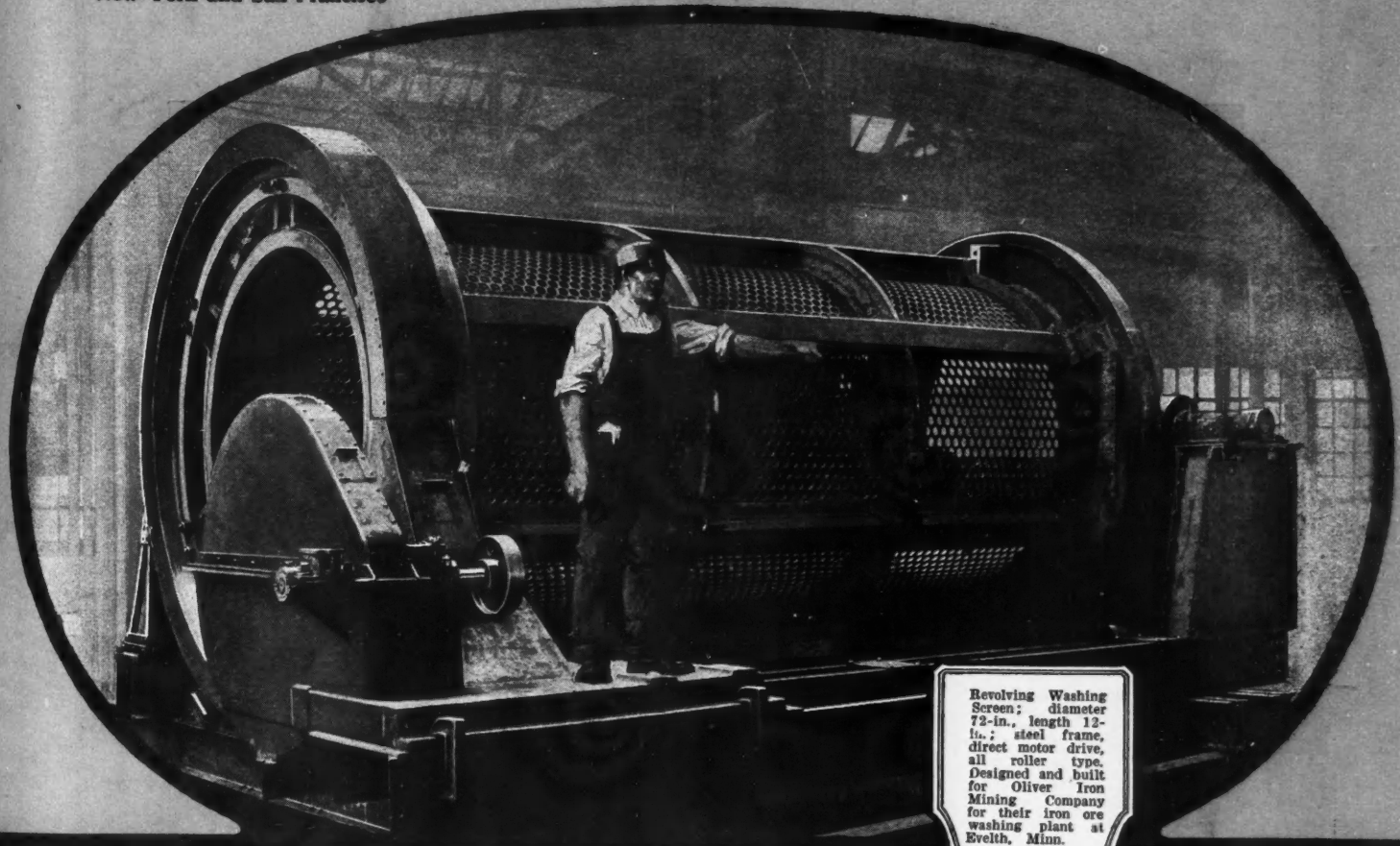


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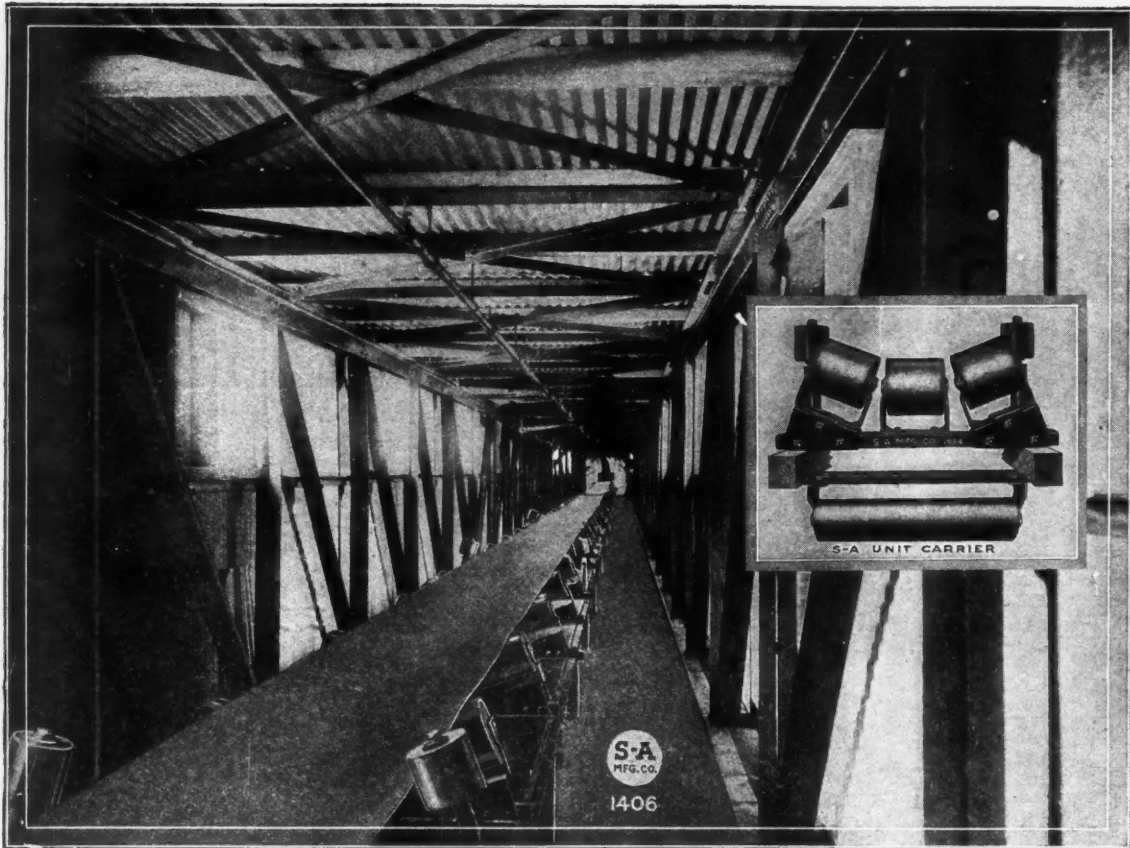
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Number 17

Our Invisible Government

THE steel strike continues to dwarf in interest various other strikes in the mining and metal industries, being, indeed, of such national importance that much of the future history of the country depends on its outcome. We are heartily in sympathy with the attitude of Judge Gary and the principles of local and individual freedom for which he is holding out. Nothing could be fairer and more patriotic than the final manifesto to the Employers' Group before they left the Industrial Conference in Washington, out of which they were forced by the quitting of the Labor Group. On the other hand, the stand of the latter group, not for collective bargaining but for Union rule, is not calculated to win public sympathy. More than that, their action in bolting the conference rather than submit to an adverse vote does not augur well for their ability to bargain fairly and moderately. The action smacks of the Mexican idea of elections, where the candidate who is defeated at the polls takes to the hills with his riflemen and harries the successful administration till another election gives him a new opportunity. No system can cure social and industrial disorders unless the right kind of manhood is behind it. Witness the failure of collective bargaining system in the case of the coal strike. This system has obtained, we are informed, between coal operators and miners since 1878; and now it takes the form, on the part of the miner, that he makes his demands for acceptance without change, discussion, or delay, and with the alternative of disaster to the whole United States.

