steel cars and you know that net loads vary from 1 to 10 tons of coal. The historical development of cars has rather closely followed the historical development of motive power. Wheel bases may vary from 16" to 42" and the number of wheels from 4 to 8. Time does not permit more than a reference to reasons favoring any particular design, but in general a short wheel base permits sharper turnouts and easier rerailing, although causing greater spillage. A longer wheel base is conducive to easier running, less spillage and fewer derailments.

In thinking of the helps to transportation, I am reminded of the old story that tells of two Irishmen and a Hebrew who were discussing the question as to what man had invented the thing of greatest value to the world. Each Irishman told of what he thought had been the greatest invention and then the Jewish gentlemen spoke up, saying, "Well, the man who invented interest was no slouch." I would be inclined to say that the man who invented oil and grease was no slouch, for we are quite familiar with their important place in transportation.

As a foundation for transportation, both literally and figuratively, stands trackwork. The type of trackwork that a mine possesses has a pronounced influence on the efficiency of its electrical equipment. As previously mentioned, the quality of the bonding is important. It is obvious that bonds should be so applied that the electrical conductivity is as high as possible and that the bond be so located as to be as free as care can make it from mechanical injury due to derailments. It is most generally agreed that the conductivity ratio between copper and steel rail is 10 to 1, although figures as low as 8 to 1 and as high as 12 to 1 are sometimes used. With this figure as a basis, it is not difficult to select such a size of bond that the electrical resistance of the track will not be increased at the joint. The design installation and maintenance of the track system has a direct mechanical effect on all electrical equipment, such as locomotives, loading machines, etc., passing over it, as well as having an important effect on the haulage loads to which the locomotives are subjected.

The American Mining Congress has published a booklet that gives a considerable amount of data on the design, installation and maintenance of mine tracks. These recommendations, when followed, will undoubtedly lessen the upkeep, lengthen the life and increase the working efficiency of all mobile electrical units in the mine. It is desirable that all turnouts be as long and easy as space and roof conditions will permit and that this same condition apply to all crossovers. Long, easy curves properly widened and with the outer rail correctly elevated likewise smooth out traffic troubles and lessen unnecessary electrical loads. Properly aligned, well drained, track using rails of sufficient weight for the intended service is also an important ally of transportation.

We have heard the expression used, "Going from bad to worse." I think the person who coined that expression must have seen some loose, unsupported rail joints. On such joints the failure and its attendant

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evils are progressive. First, the joint is allowed to become loose. Traffic causes it to pound and as it pounds it becomes looser and increases its wear. A low spot develops in the track and water may gather below the joint or adjacent ties. Looseness produces wear and additional wear produces more looseness, something like the hen and the egg cycle. Such joints throughout the mine certainly sabotage a transportation system.

The allies of a mine transportation system are very similar to those of a railway system. Similar improvements in each produce similar results of efficiency and economy. I can remember when the majority of railroads used 60# and 65% rail on their main lines. Their roadbeds were light and insecure and their rolling stock inadequate. Today finds trunk line railroads using 105#, 131# and 152# rail on heavily ballasted, well-drained roadbeds. The equipment is heavy, powerful and well-designed. Thousands of miles of road are electrically operated. Powerful, efficient electric locomotives handle the heaviest of loads at remarkable speeds. Electricity is used to pull the train, to operate the block signal systems and to operate through the same rails all local danger signals. Electricity is even used to detect imperfect rails by the use of a suitably equipped test car.

Truly, the allies of transportation are numerous, but I believe I am safe in saying that electricity, that unseen power that your group is so interested in, is the most important of all.



CONSTITUTION AND BY-LAWS

Adopted June 24, 1913
 Amended Nov. 12, 1926
 Amended Nov. 8, 1929
 Amended Nov. 8, 1935
 Amended Oct. 21, 1938

ARTICLE I.

NAME AND PURPOSE.

The Illinois Mining Institute has for its object the advancement of the mining industry by encouraging and promoting the study and investigation of mining problems, by encouraging education in practical and scientific mining, and by diffusing information in regard to mining that would be of benefit to its members.

ARTICLE II.

MEMBERSHIP.

Section 1. Any person directly engaged or interested in any branch of mining, mining supplies, mining appliances, or mining machinery may become an active member of the Institute. Any person desiring to become a member of the Institute shall fill out a blank for that purpose, giving his name, residence, age, and occupation. This application shall be accompanied by one year's dues of \$3.00. Each application for membership shall be submitted to the Executive Board, who shall make an investigation as to the qualifications of the applicant, and shall be authorized to elect to membership and issue a certificate of membership to such applicant subject to the ratification of the next regular meeting of the Institute.

Section 2. Any person of distinction in mining may be elected

an honorary member of the Institute by two-thirds vote of the members present at any regular meeting. Any member who has been an active member of the Institute and shall have retired from active business in mining may become an honorary member.

Section 3. The annual dues for active members shall be \$3.00 and any person in arrears on August 1, of the current year, after having been sent two notifications of dues, to be dropped from membership. Members in arrears for dues will not receive the printed proceedings of the Institute.

Section 4. Any active member may become a life member by the payment of \$50.00. Funds received from life members are to be invested and only the income from these funds may be used in the regular operation of the Institute.

ARTICLE III.

OFFICERS.

Section 1. The officers shall consist of a President, Vice-President, Secretary-Treasurer and twelve Executive Board members. The services of all officers shall be without compensation.

Section 2. Nominations for officers and the executive board shall be made by nominating committee of three (3) appointed by the President at least thirty days before the annual November meeting, pro-

vided that anyone can be nominated on the floor of the meeting for any office for which an election is being held.

Section 3. The President, Vice-President and Secretary-Treasurer shall be elected by ballot, annually, at the regular November meeting and shall hold office for the ensuing year.

Four Executive Board members shall be elected by ballot, annually, at the regular November meeting and shall hold office for the ensuing three years.

To make effective this change, at the regular November meeting in 1938, in addition to the four Executive Board members who shall be elected for the three year term, there shall also be elected by ballot eight other Executive Board members, four for a two year term and four for a one year term.

Section 4. In case of death, resignation, or expulsion of any officer, the executive board may fill the vacancy by appointment until the next regular meeting, when the vacancy shall be filled by regular election. In case of a vacancy in the office of president, the duties shall devolve upon the vice-president.

Section 5. The executive board shall consist of the officers and twelve other board members.

ARTICLE IV.

DUTIES OF OFFICERS.

Section 1. The president shall perform the duties commonly performed by the presiding officer and chairman. He shall sign all orders for payment of money by the treasurer, and with the executive board shall exercise a general supervision over the affairs of the Institute between sessions.

Section 2. The vice-president shall preside in the absence of the president and perform all the duties of the president in his absence.

Section 3. The secretary-treasurer shall keep a record of each meeting, shall read and file all resolutions and papers that come before the Institute, countersign all orders for money which have been signed by the president, and shall purchase necessary supplies under the direction of the executive board.

He shall keep a true record of all money received by him and payments made on account of the Institute. He shall pay out no money except on an order signed by the president, and countersigned by himself, and shall retain these orders as vouchers. He shall give bond in such sum as the Institute may provide, the premium on said bond being paid by the Institute.

He shall act as editor-in-chief for the Institute and may furnish the newspapers and other periodicals such accounts of our transactions and discussions as are proper to be published. His own judgment is to prevail in such matters unless objection is lodged at a regular meeting or by the executive board.

The retiring president shall act ex-officio in any capacity for the ensuing year.

Section 4. The president shall appoint an auditing committee annually to audit the accounts of the secretary-treasurer, and said audit shall be submitted to the November meeting of the Institute.

Section 5. The Executive Board shall perform the duties specifically prescribed by this constitution; it shall supervise the expenditures and disbursements of all money of the Institute, and no expenditure other than current expenses shall

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be authorized without first having the approval of the Executive Committee; it shall act as program committee for each meeting to determine what is to be published in the proceedings and shall perform such other duties as may be referred to them by regular or special meeting of the Institute.

ARTICLE V.

MEETINGS.

Section 1. Regular meetings shall be held in June and November of each year and on such days and in such places as may be determined by the executive board of the Institute. Notice of all meetings shall be given at least thirty days in advance of such meetings.

Section 2. Meetings of the executive board shall be held on the call of the president, or at the request of three members of the executive board, the president shall call a meeting of the board.

ARTICLE VI.

AMENDMENTS.

Section 1. This Constitution may be altered or amended at any regularly called meeting by a majority vote of the members present provided notice in writing has been given at a previous semi-annual meeting of said proposed change of amendment.

ARTICLE VII.

ORDER OF BUSINESS.

At all meetings, the following shall be the order of business:

- (1) Reading of minutes.
- (2) Report of executive board.
- (3) Report of officers.
- (4) Report of committees.
- (5) Election of new members.
- (6) Unfinished business.
- (7) New business.
- (8) Election of officers.
- (9) Program.
- (10) Adjournment.



ILLINOIS MINING INSTITUTE

LIFE MEMBERS

ANDERSON, JAMES S.....	Box 335, Bellingham, Wash.
BARROW, W. E.....	Joy Mfg. Co., Franklin, Penn.
BROOKS, C. W., Contr. Engr.....	Room 601, 53 W. Jackson Blvd., Chicago, Ill.
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- BAGWILL, GEORGE.....State Mine Inspector, 506 N. Main St., Harrisburg, Ill.
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- BEACHAM, ROBT. K., Gen. Supt.....
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- BONTJES, JOHN H., Pres.....
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- DE WITT, C. S., P. A.....C-W-F Coal Co., 332 S. Michigan Ave., Chicago, Ill.
- DE WITT, FRED G.....
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- DINN, T. J.....Ohio Oil Co., West Frankfort, Ill.
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- *DODD, W. J., Chief Petty Officer.....Camp Allen, Norfolk, Va.

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DUNCAN, GEORGE, SR.....	Duncan Foundry & Machine Co., Alton, Ill.
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- FIRTH, B. H., Supt.....Lumaghi Coal Co., Collinsville, Ill.
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- FLEMING, J. B.....Mine Safety Appliances Co., 403 Pennsylvania Ave., Urbana, Ill.
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- FLETCHER, J. H., Consulting Engr.....332 S. Michigan Ave., Chicago, Ill.
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- FOLLANSBEE, FRANK.....Pittsburgh Coal Co., Oliver Bldg., Pittsburgh, Pa.
- FORD, CLEM C.....Jeffrey Mfg. Co., 307 N. Michigan Ave., Chicago, Ill.
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- *FREEMAN, ENSIGN H. D., U.S.N.R.....1450 N. Dearborn St., Chicago, Ill.
- FRIES, FRANK W., Arbitrator.....
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- FRISBIE, CHARLES G., Chicago District Manager.....
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- FULKE, FRANK L.....% Frank Prox Co., Terre Haute, Ind.
- FULLER, RICHARD.....Coal Age, 1066 Paul Brown Bldg., St. Louis, Mo.
- GALLAGHER, W. S.....U. S. Bureau of Mines, Vincennes, Ind.
- GALLAND, J. H.....American Steel & Wire Co., 208 S. La Salle St., Chicago, Ill.
- GAMMETER, E.....Bell & Zoller Coal & Mng. Co., Zeigler, Ill.
- *GARCIA, JOHN A.....Allen & Garcia Co., 332 S. Michigan Ave., Chicago, Ill.
- GARWOOD, THOMAS L.....
Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill.
- GATELY, ALBERT.....Republic Coal Co., Fullerton & Southport Ave., Chicago, Ill.
- GAUEN, C. F.....Egyptian Tie & Timber Co., Railway Exchange Bldg., St. Louis, Mo.

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- GEROW, T. G., Vice-Pres....Truax-Traer Coal Co., 8 S. Michigan Ave., Chicago, Ill.
- GILES, WM. S.....Giles Armature & Electric Works, Marion, Ill.
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- PRICE, W. H., Supt.....Delta Coal Mining Co., Marion, Ill.
- PRINS, KLAAS, Coal Prep. Engr.....Pittsburgh Coal Co., Pittsburgh, Pa.
- PRITCHARD, W.....Goodman Mfg. Co., 322 Clark St., St. Louis, Mo.
- PROFFITT, R. P.....
% Timken Roller Bearing Co., 2534 S. Michigan Ave., Chicago, Ill.
- *PRUDENT, NORMAN.....Crescent Mining Co., Box 267, Peoria, Ill.
- PSCHIRRER, A. R., Pres.....
Pschirrer & Sons Coal Co., R. R. No. 4, Canton, Ill.

Mentioning this publication when writing Advertisers puts friendship into business.

- PSCHIRRER, JOHN.....Pschirrer & Sons Coal Co., Canton, Ill.
- PURICELLIO, CHARLES J.....Mineweld Co., 101 N. 12th St., Herrin, Ill.
- PURSGLOVE, JOSEPH, JR., Gen. Mgr.....
Cornell Coke Co., Box 1032, Morgantown, W. Va.
- RASSIEUR, T. E., Treas.....
Central Mine Equip. Co., 4520 Enright Ave., St. Louis, Mo.
- RAWSON, R. D.....Atlas Powder Co., 721 S. Grand West, Springfield, Ill.
- REAK, MURRELL, Member.....
State Mining Board, 1605 E. Oak St., West Frankfort, Ill.
- REED, FRANK H.....State Geological Survey, Urbana, Ill.
- REED, J. R., Sales Engr.....
National Electric Coil Co., 812 Union Ave., Belleville, Ill.
- REED, R. E.....Hercules Powder Co., Antlers Hotel, Taylorville, Ill.
- REES, O. W., Chemist.....
Ill. State Geological Survey, Natural Resources Bldg., Urbana, Ill.
- REESE, C. A.....General Electric Co., 607 E. Adams St., Springfield, Ill.
- REIBER, J. LOUIS.....
Mt. Olive & Staunton Coal Co., 806 LaCledde Bldg., St. Louis, Mo.
- REICHLING, R. L., Sales Engr.....
The Tool Steel Gear & Pinion Co., Cincinnati, Ohio
- REID, H. A., V. P. in Charge of Oper.....
The United Electric Coal Companies, 307 N. Michigan Ave., Chicago, Ill.
- REITHER, E. C.....% Timken Roller Bearing Co., 416 Craig St., Pittsburgh, Pa.
- RHEIN, HERBERT E.....
American Brattice Cloth Corp., 4120 Broadway, Indianapolis, Ind.
- RHINE, FRANK E.....% Piasa Foundry Co., Box 88, East Alton, Ill.
- RHOADS, M. J.....Spring Valley Coal Co., Spring Valley, Ill.
- RICE, OSCAR.....State Mine Inspector, Elizabethtown, Ill.
- RICHARDS, L. O.....Robert Holmes & Bros., Danville, Ill.
- RICHART, F. W.....Coal Age, Carterville, Ill.
- RIEGER, ARTHUR J.....804 Maple St., Zeigler, Ill.
- RITTER, M. L., Sales Mgr.....
Farrell-Cheek Steel Co., Lane & Third Sts., Sandusky, Ohio
- ROCKAMANN, ARTHUR C.....Gibraltar Equipment & Mfg. Co., Alton, Ill.
- RODENBUSH, JAKE, Asst. Mine Mgr.....Peabody No. 24 Mine, Georgetown, Ill.
- RODENBUSH, JOHN, Supt.....
Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill.

Our Advertisers make it possible to publish this volume—give them a "break."

- ROHRER, L. C., Sales Rep.....
Jones & Laughlin Steel Corp., 105 W. Adams St., Chicago, Ill.
- ROLLINS, J. E., V. P.....
Bituminous Casualty Corp., Cleaveland Bldg., Rock Island, Ill.
- ROMAN, F. W.....332 S. Michigan Ave., % Hercules Powder Co., Chicago, Ill.
- ROMIG, JOHN.....Atlas Powder Co., Wilmington, Del.
- ROOS, J. A., Sales Engr.....General Electric Co., 840 S. Canal St., Chicago, Ill.
- ROSENQUIST, G. C.....
Wood Preserving Division, Koppers Co., Railway Exchange Bldg., Chicago, Ill.
- ROSING, BORGE, Gen. Sls. Mgr.....
The West Virginia Rail Co., Huntington, W. Va.
- *ROSS, CAPT. T. P.....
Base Sec. Sig. Office, APO 922 % Postmaster, San Francisco, Calif.
- ROZANSKI, M., Mine Mgr....Peabody Mine No. 8, 524 S. Cherokee, Taylorville, Ill.
- RUHL, R. J.....Mines Equipment Co., 1909 S. Kingshighway Blvd., St. Louis, Mo.
- RUSHING, JOHN, Supt.....Mine Rescue Station, Herrin, Ill.
- RUSSELL, FRANK.....Russell & Son, 100 W. St. Louis St., West Frankfort, Ill.
- RUSSELL, W. H.....Flack Pennell Co., Saginaw, Mich.
- RUTLEDGE, J. J., Chief Mng. Engr.....State Office Building, Annapolis, Md.
- *RYAN, JOHN T., JR., Gen. Mgr.....
Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Penn.
- SACKBAUER, L. A., Coal Traf. Mgr....Missouri Pacific Railroad Co., St. Louis, Mo.
- SALSICH, NEIL E.....Jeffrey Mfg. Co., Columbus, Ohio
- SANFORD, J. H., Mgr.....Mining Division, Ohio Brass Co., Mansfield, Ohio
- SAURS, FRED C.....State Mine Inspector, 714 Barker Ave., Peoria, Ill.
- SAYLOR, H. N., Pres...Saylor Tie & Timber Co., 2331 S. Broadway, St. Louis, Mo.
- SCANLAN, DRISCOLL O.....State Mine Inspector, P. O. Box 85, Nashville, Ill.
- SCHIBER, R. R.....State Mine Inspector, Glen Carbon, Ill.
- SCHLAPP, C. H., JR.....Perry Coal Co., O'Fallon, Ill.
- SCHLEGEL, WM. P., Gen. Mgr. West Div.....
Truax-Traer Coal Co., Room 950, 314 N. Broadway, St. Louis, Mo.
- SCHLEPER, G. J.....Union Colliery Co., Dowell, Ill.
- SCHLITT, THEODORE J.....
Schlitt Hardware Co., 422 E. Adams St., Springfield, Ill.
- SCHMIDT, E. A., Sales Engr.....
I-T-E Circuit Breaker Co., 1410 Shell Bldg., St. Louis, Mo.
- SCHNEIDER, HARRY B.....Union Colliery Co., 315 N. 12th Blvd., St. Louis, Mo.
- SCHOEN, W. H. JR., Pres.....
Pittsburgh Knife & Forge Co., 718 Park Bldg., Pittsburgh, Pa.