Surely the organization of labor for mutual protection and improvement is a desirable thing; and during the war our labor organizations were loyal and helpful. That steel workers should not be allowed to adjust conditions by local "works" committees, and local collective bargaining with their employers, but must walk out to allow some higher council, composed of men perhaps unfamiliar with their conditions, to dictate to the industry, is not, in our opinion, fair; as a matter of fact, it is not even collective bargaining, but the principle of surrendering local and individual rights to the manipulation of labor bosses.

It is increasingly certain that the steel strike is being engineered by the Bolshevik organization, as testified by a member of General Wood's staff before a Senate committee; and that the coal strike and others are part of a widespread revolutionary program. The exponents of the Plumb plan of buying the railroads, the common carriers for a hundred-

odd million Americans, and turning them over to 300,000 brakemen and conductors, announced darkly to a Congressional Committee that if the plan was not accepted it would mean revolution. They should have said that if the plan were accepted it would mean revolution. The fear of a revolution initiated by labor if its demands are not granted in the case of strikes like those covering steel and coal is not a factor to be considered; for if their present methods succeed, it means an overthrow of constitutional government. It would mean the triumph of one of the great parties in what we may call the invisible government, which has grown up gradually, side by side with our regular political system.

It must seem strange to thoughtful members of Congress to be bereft of all power but that of despairing speech-making, while the real issues and future government of the country are debated upon by a conference of private chieftains, acknowledged by Washington as the real powers; and to have these powers threaten and defy Congress as the American Federation of Labor is doing in regard to the possibility of including anti-strike provisions in the pending railroad legislation. Modern methods of organization have led to the growth of these powerful leagues, while the Constitutional government that was ideal for the newly liberated thirteen colonies has become more and more inadequate. Like the Western judge who could find in his printed code nothing that covered the killing of a Chinaman, and so freed the accused, Congress finds no precedent that covers interfering with the assassination of the prosperity and liberty of the country by a conspiracy of strikes and the substitution for the American government of the dictation of an increasingly effective and arrogant labor faction, directed by its own secret system.

The fair American way to such power as its numbers and rights merit is open to Labor. Let Labor, if it will, elect its own delegates to Congress, and so secure fair representation commensurate with that of the rest of the population of the United States. It is a fact that our legislators are representatives of sections rather than groups, classes, or principles; that they consist in undue proportion of lawyers and professional politicians; and this defect is doubtless due to machine politics in the case of both great political parties. These parties will do well if they value representative government and wish to defeat the seizing of power by a minority faction, to see that their candidates represent the majority group or class in each section, and that labor, the professions, business and agriculture are fully represented.

The Mining Bureaus at Washington

CONDITIONS in those government bureaus in Washington which have to do with the mining industry are not highly satisfactory in the present stage. Not only does Congress go through the annual allotment of appropriations to the Geological Survey and the Bureau of Mines without careful, intelligent, and sympathetic consideration, but it fails to provide properly for the housing of the geologists and engineers who are the life of these organizations. Evil days have come upon us. Formerly, learning and technical skill were most highly esteemed popularly, and the man of attainments enjoyed distinct rewards of many kinds in comparison with others. Our progress in the direction of materialism has changed this. No class is relatively so poorly paid, whether in Washington or elsewhere, as the scientific or learned class; and pure learning, or research for Truth's sake, is no longer really respectable. The geologists and engineers have in desperation joined the Federation of Labor, an act at once poetic and sad—poetic because it emphasizes the brotherhood and equality of all men; sad because it expresses their vain hope of thriving and benefiting therefrom as the carpenter and the barber have done.

The modern tendency of Congress and the higher government officials, political appointees, is to classify these professional workers on the same basis with clerks, and to crowd them together so that efficient research, study, comparison, and the preparation of results are greatly impaired. The organizations in question, especially the older one, the Geological Survey, have a wonderful record and a traditional esprit de corps. The dignity of the position of the government geologist, his love and enthusiasm for his work, and fairly pleasant working conditions, formerly kept him contented with a relatively small wage. Today, with his still hardly larger wage halved as to its purchasing power by the depreciation of the dollar, his working comfort destroyed by close crowding by a Congressional committee, and his dignity attacked by the tendency of those government officials who owe their positions to politics to regard him as a kind of clerk, it is not surprising if, at some time, the final straw falls, and he leaves for some more profitable and less irksome private position.