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- *SCHONTHAL, B. E., Pres.....
B. E. Schonthal & Co., 28 E. Jackson Blvd., Chicago, Ill.
- *SCHONTHAL, D. C.....West Virginia Rail Co., Huntington, W. Va.
- SCHONTHAL, JOSEPH, Sec.....
Schonthal Corporation, 28 E. Jackson Blvd., Chicago, Ill.
- SCHOPF, JAMES M., Asst. Geol.....Illinois State Geological Survey, Urbana, Ill.
- SCHRECENGOST, H. A., Coal Mine Inspector.....
U. S. Bureau of Mines, 2530 Lowell Ave., Springfield, Ill.
- SCHULER, HARRY A., Engr.....
Robins Conveying Belt Co., 37 W. Van Buren St., Chicago, Ill.
- SCHULL, B. H., Gen. Mgr.....Binkley Mining Co., Terre Haute, Ind.
- SCHWALB, F. E., Dist. Mgr.....Webster Mfg. Co., 343 S. Dearborn St., Chicago, Ill.
- SCHWARTZ, H. L.....W. M. Hales Co., Hillsboro, Ill.
- SCHWEICKHARDT, W. K.....
Walsh Refractories Corp., 411 Delshire Place, Kirkwood, Mo.
- SEEKAMP, HERMAN L.....Superior Coal Co., Gillespie, Ill.
- SEHNERT, JOHN A.....
Jones & Laughlin Steel Corp., 916 Shell Bldg., St. Louis, Mo.
- SENGER, JOHN, JR.....Barr Coal Co., Athens, Ill.
- SERVATIUS, H., Sales Dept.....
Robert Holmes Bros., Inc., 512-520 Junction Ave., Danville, Ill.
- SEYMOUR, F. H., Gen. Supt.....Freeman Coal Mining Co., Herrin, Ill.
- SHAFER, GLENN A., Pres.....Pana Coal Co., Pana, Ill.
- SHAMBLIN, JOHN L., Mine Mgr.....
Consolidated Coal Co., 408 Pennsylvania, Staunton, Ill.
- SHEPARD, M. M., P. A.....
Franklin County Coal Corp., 135 S. La Salle St., Chicago, Ill.
- SHERWOOD, L. H., Supt.....Little John Coal Co., Victoria, Ill.
- SHORTHOUSE, L. G., JR., Supt.....
Buckheart Mine No. 17, United Electric Coal Companies, Canton, Ill.
- SHULTZ, T. M.....Central Ill. Pub. Service Co., Beardstown, Ill.
- SIEVING, A. H., Sales Engr.....
Productive Equipment Corp., 2007 Olive St., St. Louis, Mo.
- SIMPSON, J. H.....Mines Equipment Co., 1909 S. Kingshighway, St. Louis, Mo.
- SLOAN, WM. JR., Serv. Dept.....
Mine Safety Appliance Co., 317 W. Raymond St., Harrisburg, Ill.
- SLOMER, J. J., Eng. Dept.....Goodman Mfg. Co., 4834 S. Halsted St., Chicago, Ill.
- SMILEY, E. B.....Illinois Gear & Machine Co., 2108 N. Natchez Ave., Chicago, Ill.
- SMITH, C. M.....Mechanization, Munsey Building, Washington, D. C.
- SMITH, FRANCIS J., Inspector.....U. S. Bureau of Mines, Staunton, Ill.

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- SMITH, GEO. M., Mine Supt.....
Peabody Coal Co., 1800 Whittier Ave., Springfield, Ill.
- SMITH, L. D.....Onwentsia Road, Lake Forest, Ill.
- SMITH, R. B., Asst. Coal Traf. Mgr.....
Illinois Central R.R., 135 E. 11th Place, Chicago, Ill.
- SMITH, SIDNEY.....Mt. Olive & Staunton Coal Co., Staunton, Ill.
- SNARR, F. E.....Chicago, Wilmington & Franklin Coal Co., Benton, Ill.
- SNARR, GEORGE W.....Geo. W. Snarr & Co., 110 S. Ninth St., St. Louis, Mo.
- SOMERS, BYRON, Supt.....Truax-Traer Coal Co., Fiatt, Ill.
- SOMERS, HOWARD.....Truax-Traer Coal Co., Fiatt, Ill.
- SONDAG, RAY J.....Mineweld Co., 200 S. Theresa Ave., St. Louis, Mo.
- SOPER, ROY.....Goodman Mfg. Co., 322 Clark St., St. Louis, Mo.
- SOULE, M. M., Vice Pres.....Coal Sales Co., 307 N. Michigan Ave., Chicago, Ill.
- SOUTHARD, J. L., Supt.....Carter Processing Plant, Peabody Coal Co., Kincaid, Ill.
- SOUTHWARD, G. B., Mng. Engr.....
American Mining Congress, 439 Munsey Bldg., Washington, D. C.
- SPAHT, A. W.....% Old Ben Coal Co., West Frankfort, Ill.
- SPENCER, KENNETH A., V. P. & Gen. Mgr.....
The Pittsburg & Midway Coal Mng. Co., Dwight Bldg., Kansas City, Mo.
- SPERRENG, ROBERT.....Union Colliery Co., 315 N. 12th Blvd., St. Louis, Mo.
- STANK, FRANK, State Mine Inspector.....Box 202, Taylor Springs, Ill.
- STAREK, R. B.....% Old Ben Coal Corp., 230 S. Clark St., Chicago, Ill.
- STARKS, J. W., Div. Supt.....Peabody Coal Co., Taylorville, Ill.
- STELLING, H. C.....% Union Carbide Co., 30 E. 42nd St., New York, N. Y.
- ‡STEPHENS, ROBERT M.....906 S. Sixth St., Champaign, Ill.
- STEVENS, E. F.....% Union Colliery Co., Union Electric Bldg., St. Louis, Mo.
- STEVENS, ROSS.....Truax-Traer Coal Co., Liverpool, Ill.
- STEWART, PROF. J. W.....
Dept. Mining & Metallurgical Engrg., University of Illinois, Urbana, Ill.
- STINTON, WM. S., Asst. Sls. Mgr.....
Socony-Vacuum Oil Co., 4140 Lindell Blvd., St. Louis, Mo.
- ‡STOCKETT, THOMAS R.....Alta Club, Salt Lake City, Utah
- STOLTZ, C. E.....Goodman Mfg. Co., 4834 S. Halsted St., Chicago, Ill.
- *STOTLAR, PVT. J. C.....Mechanization, Inc., 307 N. Michigan Ave., Chicago, Ill.
- STRAWN, W. L., Sls. Mgr.....United Iron Works, 521 Ridge Bldg., Kansas City, Mo.
- SULLIVAN, G. DON, Asst. to Pres.....
Fairview Collieries Corp., 105 South Meridian St., Indianapolis, Indiana
- SUTHERLAND, HARRY T.....Standard Oil Co., Marion, Ill.

- SUTOR, DON M.....Mines Equipment Co., 1909 S. Kingshighway, St. Louis, Mo.
- SWEENEY, W. J.....Mt. Olive & Staunton Coal Co., Staunton, Ill.
- TAGGART, ROBERTState Mine Inspector, Farmington, Ill.
- *TAYLOR, H. H., Jr. % Franklin County Coal Co., 135 S. La Salle St., Chicago, Ill.
- TAYLOR, JOHN.....Dept. Mines & Minerals, 2055 N. State St., Eldorado, Ill.
- TEMPLETON, KENLY & CO.....1020 S. Central Ave., Chicago, Ill.
- TEMPLETON, ROBERT.....Templeton Coal Co., Terre Haute, Ind.
- *THOMAS, T. J., Pres.....Valier Coal Co., 547 W. Jackson Blvd., Chicago, Ill.
- THOMPSON, JOHN, Supt.....The Black Mountain Corporation, Kenvir, Ky.
- THOMPSON, R. A.....
Hercules Powder Co., B-20, Railway Exchange Bldg., St. Louis, Mo.
- TIMMERMAN, GEORGE.....Mt. Olive & Staunton Coal Co., Mt. Olive, Ill.
- ‡TIRRE, FRANK F.....7126 Northmoor Drive, University City, Mo.
- TODD, EMERSON H., Dist Sales Mgr.....
American Cable Division of American Chain & Cable Co., Inc., 400 W. Madison St.,
Chicago, Ill.
- TOVEY, STEVE, Asst. Mine Mgr.....Peabody Mine No. 24, Westville, Ill.
- TOWN, GLENN E.....Deer Creek Coal Co., Lincoln, Ill.
- TREADWELL, H. A., G. S.....Chicago, Wilmington & Franklin Coal Co., Benton, Ill.
- TROVILLION, L. A., Secy. to Div. Supt.....Peabody Coal Co., Taylorville, Ill.
- TRUAX, A. H., Pres.....Truax-Traer Coal Co., 8 S. Michigan Ave., Chicago, Ill.
- ULRICH, J. RAY.....Bethlehem Steel Co., Bethlehem, Pa.
- UPP, JACK.....Dayton Rubber Co., 2741 Washington Blvd., St. Louis, Mo.
- VALLIER, J. D.....General Electric Co., 112 N. Fourth St., St. Louis, Mo.
- VAN DOREN, HAROLD, Lubr. Engr.....Standard Oil Co. (Ind.), Evansville, Ind.
- VAN PELT, J. R., Asst. Director.....
Museum of Science & Industry, 57th St. & Lake Michigan, Chicago, Ill.
- VAN SCHAICK, CHARLES.....
State Mine Inspector, 207 W. Cleveland St., Spring Valley, Ill.
- VANSTON, J. M.....Electric Storage Battery Co., 1218 Olive St., St. Louis, Mo.
- VAUGHN, JOHN R.....Old Ben Coal Corp., 702 S. Jesse St., Christopher, Ill.
- VERHOEFF, J. R.....235 Wisner Ave., Park Ridge, Ill.
- VLASAK, JOSEPH, Supt.....
% St. Louis & O'Fallon Coal Co., 2001 Bowman Ave., East St. Louis, Ill.
- VOGEL, A. G.....C. B. & Q. Railroad, 547 W. Jackson Blvd., Chicago, Ill.
- VOGELPOHL, HARRY, Purchasing Agent.....Clarkson Mfg. Co., Nashville, Ill.
- VOIGHT, A. L.....United States Coal & Coke Co., 1021 Grant St., Danville, Ill.
- VOLTZ, GEO. P., Engr.....Peabody Coal Co., 2025 S. Sixth St., Springfield, Ill.

Value is apparent in the merchandise of our worthy Advertisers.

- VOLTZ, LESLIE S.....Peabody Coal Co., 231 S. La Salle St., Chicago, Ill.
- VON MEDING, WILLIAM.....Allen & Garcia Co., 332 S. Michigan Ave., Chicago, Ill.
- VON PERBANDT, L.....Allen & Garcia Co., 332 S. Michigan Ave., Chicago, Ill.
- VROMAN, J. B.....Mines Equipment Co., 723 S. Boyle, St. Louis, Mo.
- WADDELL, JACK N.....Henry H. Cross Co., 122 S. Michigan Ave., Chicago, Ill.
- WADDELL, T. C.....The Fafnir Bearing Co., 4645 Boulevard Place, Indianapolis, Ind.
- WALDRON, LEWIS.....% Peabody Coal Co., Springfield, Ill.
- WALKER, HAROLD L., Pfo., Head of the Dept.....
Dept. Mining & Metallurgical Engineering, 209 Transportation Bldg., Urbana, Ill.
- WALKER, ROY E.....Cardox Corp., 610 W. Washington Ave., Benton, Ill.
- WALLACE, E. J.....E. J. Wallace Coal Co., 1205 Olive St., St. Louis, Mo.
- WALLACE, JOHN K., Supt.....Wallace Coal Co., R.F.D. No. 1, Marion, Ill.
- ‡WALLS, MARION B.....603 S. Busey Ave., Urbana, Ill.
- WALSH, J. D., Service Engr.....Link-Belt Co., 317 N. 11th St., St. Louis, Mo.
- *WANNER, E. W., Vice Pres.....
Hulburt Oil & Grease Co., Erie & Trenton Aves., Philadelphia, Pa.
- *WARE, LOUIS, Pres.....
International Agricultural Corp., 20 N. Wacker Dr., Chicago, Ill.
- WARREN, JOHN A.....Lincoln Engineering Co., 2415 S. Michigan Ave., Chicago, Ill.
- WARREN, P. L.....Royal Electric Mfg. Co., 619 E. 40th St., Chicago, Ill.
- WASSON, L. A., Asst. Gen. Mgr.....Wasson Coal Co., Harrisburg, Ill.
- WATERMAN, C. W.....
McNally-Pittsburg Mfg. Corp., 307 N. Michigan Ave., Chicago, Ill.
- WATTLEY, P. A.....Union Wire Rope Corp., 111 N. Canal St., Chicago, Ill.
- WEART, EVERETT T.....
John A. Roebling's Sons Co., 600 W. Jackson Blvd., Chicago, Ill.
- WEBSTER, R. W., P. A.....Sahara Coal Co., 59 E. Van Buren St., Chicago, Ill.
- WEIMER, W. H.....Crescent Mining Co., Peoria, Ill.
- *WEIR, PAUL.....307 N. Michigan Ave., Chicago, Ill.
- WEIR, ROBERT, Asst. Director.....
Dept. Mines & Minerals, Room 219, State House, Springfield, Ill.
- ‡WEISSENBORN, F. E., Asst. Comm.....
Illinois Coal Operators Assn., 4266 Arsenal St., St. Louis, Mo.
- WENDELL, E. A.....Link-Belt Co., 317 N. 11th St., St. Louis, Mo.
- WENTE, I. H., Gen. Frt. Agt.....
Gulf, Mobile & Ohio Railroad, 808 Chemical Bldg., St. Louis, Mo.
- WENTWORTH, B. K., Asst. to Supt.....
Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill.

Buyer meets Seller in the back of this book.

WEST, ALBERT R.....	Bertrand P. Tracy Co., Du Quoin, Ill.
WEST, JETT J., Trav. Auditor.....	Peabody Coal Co., Box 224, Marion, Ill.
WESTERLAND, H. G.....	C. W. F. Coal Co., West Frankfort, Ill.
WEYSSER, JOHN L. G.....	
	(Mining Branch, W.P.B.), Apt. 102, 2032 37th St., S.E., Washington, D. C.
WHENNEN, W. K.....	Hardsocg Mfg. Co., 3650 S. Park Ave., Springfield, Ill.
WHITAKER, D. C.....	Goodyear Tire & Rubber Co., 305 E. Second St., Metropolis, Ill.
WHITE, FRANK L., Div. Supt.....	Peabody Coal Co., Taylorville, Ill.
WHITE, JAMES, Gen. Supt.....	Franklin County Coal Corp., Herrin, Ill.
WHITNEY, J. P.....	Peabody Coal Co., Taylorville, Ill.
WHYERS, EDWARD E.....	Wyoming Tie & Timber Co., Metropolis, Ill.
WIEDERANDERS, E. O.....	Jeffrey Mfg Co., 3015 Locust St., St. Louis, Mo.
WILCOX, D. D., G. S.....	Superior Coal Co., Gillespie, Ill.
WILCOX, RICHARD.....	Superior Coal Co., Gillespie, Ill.
WILEY, C. F.....	American Steel & Wire Co., 208 S. La Salle St., Chicago, Ill.
WILKEY, FRED S., Secy.....	
	Illinois Coal Operators Assn., 307 N. Michigan Ave., Chicago, Ill.
WILKISON, T. A.....	Hulburt Oil & Grease Co., Harrisburg, Ill.
WILLIAMS, CLIFFORD T., Sales Mgr.....	
	The American Crucible Products Co., Lorain, Ohio
WILLIAMS, T. H. J.....	Universal Lubricating Co., Schofield Bldg., Cleveland, Ohio
WILLIAMS, W. J.....	Mine Rescue Supt., Dept. Mines & Minerals, Springfield, Ill.
WILLS, GERALD.....	Peabody Coal Co., 532 N. Cottage, Taylorville, Ill.
WILSON, C. W.....	Cardox Corp., 709 E. Main St., Benton, Ill.
WILSON, GEORGE.....	Central State Collieries, Inc., St. David, Ill.
WILSON, JAMES R.....	
	State Mine Inspector, 606 W. Poplar St., West Frankfort, Ill.
WINN, ISAIAH.....	Valier Coal Co., Valier, Ill.
WINNING, W. T.....	Bituminous Casualty Corp., 704 N. Eighth St., Herrin, Ill.
WITTEN, W. E.....	Wasson Coal Co., Harrisburg, Ill.
WOLFE, F. J.....	Coal Mine Equipt. Sales Co., Beasley Bldg., Terre Haute, Ind.
WOMMACK, AL. J.....	R. J. Bearings Corp., 3152 Locust, St. Louis, Mo.
WOOD, RICHARD F.....	Belleville Fuels, Inc., 407 N. Eighth St., St. Louis, Mo.
WOODS, HENRY C., V. P.....	Sahara Coal Co., 59 E. Van Buren St., Chicago, Ill.
WOOSLEY, CLYDE W., Gen. Supt.....	Pyramid Coal Corp., Pinckneyville, Ill.
WOOSLEY, KENNETH, Supt.....	Illinois-Pocahontas Coal Co., Pocahontas, Ill.

WRIGHT, D. D.....	% Central Ill. Public Service Co., Marion, Ill.
WRIGHT, EDWARD S.....	Mine Rescue Station, 330 W. Main St., Belleville, Ill.
WRIGHT, H. D., Pres.....	Republic Coal & Coke Co., 8 S. Michigan Ave., Chicago, Ill.
WRIGHT, JOHN, Supt. Inspection & Del'y.....	Ayer & Lord Tie Co., Carbondale, Ill.
YERKES, J. H.....	Jos. H. Yerkes & Co., 308 N. Sixth St., St. Louis, Mo.
YOUNG, ALEX.....	Superior Coal Co., Gillespie, Ill.
YOUNG, A. M.....	Central Ill. Public Service Co., Springfield, Ill.
YOUNG, L. E.....	Box 146, Pittsburgh, Pa.
YOUNG, W. P., Pres.....	Bell & Zoller Coal & Mining Co., 307 N. Michigan Ave., Chicago, Ill.
*ZELLER, HARRY, V. P.....	West Virginia Rail Co., Huntington, W. Va.
ZIMMER, WALTER.....	Bixby-Zimmer Engineering Co., 961 Abingdon St., Galesburg, Ill.
ZIMMERMAN, M. O., Auditor.....	Peabody Coal Co., Springfield, Ill.
ZINKGRAF, J. W., Dist. Mgr.....	Chicago Pneumatic Tool Co., 1931 Washington Ave., St. Louis, Mo.

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†Honorary Members.

‡Scholarship Members.

*Serving in the armed forces of the United States Government. Carried as members in good standing without payment of dues for the duration.



A WORD TO THE MEMBERS FROM THE SECRETARY

This is the fourteenth issue of our Yearbook. There is, of course, a tremendous amount of work connected with getting together and issuing these Proceedings.

Probably few of the members have ever stopped to consider what makes this book possible. We are greatly indebted to the suppliers for advertisements in order to defray the expenses of the Yearbook.

Many of our advertisers have contributed regularly to each issue since our Yearbook was first published, and they have expressed satisfaction in the results obtained from such space carried in the book.

We are eager to have this feeling continue to prevail with our supporters—the advertisers. You, as a purchaser, can greatly assist if you will give the advertisers the support and cooperation to which they are entitled, by patronizing these companies and using their products.

Refer to the Advertising Section and Index in the back of the book. It will prove helpful to you.

The success of our publication depends greatly on this sort of cooperation. The Advertising Committee has done a fine job in its untiring efforts. The consistent cooperation of the members of the Advertising Committee with the suppliers makes this publication possible.

Our Advertisers, who make this volume possible, will appreciate your inquiries.

In Loving Remembrance

WILLIAM ORTMAN, Feb. 22, 1931
S. W. FARNHAM, March 12, 1931
H. C. PERRY, April 13, 1931
A. J. SAYERS, Oct. 11, 1931
C. E. KARSTROM, March 24, 1932
JOSEPH D. ZOOK, May 28, 1932
EDWARD CAHILL, Aug. 4, 1932
JOSEPH VIANO, Dec. 12, 1932
JOHN ROLLO, Feb. 6, 1933
DAVID I. ROCK, Aug. 2, 1933
WM. HUTTON, Aug. 18, 1934
FRED K. CLARK, Oct. 24, 1934
ERWIN CHINN, April 16, 1935
ADAM CURRIE, June 12, 1935
W. H. SLINGLUFF, Sept. 10, 1935
CHAS. B. SPICER, Oct. 26, 1935
NELSON P. MORRIS, Sept. 3, 1936
DON WILLS, Dec. 9, 1936
T. E. COULEHAN, Jan. 11, 1937
ALBERT WEBB, March 5, 1937
H. B. COOLEY, March 23, 1937
C. W. SWANSON, July, 1937
JOSEPH McFADDEN, Sept. 15, 1937
E. G. LEWIS, Sept. 21, 1937
E. L. STEVENS, Sept. 28, 1937
W. C. ARGUST, Dec. 17, 1937
H. H. TAYLOR, SR., Dec. 28, 1937
E. L. BERGER, May 27, 1938
J. I. THOMPSON, June 24, 1938
P. W. MacMURDO, July 11, 1938
J. A. EDE, July 26, 1938
M. C. MITCHELL, Sept. 11, 1938
C. F. HAMILTON, Sept. 22, 1938

H. C. LONGSTAFF, Oct. 12, 1938
JOHN JOHNSON, Jan. 2, 1939
C. A. BLOMQUIST, Jan. 9, 1939
JOHN WHITE, April 15, 1939
CHARLES HAFFTER, May 21, 1939
BRUNO F. MEYER, July 21, 1939
JOHN A. GARCIA, Aug. 11, 1939
A. J. MOORSHEAD, Oct. 16, 1939
HARVEY E. SMITH, Nov. 6, 1939
C. W. McREAKEN, Nov. 30, 1939
C. C. HUBBART, March 4, 1940
SAMUEL HANTMAN, Sept. 13, 1940
SIMON A. BOEDEKER, Oct. 12, 1940
JOHN H. DAVIS, Oct. 21, 1940
S. J. WILLS, Oct. 22, 1940
HARRY HANTMAN, Nov. 5, 1940
J. W. GLENWRIGHT, Nov. 27, 1940
J. C. WILSON, Dec. 18, 1940
NICHOLAS CHRISTENSEN, Dec. 26, 1940
JOHN W. POLING, Jan. 31, 1941
JOHN T. RYAN, Feb. 20, 1941
M. F. PELTIER, April 2, 1941
F. M. BEAN, April 30, 1941
F. M. SCHULL, Aug. 20, 1941
C. J. SANDOE, Aug. 29, 1941
F. F. SCHLINK, March 15, 1942
HUGH MURRAY, June 5, 1942
G. D. COWIN, June 14, 1942
JAMES M. ROLLO, June 15, 1942
SYDNEY A. HALE, Aug. 12, 1942
BYRON BROWN, Sept. 17, 1942
J. E. SEYMOUR, Nov. 21, 1942
A. F. ALLARD, Dec. 29, 1942

Friends, Meet Your Friends

This is the fourteenth consecutive yearbook we have published.

Many of our friends — the advertisers — have carried copy with us in each issue. They have expressed satisfaction with the results obtained through their support.

We urge our membership to consult the Advertising Section in this and other issues of our Proceedings when in need of equipment.

Much of the success of our Institute is due to the support we have had from our friends. We want to continue meriting it.



The following companies who are advertising in this issue carried copy in our first yearbook published in 1893:

Duncan Foundry & Machine Works, Inc.
The Jeffrey Manufacturing Co.
A. Leschen & Sons Rope Co.
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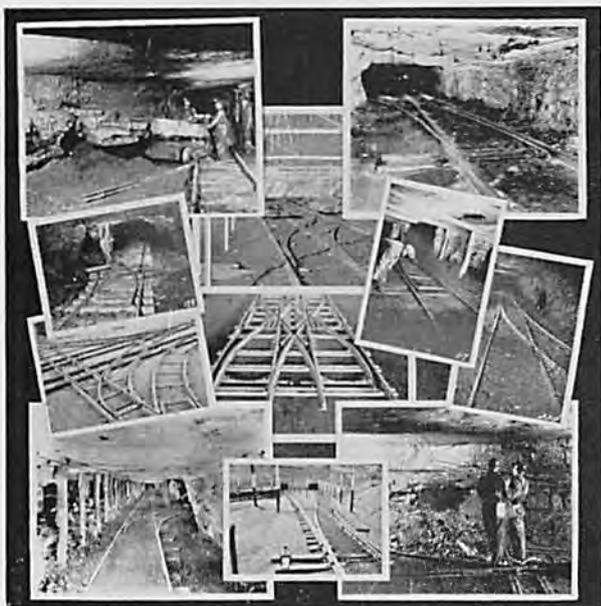


Hulburt Oil & Grease Company

Philadelphia, Pa.

Specialists in Coal Mine Lubrication

*Where ever you go
You find "West Va." Trackwork*



**Rails
Frogs & Switches
Steel Ties
Reinforcing Bars
Special Shapes**

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Manufacturers
Since 1907

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Illustrations shows typical installations of West Virginia Track. Included are installations located at Birmingham, Ala.; Eccles, W. Va.; Omar, W. Va.; Williamson, W. Va.; Princeton, Ind.; Harlan, Ky.; Chicago, Ill.; New York, N. Y.; Wheeling, W. Va.; Adena, O., and Herrin, Ill.

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TO SOLVE TODAY'S PROBLEMS...



... AND TO HELP SOLVE
PRODUCTION PROBLEMS
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THE MAGAZINE OF MODERN COAL

MECHANIZATION, INC.
406 MUNSEY BUILDING
WASHINGTON, D. C.



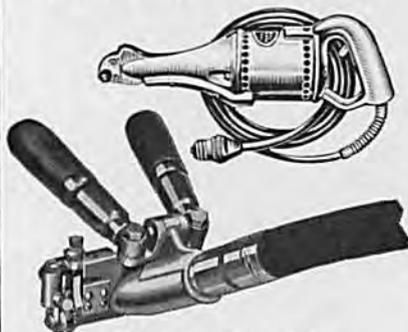
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BAKELITE FUSE PULLERS

For Mines, Pump-Houses and other damp locations. Will not warp, swell or bind

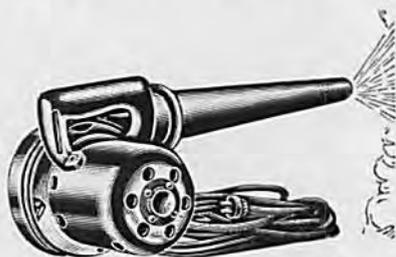


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Four Types—Most Powerful in their class

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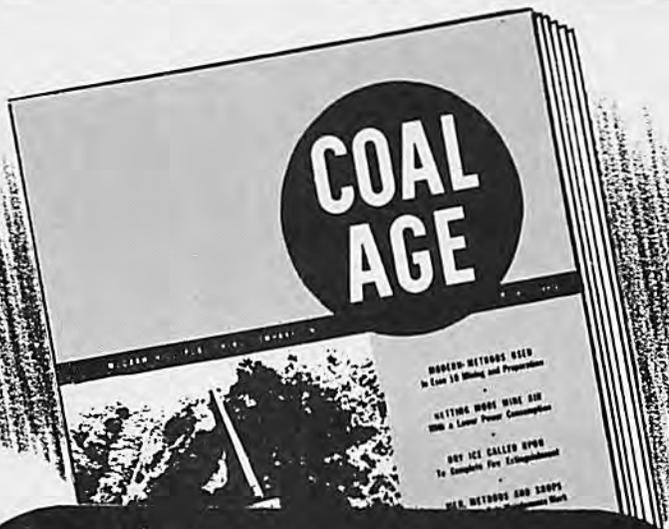


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“Double-Action”

Since action speaks louder than words, the most convincing way to demonstrate both our patriotic desire to further the war effort and efficiently to serve the Coal Mining industry is to continue our full-time production schedules and pursue with increased diligence our research activities in respect of effecting new economies for those we are privileged to serve. These activities also express in terms of action our genuine appreciation of the support and cooperation extended us by Members of the Institute.



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6,000,000 TONS Carried by this Conveyor

OVER 6,000,000 tons of run-of-mine coal have been handled by this S-A Belt Conveyor over its 1,400-foot run at Blue Diamond Coal Company's Mayflower Mine at Bonny Blue, Virginia.

It has moved this huge tonnage with a minimum of maintenance attention, according to S. M. Williams, Superintendent . . . and has many more tons to go.

Service records like these on S-A Conveyors all over the world are your best assurance of *low cost per ton* handling when you buy S-A equipment.

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A REAL "COAL DIGGER!"
for low and high coal

Patented

LOWEST LOADING MACHINE ON WHEELS!

Manufactured by CLARKSON MANUFACTURING COMPANY, Nashville, Illinois

ROPE LIFE LARGELY DEPENDS ON THE OPERATOR

...Yes, even **TRU-LAY** *Preformed*



While American Cable **TRU-LAY** **PREFORMED** invariably lasts longer than ordinary non-preformed wire rope, it still is a precision machine made of steel (critical material) and subject to wear. Careful operators can make a wire rope last much longer, while inexperienced ones can quickly ruin it. Make sure your inexperienced operators know how to take care of wire ropes properly. Here are a few fundamental suggestions:

- ★ Inspect, clean and lubricate all wire rope regularly. Tighten fittings. Be sure hemp core is not dry, or corrosion or collapse may occur.
- ★ Be sure the rope is the proper one for the service. It should have proper strength, flexibility, resistance to abrasion, fatigue, crushing and heat. Consult your American Cable representative.
- ★ If drums or sheaves are small, or there is a tendency to whip or kink, specify **TRU-LAY** **PREFORMED**, the fatigue-resisting flexible rope.
- ★ Be careful of the fleet angle. If the rope deviates from the center plane of the sheave more than $1\frac{1}{2}$ degrees, undue wear will result.
- ★ Don't allow bad spooling on drums. Spaces between wraps, or crossed wraps, cause crushing and binding. **TRU-LAY** **PREFORMED** spools better than most ropes.

Conserve steel by making your present equipment last longer. Proper inspection, lubrication and maintenance will make long-life **TRU-LAY** **PREFORMED** last longer.

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MECHANICAL RUBBER GOODS**

Serving the
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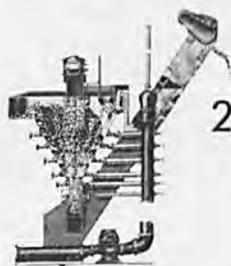
THE MANHATTAN RUBBER MFG. DIVISION
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Executive Offices and Factories: PASSAIC, N. J.

**McNALLY
PITTSBURG
OFFERS YOU
3 types
of washers**



1
McNally-Norton Patented Washer—Accurately separates refuse from coal, providing uniform output regardless of variations in raw coal input. Available in standard, compound, nut, and unit washers of various capacities to 350 tph.



2
Menzies Cone Separator—Raw coal is fed into a cone. Water currents from a series of nozzles keep the coal in suspension. Refuse sinks to bottom and pure coal is floated over a baffle.



3
McNally-Rheo Launder—The Coarse Coal Launder illustrated cleans coal up to six inches. Fine Coal Launder furnished for cleaning sizes below one-half inch. Efficiency unsurpassed.

Every operating official in coal mining should have this 48-page book containing important operating data not found in a catalog.

Actual installations with production figures are shown. Phantom illustrations of the important units of equipment demonstrate the principle of operation. A request on your letterhead will bring it at once.

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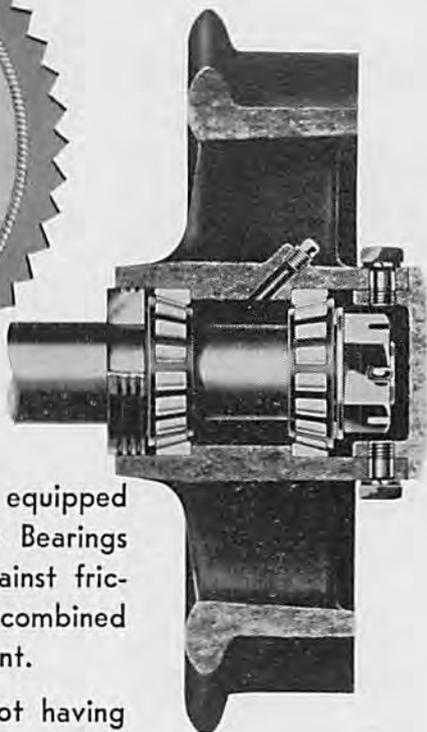
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Typical application of Timken Bearings in mine car wheels.