Many of the best men in the Survey and the Bureau have left this fall. The Survey averages a loss of 20 per cent per year, or, theoretically, a complete renewal in five years. Is it not possible to have a campaign of education among the political throng in Washington, to teach them the great importance of this handful of trained and efficient scientific experts, and the basic distinction between them and the multitude of careless clerks who pack the rooms of the departments and furnish so convincing an example of the inefficiency of a bureaucracy? These two organizations represent, in the government, the greatest basic industry of the country, and the great influence of that industry should be applied toward securing them more intelligently dispensed appropriations, appropriate quarters, and a comprehending

and sympathetic direction. A separate government building for mining and geology should be provided for at once; and a separate entity within the executive organization.

Dedication of the Bureau of Mines Pittsburgh Station

THE recent dedication of the Bureau of Mines Building in Pittsburgh brings to mind the purpose and accomplishments of this useful institution, which was organized in 1910 and which since its inception has become recognized as a valuable and necessary complement to the industries of the United States. It is a trait of human nature that, when enterprises have passed the experimental stage and have proved successful, they are too often accepted as facts, and due consideration is not accorded to the efforts that called them into being, and the benefits derived from them are too often accepted in a "taken for granted" spirit.

Much of the good feeling that the Bureau has created is based upon service rendered in conserving human life and in developing natural resources. Those spectators at the first-aid and mine rescue contests conducted during the three days of the exercises at Pittsburgh were much impressed by the skill and enthusiasm of the members of the 101 teams which participated. The teams came from many sections of the country, one team journeying from the State of Washington and two teams from Colorado. Montana sent the Butte district team, the membership representing six different mining companies, and that team captured the second prize in the first-aid contest.

The pageant, "The Hidden Treasures of Earth," presented on the night of the second day of the meeting, deserves especial commendation, and the author, Thomas Wood Stevens, is to be congratulated. Any agency which directs attention to the romance in the every-day work of mining and preparing the products of that industry for consumption makes the worker's world a more pleasant place in which to live. The interest in the pageant, and the artistic excellence that marked its presentation, suggest that similar entertainment features would contribute highly to the enjoyment of dedicatory and convention ceremonies in general.

Wartime Manufacture of Refractories in Britain

Soon after the outbreak of hostilities in 1914, many British industries found themselves deprived of essential raw or semi-manufactured materials of mineral origin. Great impetus was given to the working of home supplies of metallic minerals, such as the ores of iron, lead, zinc, tin, and tungsten and of deposits of barytes, fluorspar, and quartz.

In discussing the subject in an article prepared for the Journal of the Society of Chemical Industry, P. G. H. Boswell mentions particularly the dearth of refractory materials and describes some of the work accomplished in efforts to add to the supply. In consequence of the cutting off of supplies of

Austrian and Greek magnesite, the home resources of dolomite were successfully developed. Mention is made of a similar impure artificial product of dolomite, silica, and iron oxide prepared in American cement kilns and sold under such trade names as cinderlag and magdalite.

Geo-chemical research on silica bricks showed that the quality of those burned at over 1,300 degrees C., the temperature commonly employed, could be materially improved by longer burning at a higher temperature. Greater inversion of the quartz to other low-density forms of silica known as tridymite and cristobalite was thus insured, with the consequence that less expansion of the brick occurred when it was set in the furnace. To quote further:

"The investigation by the geologists and mining engineers of home supplies of potash-bearing minerals, such as feldspar, and the recovery by the chemist, in co-operation with the geologist, of potash from blast-furnace flues in Britain and cement-kiln flues in America, temporarily overcame the difficulties produced by the absence of German salts. The coprolite-bearing deposits of the Cambridge greensand were, after some delay, opened up for the purpose of obtaining the contained phosphate of lime, and at the date of the armistice were yielding helpful supplies."