Step up the capacity of your mining equipment for speed, load and endurance; give it greater effectiveness for Victory. Use Timken Bearings throughout.



Equipment that is only partly equipped with Timken Tapered Roller Bearings is only partly protected against friction; wear; radial, thrust and combined loads; shock and misalignment.

That is a lot better than not having *any* Timken Bearings, of course, but it still is short of reaching victory performance standards. You won't realize the full possibilities of Timken Bearings until you install them at every suitable position—then you'll wish you had done it sooner.

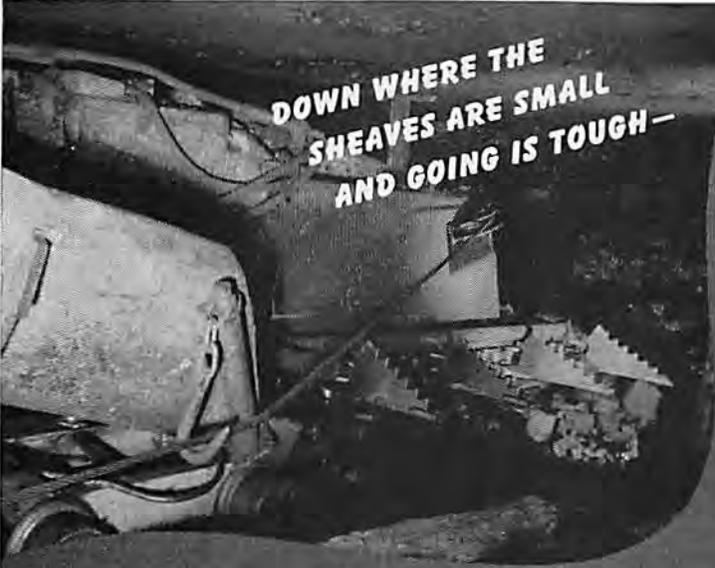
Equipment designers who make full use of Timken Bearings give their companies a two-fold advantage—*better* machines and *better selling* machines; for no name in bearings makes such a strong appeal to buyers as "TIMKEN". The Timken Roller Bearing Company, Canton, Ohio.

"All There Is In Bearings"

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



DOWN WHERE THE
SHEAVES ARE SMALL
AND GOING IS TOUGH—

HAZARD LAY-SET *Preformed* IS PREFERRED

● More and more mine operators are standardizing on Hazard LAY-SET Preformed for undercutting machines, loaders, and other underground work. There are several reasons why they prefer LAY-SET. First: it is a safer rope for the miners to handle. Broken crown wires don't wicker out to tear hands or legs and possibly cause blood-poisoning. Second: LAY-SET gives much longer service (greater dollar value) because, being preformed, it possesses so much resistance to fatigue that it can take the punishment of small sheaves in its stride. Then, of course, LAY-SET Preformed is easier to handle; spools better; resists kinking. Small wonder mechanized mines are rapidly turning to Hazard LAY-SET Preformed. Write for full details.

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From the rugged, one-piece molded crown right through to the hammock toggles and band snaps, the HARD BOILED Cap puts every one of its 13 ounces into head protection. You'll have to wear one yourself to appreciate the sheer comfort of the full-floating crown and self-shaping headband. Stock only three

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Pocket-size guide gives injury diagnosis and treatment. Write for it. Also new First Aid Catalog, listing many kits and supplies available.

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Type KSC Automatic
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Breaker protecting
one active mining
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AUTOMATIC RECLOSING CIRCUIT BREAKERS PRODUCE DEFINITE ECONOMIES

Raise production; reduce fire hazard; lower maintenance charges; decrease total energy consumption and power demand. These advantages with Automatic Reclosing Circuit Breakers are fully described in I-T-E Bulletins based on actual installations in mines.

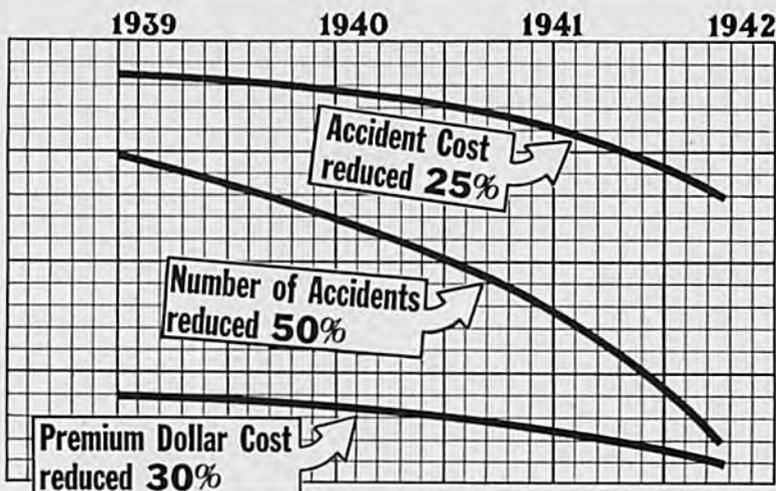
BULLETINS TELL THE STORY ➔

*These bulletins deal with a variety of mining conditions
Copies will be gladly furnished on request.*



I-T-E CIRCUIT BREAKER COMPANY • PHILADELPHIA

REPRESENTATIVES IN PRINCIPAL MINING AREAS



Typical experience of Illinois holders of Bituminous Casualty Corporation policy

— and down came the cost of Workmen's Compensation

This mine owner is now enjoying the benefits, in dollars and cents, of Bituminous Casualty service. We began writing his Workmen's Compensation in 1939. Our safety engineers inspected the mine, made recommendations in the interests of production as well as safety. He cooperated.

Periodically our men visited the mine, keeping a watchful eye on all operations and making continuous and practical applications of coal mine safety measures. Our modern Industrial Laboratory likewise contributed to the gradual reduction of loss ratio, accidents and rate. Today the owner enjoys protection and service unequalled in the industry, plus definite economies in production — all at a LOWER rate.

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18 YEARS on the job!

A leading anthracite operator has just replaced several hundred Model A Wheat Cap Lamps (originally installed in 1923) with our latest Model GW. 18 years on the job is an enviable service record for a miners' cap lamp. We would like to send you one of these original Wheat outfits so you can see for yourself that they still represent a dependable source of light. It will pay you to investigate the many improvements we have engineered into our latest models.



Latest Model GW

WHEAT

The Engineered Cap Lamp

Here are the 1942 features — judge for yourself!

- 1 Two bulbs (one for emergencies) — miner is never in the dark.
- 2 Center mounted, Krypton-filled bulb, gives 20% more light — no dark "shadow spot" in beam.
- 3 Choice of 3 reflectors gives narrow concentrated beam, a medium beam, or a widespread beam of light — suits all working conditions.
- 4 Headpiece weighs less than 6 ounces, Lamp Cord 6 ounces, Battery 62 ounces — Total weight of Lamp complete 74 ounces.
- 5 Headpiece molded of strong bakelite; sealed, moisture-proof and dust-proof.
- 6 Rubber battery case — non-conductor of electricity — a valuable safety feature.
- 7 Battery solution (free) limited to one ounce total both cells.
- 8 Lead-acid type battery maintains high voltage throughout shift (80+% efficiency) — year after year.
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- 10 Designed for self-service charging system for lowest lamp-house operating cost.
- 11 To charge, headpiece is simply slipped on to key in charging rack, and turned to make contact. Nothing to take apart — unit-sealed construction.
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SPECIALISTS IN MINE
LIGHTING FOR 25 YEARS
KOEHLER MFG. CO.

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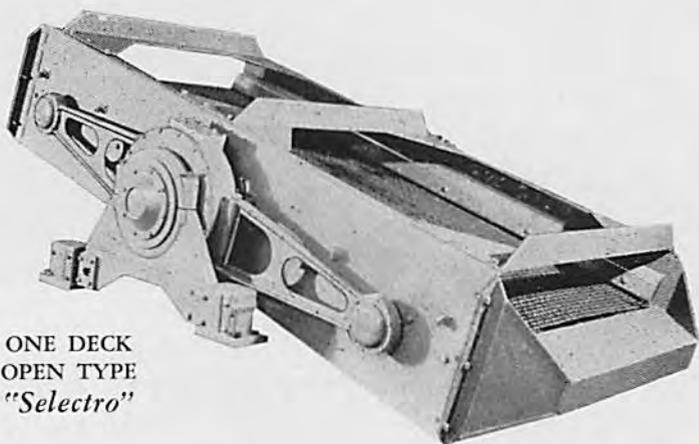
KOEHLER SAFETY LAMP



HUGGER • DEPENDABLE
SENSITIVE

Selectro

VIBRATING SCREENS



ONE DECK
OPEN TYPE
"Selectro"

Repeat Orders **TELL THE STORY**

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The "Selectro" must be good - - - why not investigate.

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**SOLDIERS OF
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WITH
MORE EFFECTIVE
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*Our 78 Years of Car Building Experience
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POST MOUNTED
ELECTRIC COAL DRILLS
MINERS TOOLS & SUPPLIES

Vertical and Horizontal gasoline and electric driven boring machines. Differentials for loading machines.

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In Strip Mines, Too!

Simplex Jacks Keep 'em Rolling!



Keep trucks, tractors and shovels on the go with plenty of Simplex Jacks on hand to speed repairs, replacements or to free mired equipment.

The Hanna Coal Co., St. Clairsville, Ohio—like so many Illinois mines—uses them in pit, shop and at the tippie to insure a steady flow of coal out of the mine. One of their No. 85-A's (17" high, lifts full 5-tons on cap or toe lift) facilitates repairs to dump mechanism of pit truck.

Whether it's open face or shaft mining, there's a Simplex Jack to do every lifting, lowering, pulling, supporting and tensioning job faster and *safer*, enabling fewer men to get out more work!

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Better, Safer Mine Jacks Since 1899



Send for Bulletin
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In the Bell & Zoller Coal & Mining Co. mines at Zeigler, Illinois, roof support posts and cap pieces made of yellow pine and oak timber, pressure-treated with zinc chloride, are used in main headings and air courses. Main haulage ties are 5x7—6-foot Oak, treated with $\frac{1}{2}\#$ Zinc Chloride per cubic foot.

You can save money and have

safer and more dependable installations by using preservatively treated mine ties, timbers and props.

An experienced organization produces the timber supply for our Carbondale Illinois plant which is equipped for standard pressure treatments with salts or creosote preservatives and can serve all mines in Illinois.

Inquiries solicited.

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Mine car haulage costs can be definitely reduced by the use of Miner Draft and Buffer Gears. These devices should be specified for your cars because they provide necessary protection against the shocks of mine train operation. These shocks must be properly absorbed in order to prevent high maintenance expense and premature breaking down of car structure. Miner Gears are made in both center and double bumper arrangements.

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KRO-MA-LAC

For Insulation of All Types of Electrical Windings

II. We Satisfy

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*Break the
Bottleneck/
at the Scale!*

SAVE

- **MAN-POWER**
- **TIME** and
- **DOLLARS**



The only thing that goes through a bottleneck with speed is your dough. At 112 Illinois mines the scale bottleneck was eliminated by a Streeter-Amets Recorder. In the tippie, at the bottom of the shaft, on track and motor truck scales Streeter-Amets speed weighing and cut costs . . . weigh in motion and eliminate spot weighing . . . print the weight and stop weight errors.

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There is a model for every mine-weighing job. They can be attached to present scales or installed complete with scale levers. Our field engineers make quick work of installations. Tell us what kind of a scale you use — we will tell you how Streeter-Amets Automatic Weighers can save for you. Available on a time or complete job basis.

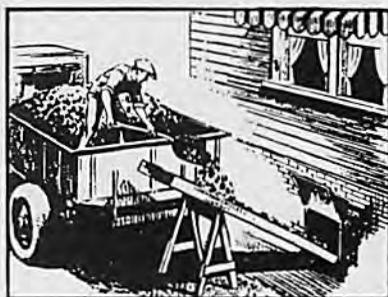
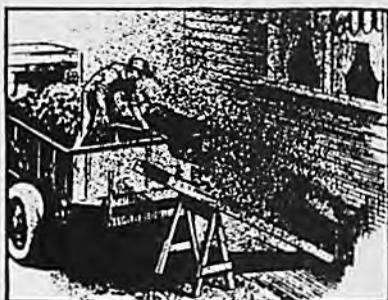
Originators of Automatic Weight Recorders — First in 1888



STREETER-AMET COMPANY

4103 Ravenswood

Chicago



Coaladd — The film that seals dust

The "Does and Does Nots"
of this Widely Used Killer of Coal Dust

Coaladd does

permanently lay the dust, staying with the coal from point of application to the furnace. If in handling the lumps break, COALADD transfers itself by contact to the fresh surfaces to lay the new dust.

Coaladd does not

corrode metal or rubber. COALADD-treated coal can be used without fear of corrosion in mechanical stokers.

Tell your customers that COALADD-treated coal is entirely safe to use in their furnaces . . . that it will not corrode

stoker parts. Advise them to use it in order to have cleaner cellars. COALADD-treated coal is obtainable in most territories.



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You can save money and have

safer and more dependable installations by using preservatively treated mine ties, timbers and props.

An experienced organization produces the timber supply for our Carbondale Illinois plant which is equipped for standard pressure treatments with salts or creosote preservatives and can serve all mines in Illinois.

Inquiries solicited.

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*Break the
Bottleneck/
at the Scale!*

SAVE

- MAN-POWER**
- TIME and**
- DOLLARS**



The only thing that goes through a bottleneck with speed is your dough. At 112 Illinois mines the scale bottleneck was eliminated by a Streeter-Amet Recorder. In the tipple, at the bottom of the shaft, on track and motor truck scales Streeter-Amets speed weighing and cut costs . . . weigh in motion and eliminate spot weighing . . . print the weight and stop weight errors

Speed and Accuracy are only two advantages Streeter-Amets offer. Here are just a few reasons why Illinois operators chose Streeter-Amet Recorders. Much needed man-power was saved at a strip mine. Automatically weighed hopper loads eliminated a weighmaster in a tipple. Without extra help, a strip operator could weigh his coal within an hour after washing. To eliminate weight arguments a loading crew and management elected a Streeter-Amet to print weights. A 24-hour earlier delivery schedule was met by an operator who weighed only 10 cars a day and weights checked.

There is a model for every mine-weighing job. They can be attached to present scales or installed complete with scale levers. Our field engineers make quick work of installations. Tell us what kind of a scale you use—we will tell you how Streeter-Amet Automatic Weighers can save for you. Available on a time or complete job basis.

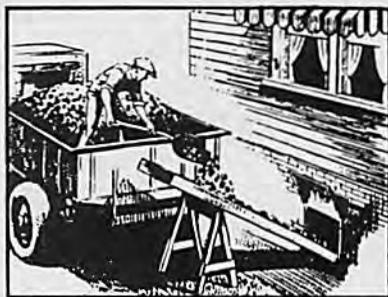
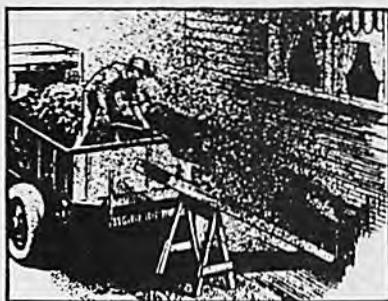
Originators of Automatic Weight Recorders—First in 1888



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Coaladd — The film that seals dust

The "Does and Does Nots"
of this Widely Used Killer of Coal Dust

Coaladd does

permanently lay the dust, staying with the coal from point of application to the furnace. If in handling the lumps break, COALADD transfers itself by contact to the fresh surfaces to lay the new dust.

Coaladd does not

corrode metal or rubber. COALADD-treated coal can be used without fear of corrosion in mechanical stokers.

Tell your customers that COALADD-treated coal is entirely safe to use in their furnaces . . . that it will not corrode

stoker parts. Advise them to use it in order to have cleaner cellars. COALADD-treated coal is obtainable in most territories.



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11-J.M.31

90%

of the dust can be eliminated at the working face at a justifiable cost and with no resultant injurious effect on fine screening, air cleaning or other methods of preparation."*



**. . . so says the Chief
Engineer of an important coal company.
The dust-allaying agent used throughout
its mines is COMPOUND M**

Dust effectively wetted is safe dust and Compound M is the product so conclusively proved for laying coal dust that its use is recommended by government inspectors. In the mine referred to above, practically all cutting and loading operations for the 30,000 ton daily production

schedule are dust-protected by Compound M.

If this important company feels that Compound M is the best way to kill mine dust, it must have superior merit. Why not make a comprehensive test in your mine? We'll be glad to give you full engineering data.



Compound M is a Johnson-March product; one of several special film-forming chemicals for industrial use.

DISTRICT SALES AGENTS
28 EAST JACKSON BLVD.
CHICAGO, ILL.



*Send for bulletin describing application of Compound M at this important mine.



THE JOHNSON-MARCH CORPORATION
52 VANDERBILT AVENUE

NEW YORK, N. Y.

11-JM-11

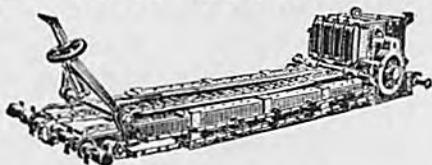
A PRACTICAL MACHINE

Jeffrey 35-B

50 years ago and TODAY . . . reproduced on this two-page color advertisement showing a modern Jeffrey coal cutter is a small advertisement which we ran fifty years ago in the 1892 proceedings. Note the progress made in coal cutter design through fifty years of mining activity.

JEFFREY COAL MINING MACHINES.

There are
in daily use
100
JEFFREY
Electric
Mining
Machines

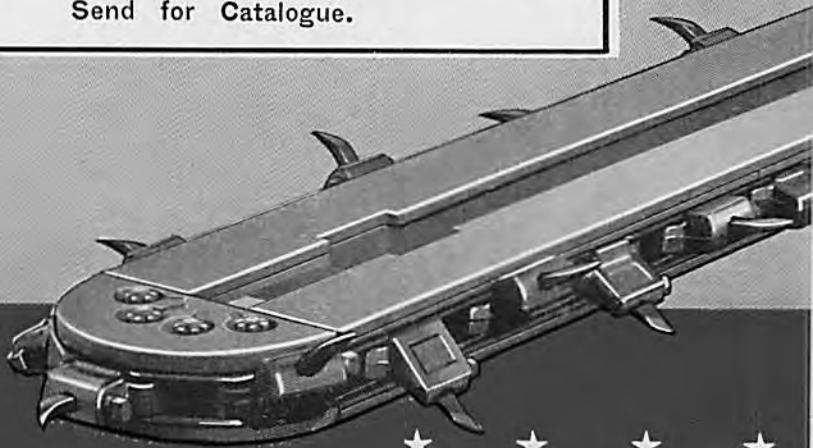


Also
Several
Hundred
JEFFREY
Air
Machines.

ALSO MAKE A SPECIALTY OF
GENERAL MINE EQUIPMENT, ELEVATORS, CONVEYORS FOR HANDLING COAL.

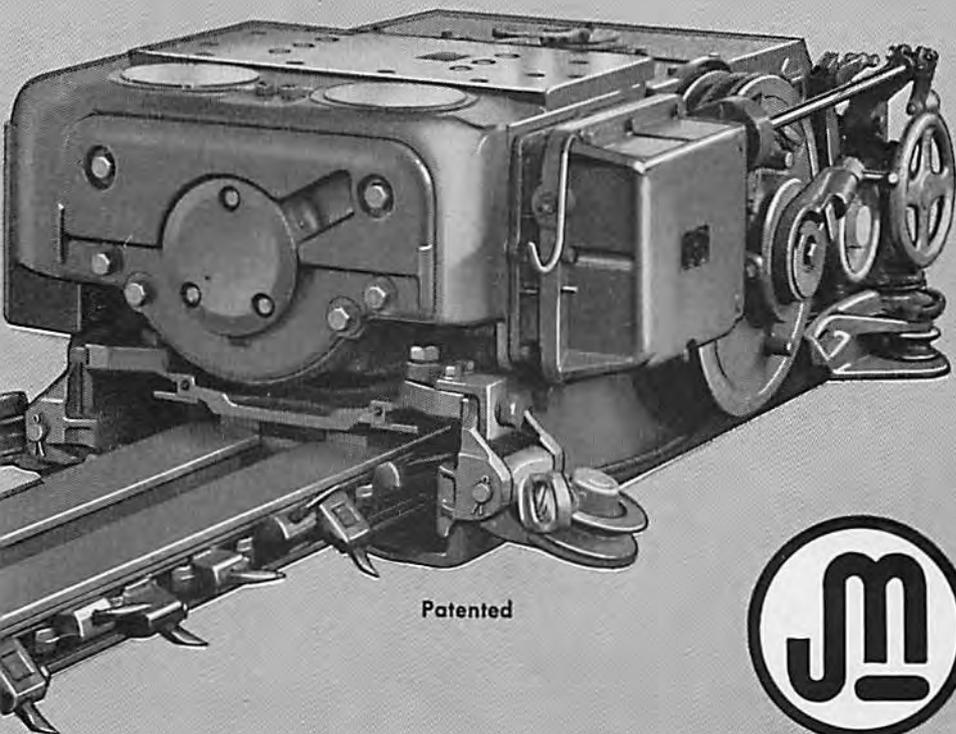
THE JEFFREY MF'G COMPANY, Columbus, O.

Send for Catalogue.



FOR THE JOB REQUIRED

Shortwall Coal Cutter



Patented



THE JEFFREY MANUFACTURING COMPANY

872-99 North Fourth Street, Columbus, Ohio

Sales Offices:

Baltimore
Birmingham
Boston
Buffalo

Chicago
Cleveland
Cincinnati
Detroit

Denver
Harlan
Houston
Huntington

Milwaukee
New York
Philadelphia
Pittsburgh

Scranton
Salt Lake City
St. Louis

Service Stations:

Pittsburgh
Harlan, Ky.

Birmingham
St. Louis

Logan-Beckley,
W. Va.

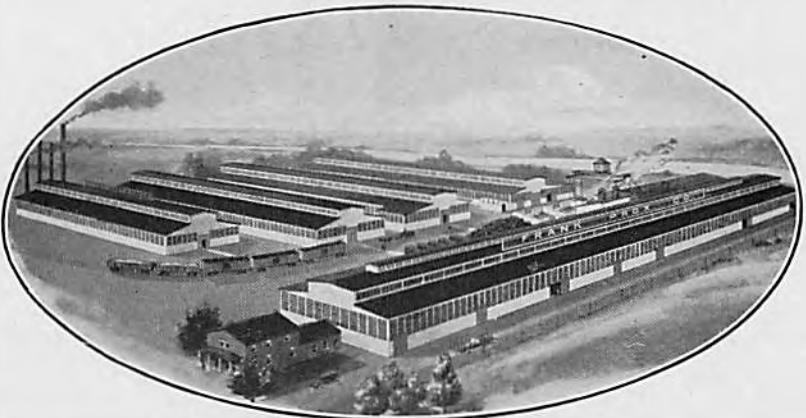
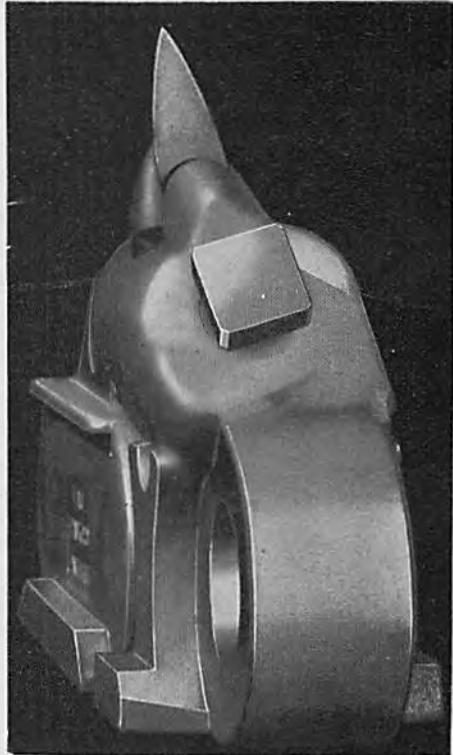
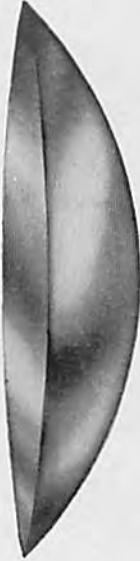
Scranton



PROX

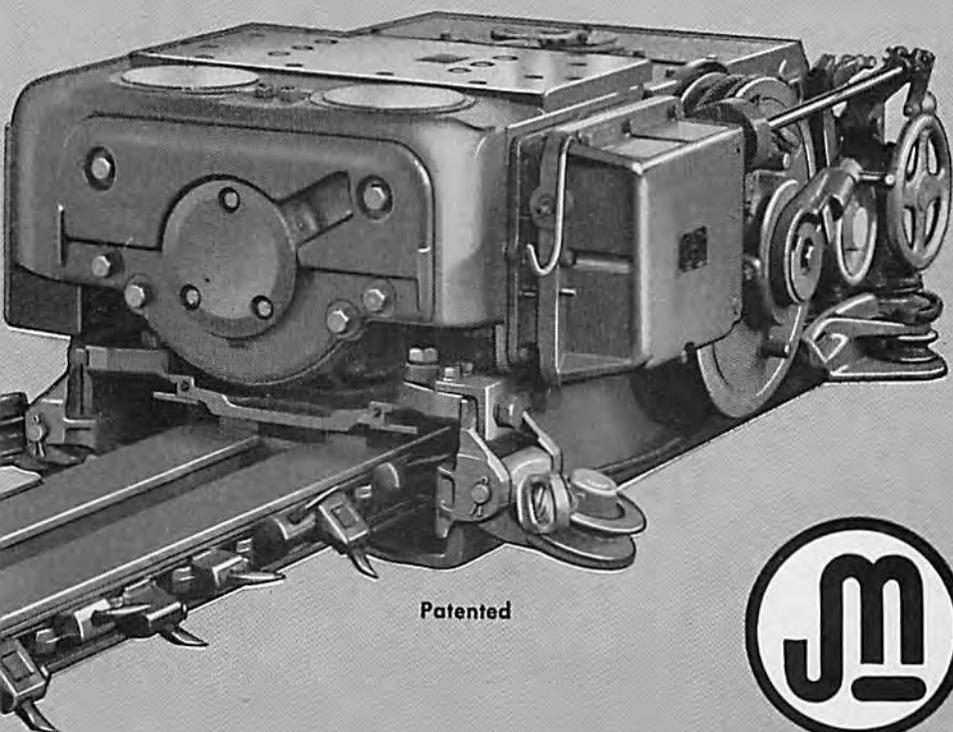
ON THE BANKS OF THE WABASH — SINCE 1874

FRANK PROX COMPANY
TERRE HAUTE - INDIANA.



FOR THE JOB REQUIRED

Shortwall Coal Cutter



Patented



THE JEFFREY MANUFACTURING COMPANY

872-99 North Fourth Street, Columbus, Ohio

Sales Offices:

Baltimore
Birmingham
Boston
Buffalo

Chicago
Cleveland
Cincinnati
Detroit

Denver
Harlan
Houston
Huntington

Milwaukee
New York
Philadelphia
Pittsburgh

Scranton
Salt Lake City
St. Louis

Service Stations:

Pittsburgh
Harlan, Ky.

Birmingham
St. Louis

Logan-Beckley,
W. Va.

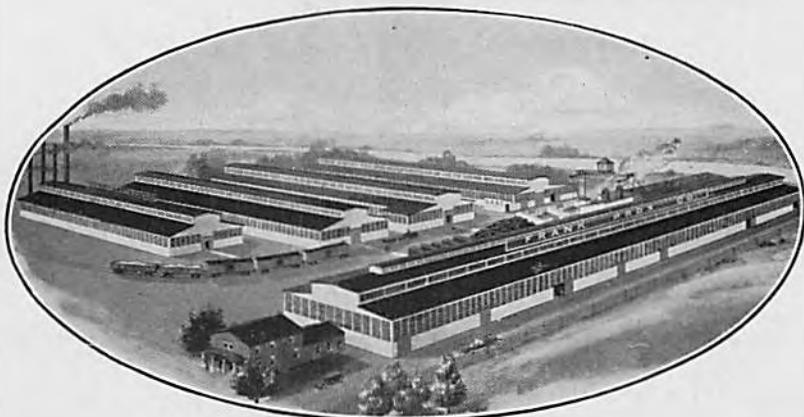
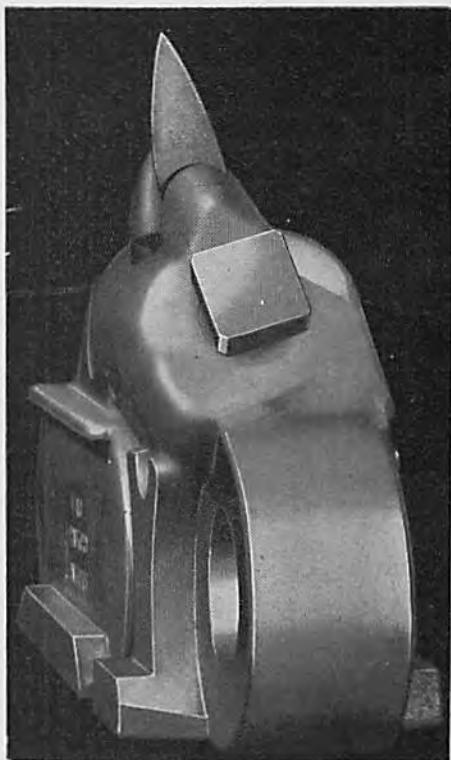
Scranton

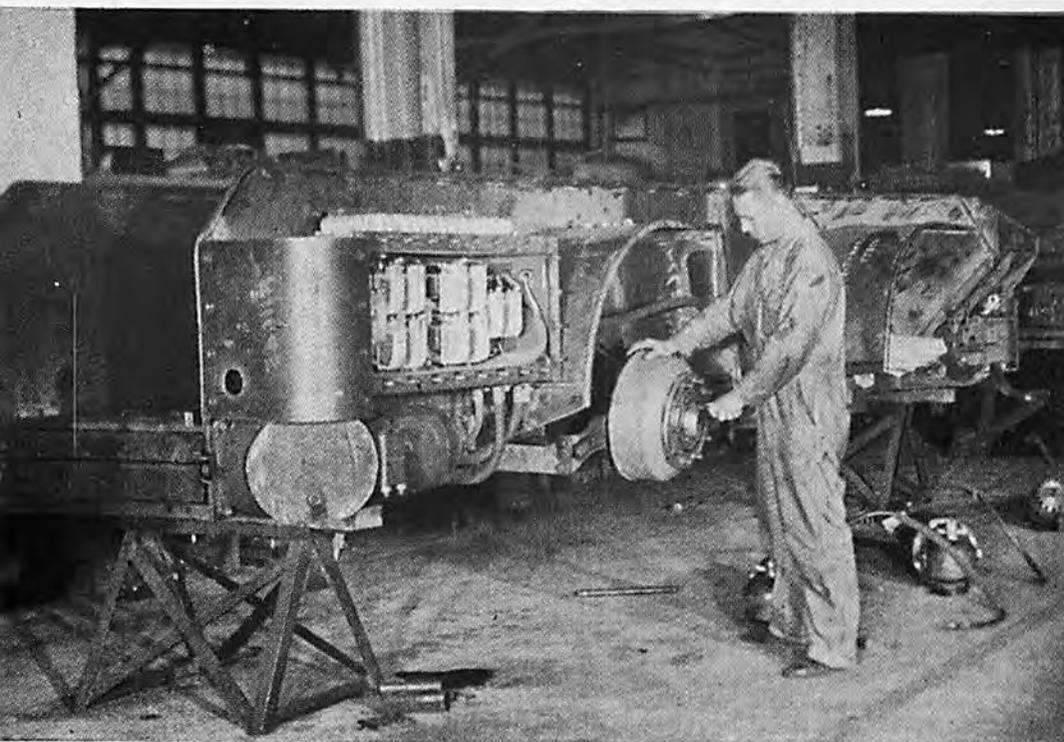


PROX

ON THE BANKS OF THE WABASH — SINCE 1854

FRANK PROX COMPANY
TERRE HAUTE - INDIANA.



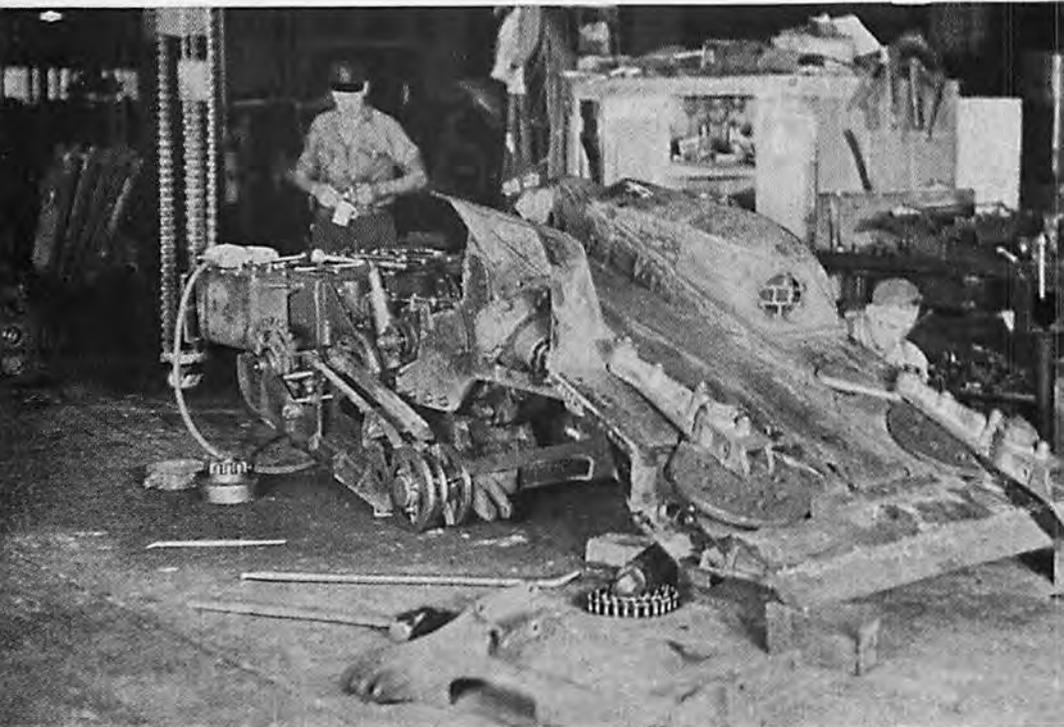


y Machines are built by skilled, specialized craftsmen. Careful, expert workmanship plus thorough inspecting and positive testing of every working part, assures long life and satisfactory performance.

JOY

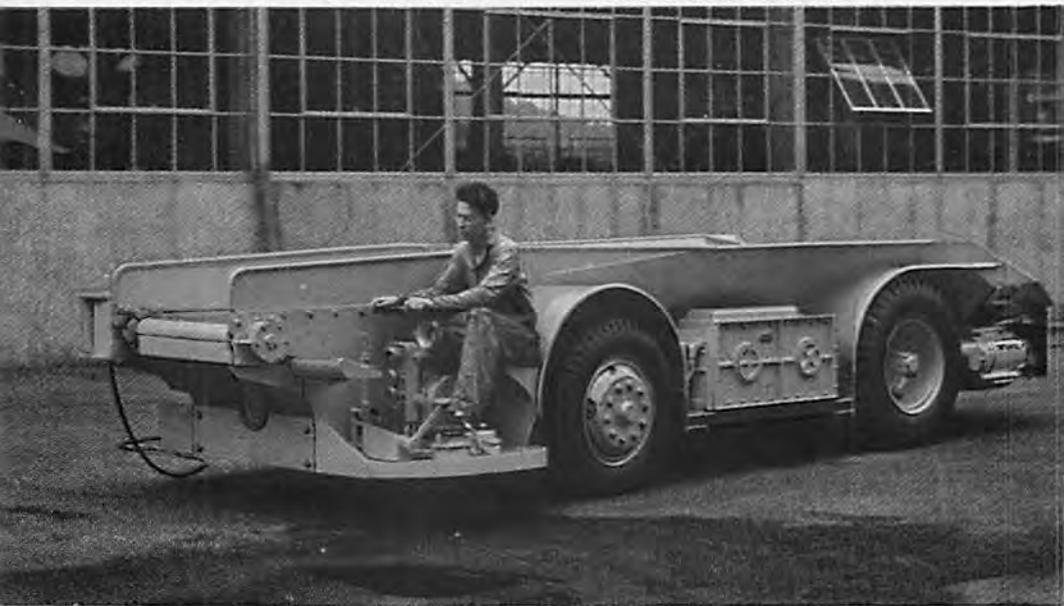
*Builds for Lasting
Economical Service*

Engineered and Designed.



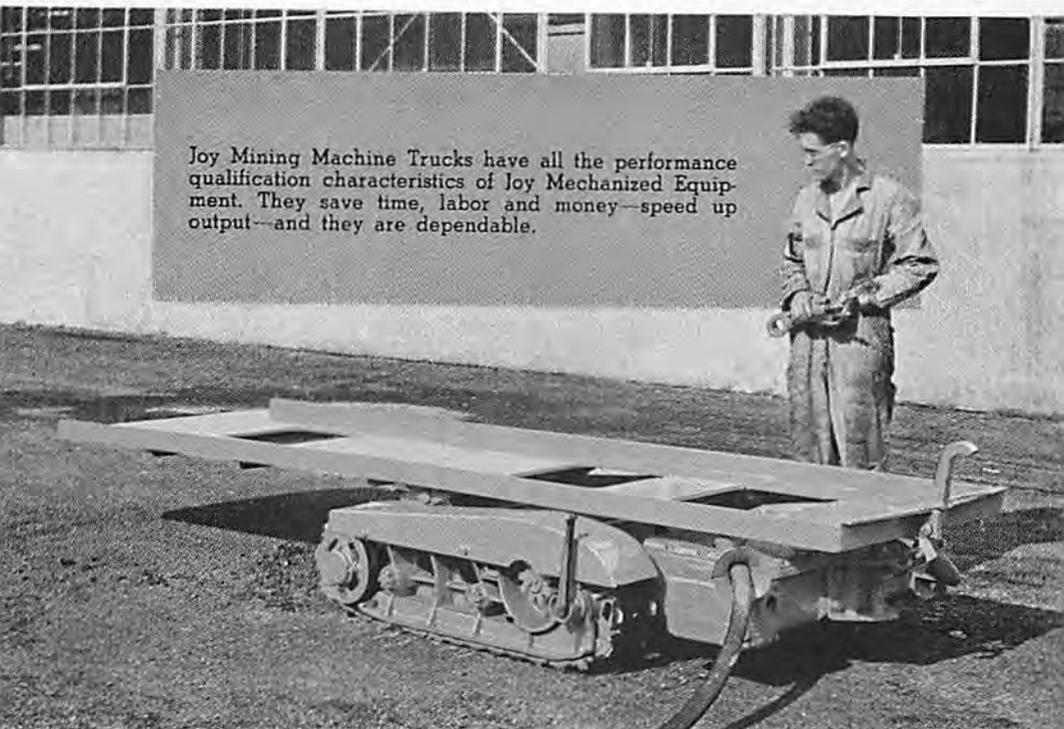
Joy Equipment is built in a big, modern daylight factory by careful teamed craftsmen. Every part—every piece is checked and rechecked for accuracy and dependability.

Joy Shuttle Cars have solved the secondary haulage problems for many mine executives. They speed up output—cut sections costs—modernize obsolete methods.



Joy Loaders and Shuttle Cars

to do their work well!



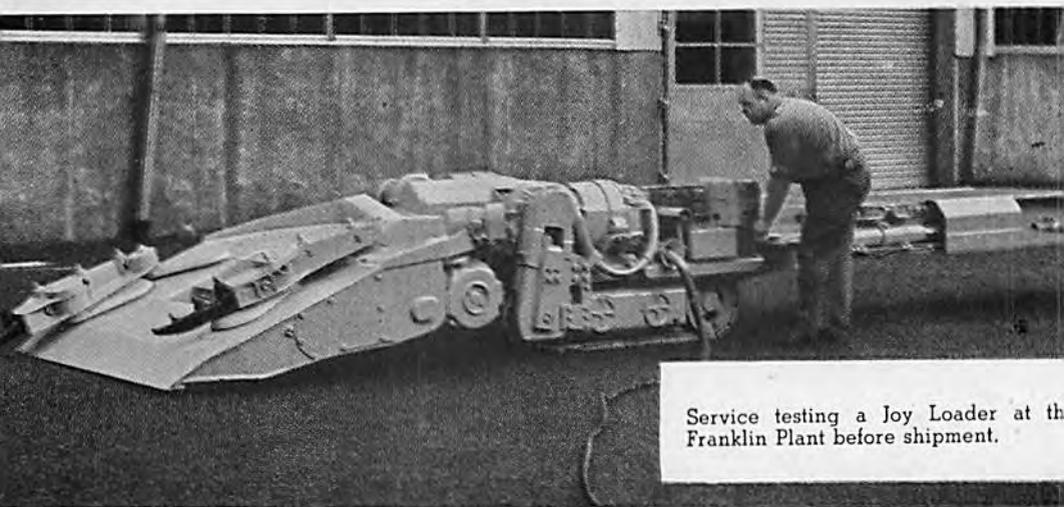
Joy Mining Machine Trucks have all the performance qualification characteristics of Joy Mechanized Equipment. They save time, labor and money—speed up output—and they are dependable.

Every piece of Joy Equipment is built to rigid standards of quality in materials and excellence in performance. That is why "Joy" leads the world in Mechanized Mining Equipment.

Joy Loaders have proved in many mines, under many varying conditions, their ability to speed up operation, increase output and to stand-up under hard, grueling service.



cut costs...increase tonnage



Service testing a Joy Loader at the Franklin Plant before shipment.

Rigid close inspection of every part—is followed by actual shop test of every machine—that's why there are no "bugs" in Joy Machines when they reach the field. Every machine works perfectly *before* it leaves the Joy Plant.

**Joy Loaders
and Shuttle Cars
will help you solve your
production problems**



*Consult a Joy Engineer
...no obligation*

JOY

**MANUFACTURING CO.
FRANKLIN, PA.**

LINK-BELT

EQUIPMENT

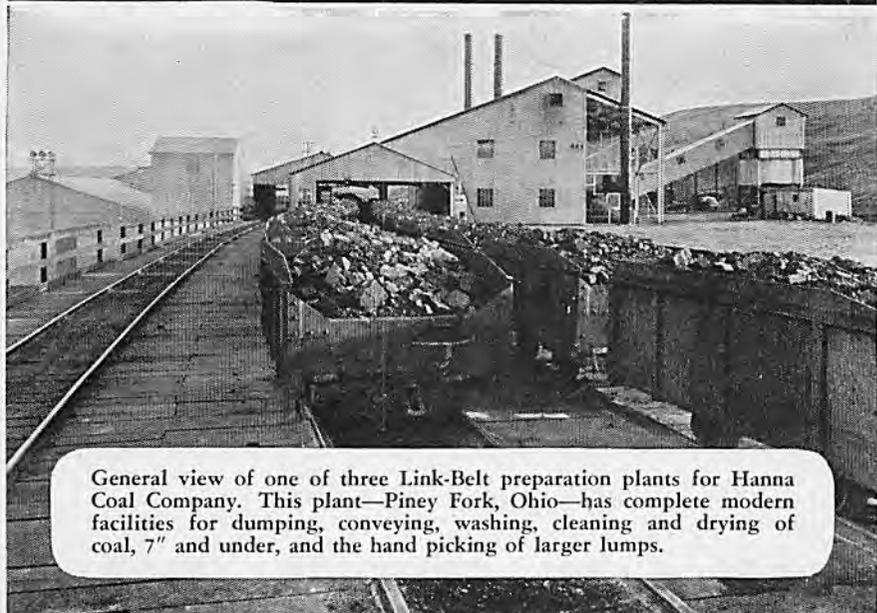
for Coal
Preparation
and
Handling

- Coal Washing Systems
- Pneumatic Separators
- Heat Dryers.. Picking Tables
- Screening Equipment
- Loading Booms.. Crushers
- Car Feeders and Dumpers
- Blending and Mixing Equip-
ment.. Conveyors and Elevators
- Power Transmission Equipment



LINK-BELT COMPANY

Chicago, Philadelphia, Pittsburgh, Denver,
Wilkes-Barre, Huntington, W. Va., Detroit,
Kansas City, Mo., Cleveland, Seattle,
Indianapolis, St. Louis, Toronto,
Vancouver 8783



General view of one of three Link-Belt preparation plants for Hanna Coal Company. This plant—Piney Fork, Ohio—has complete modern facilities for dumping, conveying, washing, cleaning and drying of coal, 7" and under, and the hand picking of larger lumps.

STANDARD OIL ANNOUNCES NEW

SUPERLA MINE LOADER LUBRICANTS

to help you
load out war-time tonnage

TODAY as never before, mine operators are interested in equipment maintenance. More tonnage and longer life from each machine are the order of the day in a nation which means business in winning the war. Here's help for you on this problem. Standard Oil has developed a new line of lubricants to meet today's demands on your equipment—four grades of thickened oils that give maximum protection to clutches, gears, and bearings on hard pressed loaders and cutters.

HERE ARE SOME OF THE ADVANTAGES:

- Stand up under severe operation. All grades resist separation and oxidation even at elevated temperatures where equipment is worked to capacity.
- Reduce maintenance time. The slightly heavier consistencies of these lubricants reduces both wear and consumption. Idle machine time for lubrication and repairs is reduced to the minimum.
- Resists heat. The oils used in the manufacture of these lubricants have unusually high viscosity indices—that means

they do not thin out excessively at high temperatures. This gives added protection to gears and clutches under all conditions of operation.

- Meet all requirements. Four grades in this new line of thickened oils meet practically all conditions found in the various makes of machines and the various degrees of normal wear.

- Prove these qualities in your equipment. Arrange, today, to have a Standard Lubrication Engineer help you make a test. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, for the Engineer nearest you.

OIL IS AMMUNITION . . . USE IT WISELY

STANDARD OIL COMPANY (INDIANA)

Still Serving
THE COAL MINING INDUSTRY



The above is a small reproduction of our advertisement that appeared 50 years ago in the first issue of the "Book of Proceedings" published by the Illinois Mining Institute.

Since this advertisement was originally published, the Coal Mining Industry has supplied much of the fuel and energy that has enabled this country to become the world leader in industrial progress. We are proud of the part that "HERCULES" (Red-Strand) Wire Rope has taken in this vital industry during these many interesting and productive years.

In order to have kept in stride with the March of Progress, "HERCULES" Wire Rope has been made in a larger and larger number of constructions and types. Today it is available in both Round Strand and Flattened Strand constructions — all of which can be furnished in either the Preformed or Non-Preformed types. In this one grade there is a "correct rope" for every coal mining purpose.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
 WIRE ROPE MAKERS
 ESTABLISHED 1857
 5909 KENNERLY AVENUE ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
 CHICAGO • • • 810 W. Washington Blvd.
 DENVER • • • 1554 Wazee Street



SAN FRANCISCO • • • 520 Fourth Street
 PORTLAND • • • 914 N. W. 14th Avenue
 SEATTLE • • • 3410 First Avenue South

Hotel Abraham Lincoln

Springfield, Illinois

★ ★ ★

STRICTLY FIREPROOF

300 COMFORTABLE ROOMS

★ ★ ★

Make this your Headquarters

WHEN IN SPRINGFIELD

**You
Can
Get**

COTTON IS KNIFING deeply into burlap's wide domain while war keeps the big Indian monopoly textile at home.
U. S. coal mines use about 20 million yards of heavy cloth yearly to control air currents—burlap goes the job almost exclusively. Heretofore disperse gases, prevent explosions. Now cotton is taking over. A special, chemically treated, flameproof and mildewproof cotton fabric fills the bill. More than fills it, experimenters say. They claim it lasts three to five times as long as the burlap.

From the Wall Street Journal,
Tues, June 23, 1942

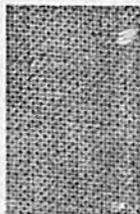


Moropa COTTON BRATTICE CLOTH

SO ORDER NOW

FOR FUTURE NEEDS

TRY THE FAMOUS
"BLOW - TORCH"
TEST and prove to
your own satisfac-
tion MOROPA'S
resistance to fire.



"Don't miss the boat" — smart coal operators are switching now to Moropa — the domestic cotton brattice cloth protected with the famous dry flame and mildew proof treatment — cotton requires special treatment — Moropa has it — the result of years of experiment in adapting cotton to every coal mine brattice condition — Moropa — the recognized "cost per ton savings" brattice cloth.

*MOROPA is Manufactured in America by
and Sold Only by*

JOHN FLOCKER & COMPANY

642 GRANT ST.

Est. 1822

PITTSBURGH, PA.

OBERMAN IRON & SUPPLY

Specializing in New and Used

STRUCTURAL IRON PIPE SUPPLIES

MINING MACHINERY — RAILS



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ST. LOUIS, MO.

INTEGRITY

RELIABILITY

ACCURACY

Coal Sampling

Coal Analysis

Float & Sink Tests

Boiler Testing

Fitting coal to the plant

Rehabilitation of inadequate power plants



COMMERCIAL TESTING & ENGINEERING CO.

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TOLEDO, OHIO

CHARLESTON, W. VA.

DETROIT, MICH.

COUNT ON

Ahlberg *All-Bearing Service*

FOR ALL YOUR BEARING NEEDS



AHLBERG GROUND BEARINGS

You can make substantial savings when you exchange sound worn ball bearings for these Ahlberg Service-Proven bearings which carry a new bearing guarantee.

Save time and expense on bearing replacements by standardizing on Ahlberg All-Bearing Service. You'll get dependable quality and prompt supply from your authorized Ahlberg Supply House which is backed by stocks at 25 strategically located warehouses in principal centers.



(CJB) MASTER BALL BEARINGS

— Precision - manufactured by Ahlberg to even closer tolerances than S. A. E. Standards. Sizes and types to meet every need.

(CJB) PILLOW BLOCKS

— Precision bearings in sturdy housings with generous lubricant reservoirs. Labyrinth type seals are effective and long wearing.



BOWER TAPERED ROLLER BEARINGS

— Super - Finishing gives these supreme roller bearings the greatest roller surface contact of any roller bearing made.

AHLBERG BEARING COMPANY

Manufacturers of (CJB) Master Ball Bearings
2831 Locust St., St. Louis, Mo.
2715 Michigan Ave., Chicago, Ill.

Authorized Mine Distributors:

Central Supply Co., Greenville, Ky.
Walker Electric Supply Company, 126 So. 3rd St., Terre Haute, Ind.
George Klein Armature Works, 1441 N. Elm St., Centralia, Ill.
Heimroth Electric & Machine Co., 1000 Poplar St., Terre Haute, Ind.
Central Mine Equipment Co., 4520 Enright St., St. Louis, Mo.
Kixmiller & Son, Bicknell, Indiana

Duncan Foundry and Machine Works,

MANUFACTURERS OF

Mining • Cars, • Car • Wheels,

REVOLVING SCREENS, SHAKER SCREENS, FANS,

AND ALL KINDS OF

MINING MACHINERY.

Piasa Street,

Alton, Illinois.

In the course of over 50 years of manufacturing mine equipment we deemed it advantageous to the mining industry to specialize in certain equipment. We are therefore calling attention to our

CAST STEEL MINE CAR WHEELS AND TRUCK
ASSEMBLIES

Pioneers in the manufacture of steel wheels.



**DUNCAN FOUNDRY
AND MACHINE WORKS, INC.**

Alton, Ill.

BERRY BEARING COMPANY

2635 Michigan Avenue

Phone: Calumet 2250 — Chicago

Specializing in:

BALL and ROLLER BEARINGS
for the Coal Field

IMMEDIATE SHIPMENT FROM STOCK

Direct Factory Distributors of:

SKF

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NEW DEPARTURE

NORMA-HOFFMAN

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GARLOCK KLOZURES

and

BUNTING BRONZE BUSHINGS

All Types of Ball Bearings Reground

Soaperior

GRAVITY TANK LIQUID SOAP DISPENSING SYSTEM

conveys pure liquid soap from wall tanks through pipe lines to dispensing valves over wash basins, wash troughs or in showers. Supplies individual sanitary liquid soap at lowest cost.



Furnished complete: tanks, valves, fasteners, fittings and pipe cut to your measure.

Miners Special Hard Water Liquid Soap—a quick lathering, free rinsing pure vegetable oil toilet soap.

Write for details

**U. S. SANITARY
SPECIALTIES CORP.**
CHICAGO NEW YORK



The Mark

LEETONIA

on mine drills and tools is your assurance of quality. For over a third of a century our efforts have been to produce quality products that would satisfactorily serve the user.

Our constant growth has proven our policy to be right. For purchasing agents and those interested in production our catalog is free for the asking. Where there is efficient management of coal, clay or metal mines, there you will find Leetonia Drills and Tools.



Address—

The Leetonia Tool Company

LEETONIA, OHIO, U. S. A.

PROMET

“Engineered” Bearings

for COAL MINE LOCOMOTIVES, MACHINES, etc.

PROMET Bronze Bearings and Babbitts

“A Proven Success in the Coal Industry”

MANY YEARS AGO WE CLAIMED Longer Wearing Life for our products as compared with that of competition. We also predicted lower Production Costs per ton of coal produced, for all users of PROMET “Engineered” Bearings.

NOW WE HAVE PROVEN these were not idle statements. Millions of tons of coal have now been mined over PROMET Bearings—and our claims are now backed by production figures in mines, as well as in all types of industry.

If you haven't yet tried PROMET, you are penalizing your cost sheet.

Ask your neighbor — he knows

THE AMERICAN CRUCIBLE PRODUCTS COMPANY

LORAIN, OHIO

offering

CONSULTING BEARING SERVICE

CONSISTENT QUALITY

PROMPT DELIVERIES

Gemco Tru-Blu Tools

"Have the Strength of Gibraltar — Yet a Child of Five Can Carry Them"



GEMCO TRU-BLU TOOLS MAKE SUPERMEN OF MINERS!

Here's a few of these Miner's helpers to reduce your cost per ton: Rail Benders and Punches, Car Stops, Rerailers, Grease Guns, Car Movers, Mine Cars and Wheels, Special Combination Tools, Derailers, Rail Hoppers, Oils, Grease, Rails and Track Fittings. Send for full data and latest catalog or see your jobber for immediate delivery.

Lot of Relay 60 and 90 lb. Rail — Immediate Shipment!

G I B R A L T A R
EQUIPMENT & MANUFACTURING CO.
ALTON, ILLINOIS **PHONE 3-8514**

You Can't Afford To Try To Do Without "Gemco True-Blu" Equipment.

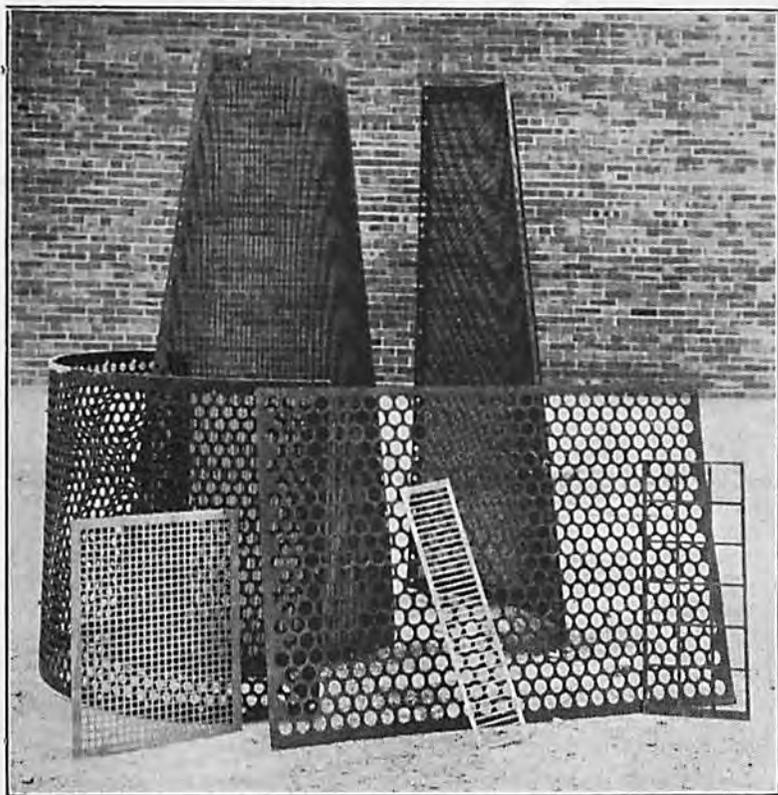
War Times—All Times—You can't afford to try to do without "Gemco Tru-Blu" equipment. Short of men? Gemco Ratchet Benders, Multi-Leverage Punches, etc., will help you a lot!

Standard Stamping and Perforating Co.

3131-3155 W. 49th Place

CHICAGO, ILL.

Phone Hemlock 8406-7-8

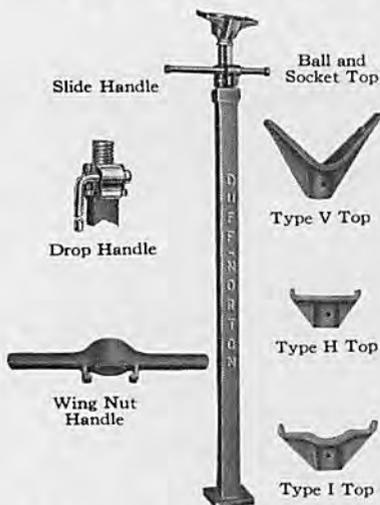


PERFORATED METALS OF MILD STEEL,
HIGH CARBON STEEL OR ABRASION
STEEL FOR LONG WEAR AND
ACCURATE SCREENING

LARGE STOCKS OF RAW MATERIAL
INSURES QUICK DELIVERIES

DUFF NORTON JACKS

for Modern Coal Mining Service



DUFF-NORTON MINE ROOF JACK

A great time and labor saving device—assuring maximum safety in mechanical mining practice. Available with three handle styles and four head types, as illustrated at left. Features increased size, thicker tubing, larger screw, chrome-yellow finish.

ADJUSTABLE MINE TIMBER-LIFTING JACK

Designed especially for cross timbering. Easy one-man operation, safe and positive. Available with slide, drop or wing nut handles and type I, V or H tops.

JOURNAL JACKS



Unusually compact and easy to carry. Ball-bearing screw type. Ideal for heavy, low-set loads. Steel operating lever furnished.

AUTOMATIC LOWERING JACKS

Incorporate all the latest improvements. Equipped with curved top, single or double socket lever, optional tripping device. Duff-Norton Jacks are made in over 300 types and sizes for every mining application.



Write

FOR NEW BULLETIN. Ask your Distributor for a copy of the new Bulletin giving sizes, ratings and prices of the new Duff-Norton Mine Roof Jack. If he hasn't a copy, we'll be glad to send you one by return mail.

THE DUFF-NORTON MANUFACTURING COMPANY

"The House That Jacks Built"

PITTSBURGH, PA.

Canadian Plant:

Coaticook, Quebec

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS, OHIO

Telephone University 4144

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Manufacturers of

ELECTRICAL COILS

Buettner Shelburne Machine Company, Inc.

•
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Supplies for Electrical

COAL MINING MACHINERY

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SOUTH THIRD AND MINSHALL STREETS
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MISSISSIPPI LIME COMPANY

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•

DROP FORGED SWIVEL COUPLINGS

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MINING MACHINE BITS

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•

SET SCREW WRENCHES

•

BIT BOXES

**PITTSBURGH KNIFE
and FORGE COMPANY**

716 Chateau Street, North Side

PITTSBURGH, PENNA.

Coal Mining Screens

PERFORATED METALS

We manufacture Coal Mining Screens of every type—flat—flanged end—cylindrical or special shape. Any size or style screen in whatever thickness of metal you desire. Perforated with the exact size and style of holes you require. We are supplying Coal Screens to many leading coal mines—made to their exact requirements and specifications. We can duplicate the Screens you are now using.

Write for Quotations

CHICAGO PERFORATING CO.

2445 W. 24th Pl., Chicago, Ill.

KLEIN ARMATURE WORKS

1439 N. Elm St.

CENTRALIA, ILL.

Phone 1552

Manufacturers of

Commutators—Mica and Glass Armature Coils,
Klein Patented Carbon Brushes,
Electric Motors Rewound,
Expert Machine Shopwork,
Brass Foundry,
Bearings—Bushings.



FLEXIPIPE

Provides dependable ventilation.

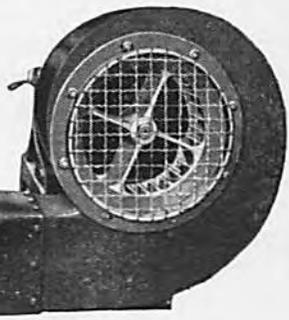
Supplies fresh air exactly when and where it is needed. Eliminates ventilation problems.

This flexible air tubing is used extensively as an auxiliary system of ventilation in Coal Mines.

Write for our Free Book

BEMIS BRO. BAG CO.
ST. LOUIS, MO.

The
Original
makers of
FLEXIBLE
AirTubing



LOWER COSTS *PER TON*

The small producer will find this low cost crusher the answer to sizing demands. Additional requirements can be met with more units. Write today for prices and details.

**THE WORLD'S
FASTEST CAGE**

OLSON
AUTOMATIC
SELF-DUMPING
CAGE
TYPE OC7



**THE ALL PURPOSE
STOKER COAL CRUSHER**



FROM A CUSTOMER:
"We installed and have had in operation . . . one of your crushers . . . and are happy to advise that the performance is very satisfactory." (A copy will be sent on request.)

EAGLE STOKER COAL CRUSHER

LOW UP-KEEP
5-HP AMPLE
FOR DRIVING

**EAGLE IRON
WORKS
DES MOINES, IOWA**

MINE RAILS

Guaranteed Practically Equal to New

Super Quality Machine Straightened and Thoroughly Reconditioned.
Standard Modern Section and Drilling.

Priced at 20% to 40% less than cost of New Rails.

Fully Guaranteed—shipped anywhere—subject to inspection and approval at your Mine.

New Rails, Frogs and Switches, Spikes, Bolts and Nuts, Splice or Angle Bars, Tie Plates, Gauge Rods and all other Track Accessories.

1 ton or 1,000 tons.

Shipment immediately from Stock. Phone, Write or Wire for Quotation.

L. B. FOSTER COMPANY

231 South La Salle Street

CHICAGO, ILLINOIS

Telephone Central 6759



Use the wire rope
that's cut out for

today's jobs

There's no place for slack in the coal industry's program—or in a vital mining cable. To accelerate production, to strengthen your defense against equipment shutdowns, you need the workability and durability of Preformed Yellow Strand. With this time-tested wire rope handling the load, giant stripping and loading shovels can take the full bite. Main hoists can utilize their high speeds with safety. Above and below ground, cable-using machines can move closer to capacity operations and put off replacements.

These gains result from pointing up Yellow Strand's stout, drawn-to-order steel wires with the limberness of preforming. The rope reeves easily . . . runs freely around small sheaves . . . spools evenly despite overloads. Still every length is as tough as ever—highly resistant to shock, abrasion and drum crushing. Today time-and-labor-saving cable counts *double* in production. Install Preformed Yellow Strand and help your men and machines deliver to the limit.

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle. Factories: St. Louis, Seattle, Peoria

**YELLOW
STRAND**

PREFORMED WIRE ROPE



A MAINSTAY OF WAR PRODUCTION

EGYPTIAN SALES AGENCY

G. F. BLANKINSHIP, *Sales Engineer*

MURPHYSBORO, ILLINOIS

*Manufacturers, Direct Sales Representatives
and Distributors*

CASTINGS

Gray Iron, Steel and Brass

MINE CARS COMPLETE

TRANSMISSION EQUIPMENT

Shafting, V-Belt Drives, Gears,
Sprockets, Pulleys

WIRE ROPE & CHAIN

QUAKER RUBBER PRODUCTS

Belting, Hose and Packing

REPAIR PARTS

Cage, Shaker Screen, Boiler,
Car Wheels, Boxes, Stop Blocks,
Hitchings, Hoisting Sheaves

TRACK EQUIPMENT

Frogs, Switches, Switch Stands,
Turnouts complete

LYON STEEL PRODUCTS

Steel Shop Equipment, Shelving
and Lockers, Steel Furniture

TOOLS

"Umeco" Rail Punches and Benders, Track and Industrial Jacks, Armstrong
Lathe Tools, Badger Car Movers, Aldon Car Replacers, Anchor Rerailers and
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ENGINEERING AND INSPECTION SERVICE

Recommendations covering materials and repair parts as manufactured by the
companies for whom we are Direct Factory Representatives.

WESTERN EXPLOSIVES

DYNAMITE

GELATIN

PERMISSIBLE POWDERS

BLASTING POWDER

PELLET POWDER

ELECTRIC BLASTING CAPS

BLASTING CAPS

ELECTRIC SQUIBS

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BLASTING ACCESSORIES

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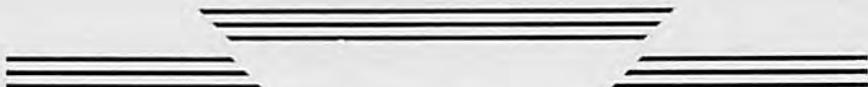
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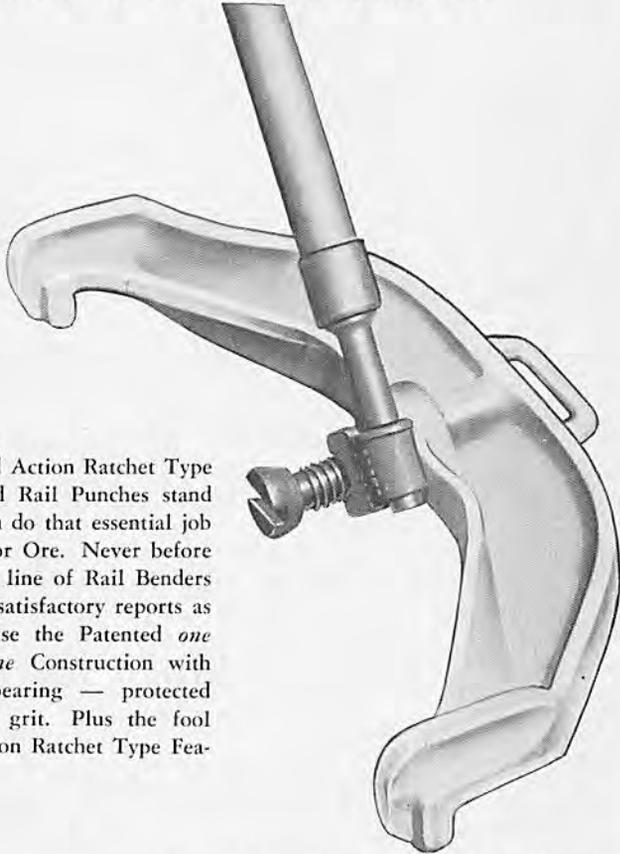
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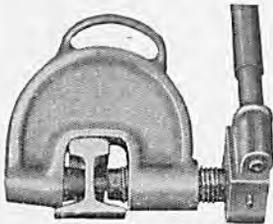
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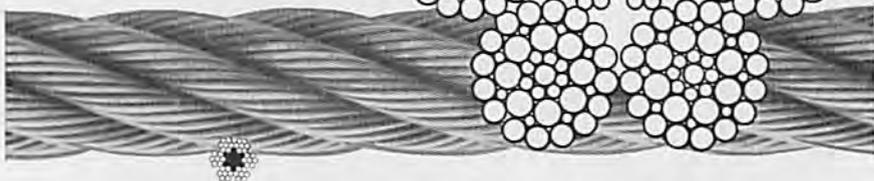
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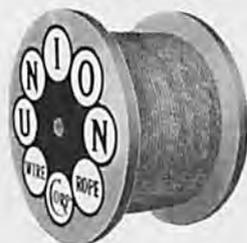
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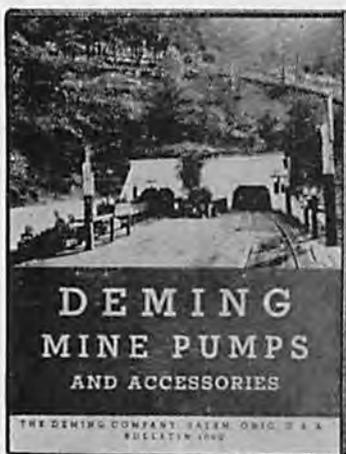
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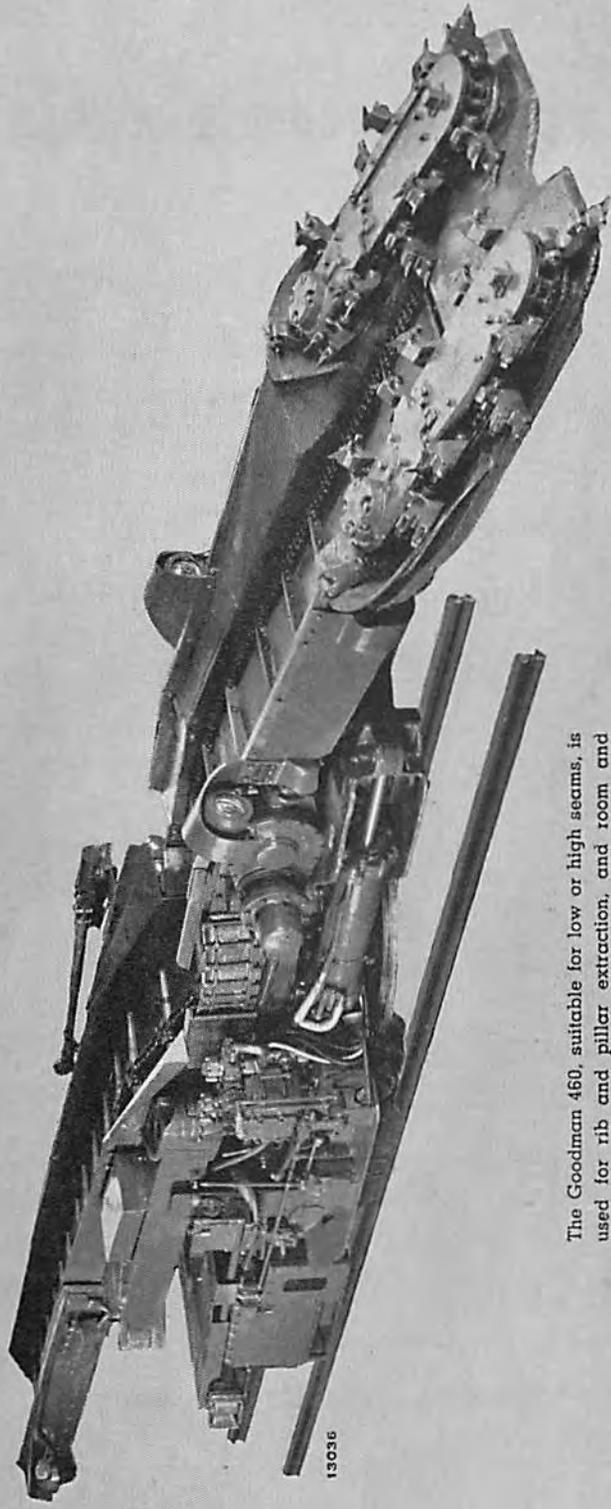
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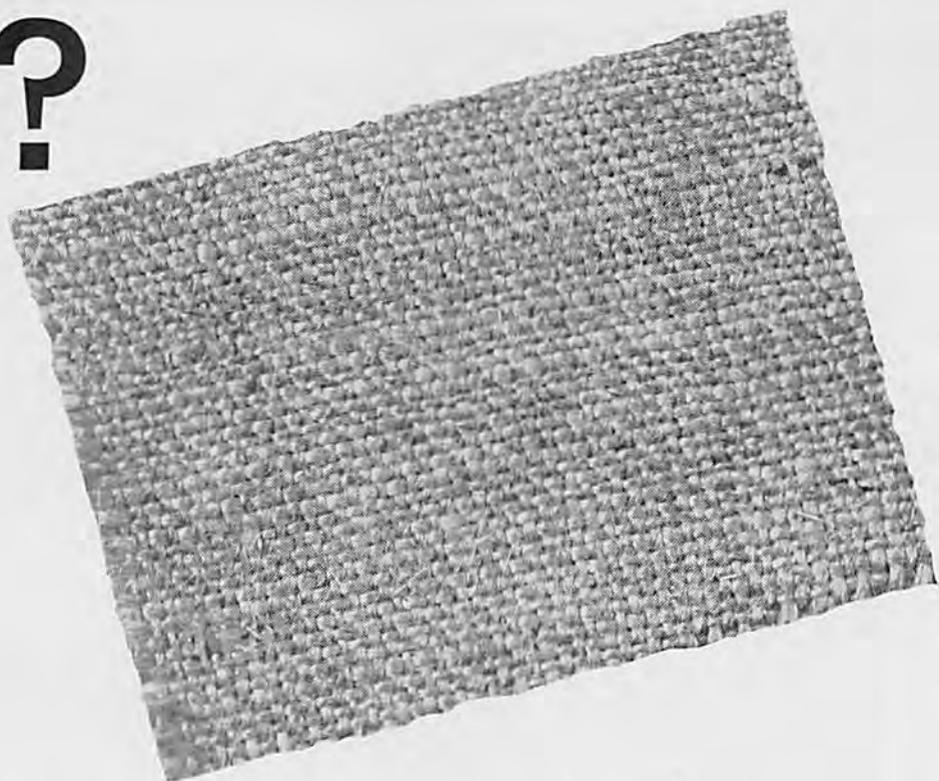
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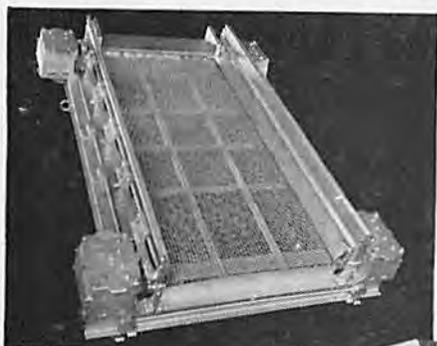


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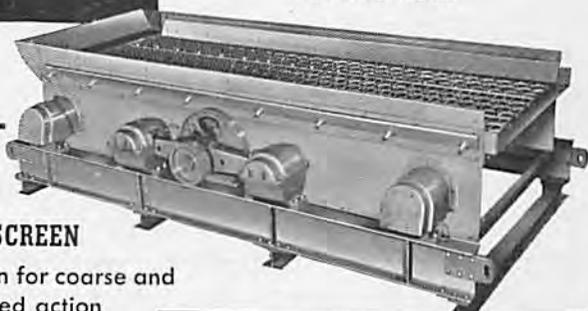


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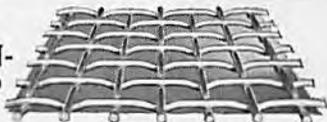
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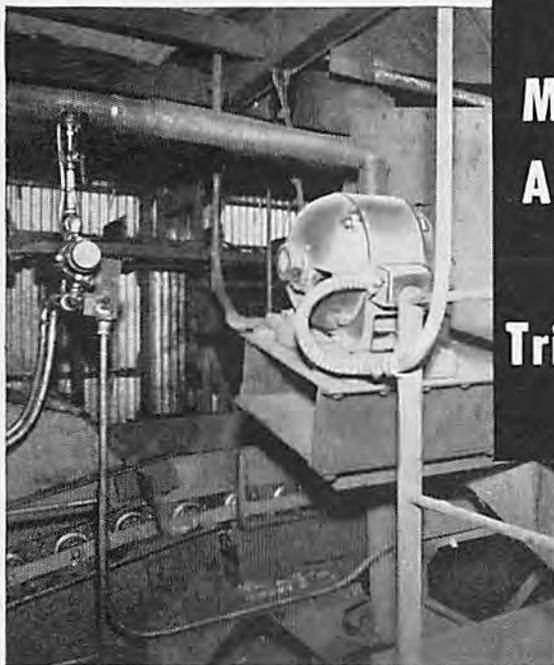
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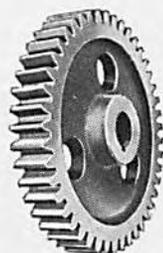
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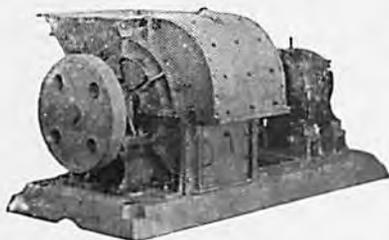
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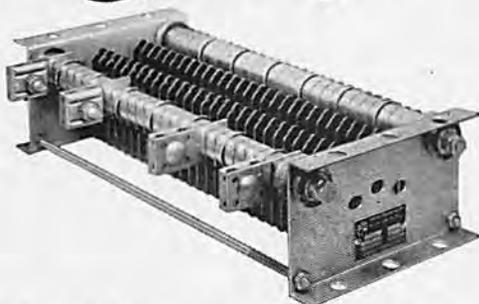
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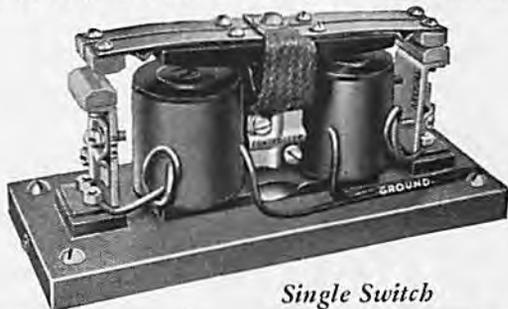
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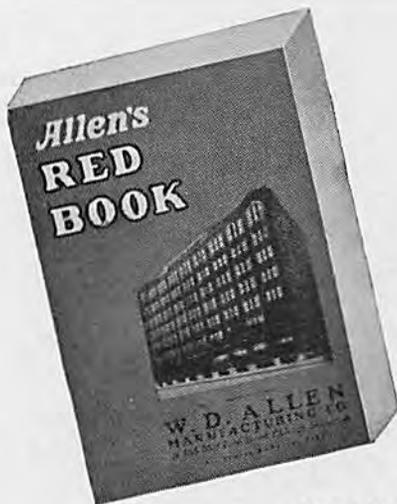
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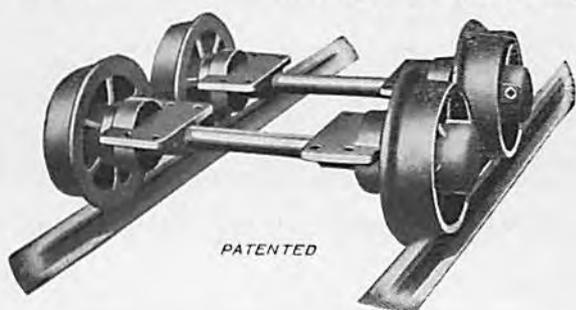
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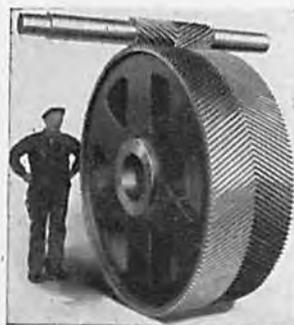
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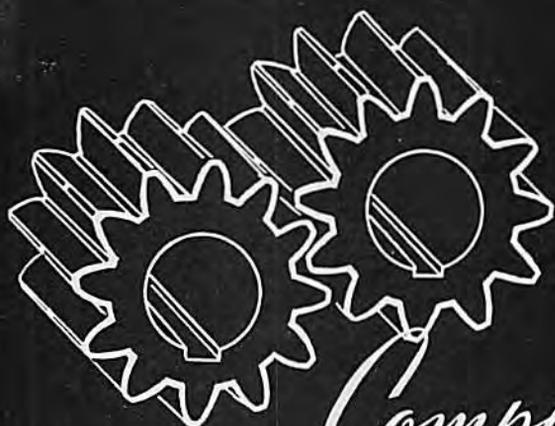
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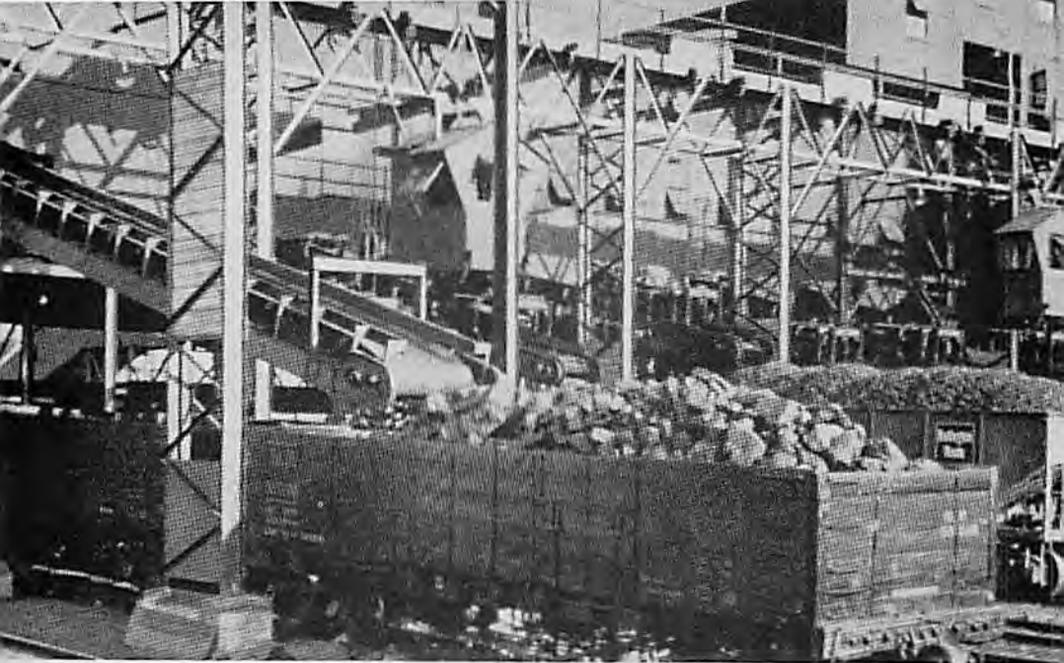
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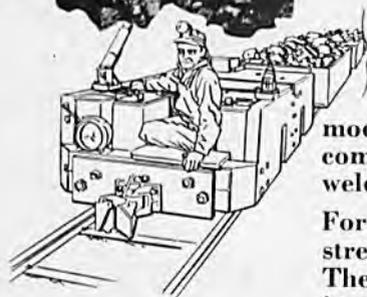
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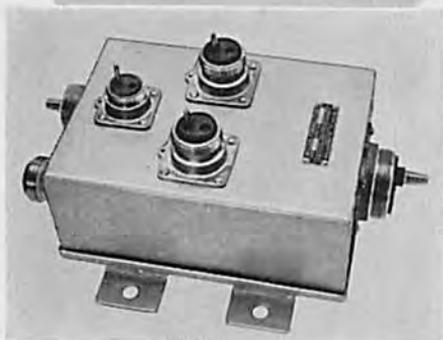
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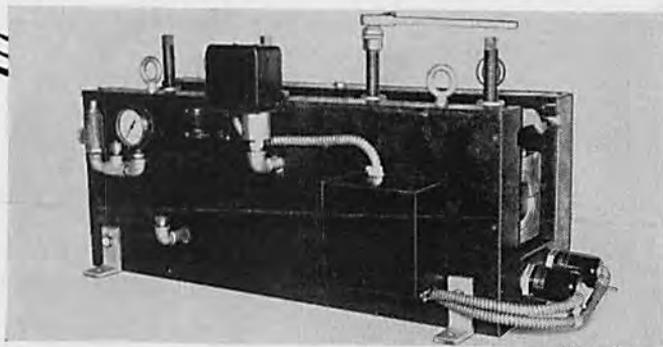
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