The Lure of Gold

SINCE days of old the lure of gold has excited men to pioneer in far-distant lands. Be it a sunken treasure ship or the vague rumor of a gold discovery, there will be some one, or there may be many, who will gladly exchange their sure-thing, humdrum occupation for the shoestring of a chance in the bleak stretches of the Arctic or the humid, parboiled tropics. A quick but seldom an easy path to fortune is ostensibly the motive, but we believe that this apparent motive is merely an accessory. It is primarily the love of adventure that impels men to venture forth on this quest for gold. It is the same spirit that drove the old vikings away from their home shores to distant, unknown lands.

The latest expedition of the kind is the cruise of the "Casco." This small schooner, once used by Robert Louis Stevenson, has finished its romantic career by being pounded to pieces in Bering Strait, north of Nome. It was outfitted and started on a gold-seeking expedition to the Kolyma River, in Siberia. The party of adventurers, under Captain C. L. Oliver, left San Francisco in June. North Cape, 400 miles west of Bering Strait, was reached. Ice floes and an early winter stopped further progress, and the return ended in disaster. Twelve of the party were left in Arctic Siberia, where they will prospect for gold. The remainder returned to outfit another vessel.

There are now fewer places for the adventurous gold seeker. Both the North and South poles have been discovered. The in-between places remain to be explored in detail. The problems of arctic travel have been successfully solved, and the tropics do not

present the extreme difficulties they once did. But in both the tropics and the arctic there will be for a long time to come open places for the adventurer and the gold seeker.

Time in Engineering Calculations

TIME is a flow. Matter cannot be destroyed, but time flows by ceaselessly, never to return. The time element enters into the calculations of the engineer as it does into practically all affairs of human life. An expenditure of 100,000 ft. lb. of work is a definite quantity, a 100-lb. weight lifted 1,000 ft. or a 1,000-lb. weight lifted 100 ft. The time within which this work is done determines intensity, and the rate, or the number of foot-pounds of work per minute, is power.

A hundred horsepower motor will give forth 3,300,000 ft. lb. of work per minute at the pulley. The present value of an ore deposit containing \$1,000,000 worth of recoverable metal is dependent upon the time element. If it were mined in an extremely short time it would command a value closely approximating \$1,000,000. If it required ten years to mine it, its present value would be materially less. Labor is bought at a given price per hour or per day. For the use of capital a given rate of interest per unit of time, six months or a year, is paid.

In selecting materials for underground structures, the time element is often a determining factor. How long is the working to remain open? How long is the structure to be used? Innumerable examples might be given, but enough has been said to emphasize the prominence of the time element in engineering. The clock should be placed alongside of the engineer's scale, and he should think in terms of this as well as other dimensional units.

Work and Play

HOW easy it is to please some men. One man will indulge in an automobile. He will pick it from among the multitude of designs. It will be of a certain style and kind which bears about the same relation to the personality of the owner as does his hat, or his necktie, or even his clothes. He takes a great pleasure in operating it. He cleans and fixes it with much the same solicitude that a mother takes with her child. It becomes a hobby with him.

In sharp contrast, another man makes his work his hobby. If he be the manager of a mine, he takes delight in all the many activities above and below ground. A thousand men may be under him. He feels a certain responsibility for them. Their welfare appeals to him. If one becomes sick or meets with an accident, he is among the first to concern himself with the affair. He goes among his men imparting enthusiasm. His interest becomes theirs, and the whole project keys into harmony with the spirit he brings to his trust. It is all worth while, whether it be a play or a work hobby. It is this spirit that leavens the day and smooths out the inequalities. All men ought to make their work as well as their play a hobby.



SMOKER GIVEN BY THE AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS IN THE GOLD ROOM OF THE CONGRESS HOTEL, CHICAGO, MONDAY EVENING, SEPT. 22, 1919.

Recent Social Gatherings of Engineers

SMOKER OF THE AMERICAN ELECTROCHEMICAL SOCIETY IN THE FLORENTINE ROOM OF THE CONGRESS HOTEL, CHICAGO, THURSDAY EVENING, SEPT. 25, 1919.



Development of the Rock Drill in America

Progress in Invention and Manufacture of Rock Drills Has Been Rapid Since the Inception of the First Machine, and Today a Number of Types Are Suitable to the Requirements Demanded by Various Operations

BY CHARLES AUSTIN HIRSCHBERG

COLORADO, known to many as the land of scenic beauty and mountain grandeur, is not only the playground of the tourist and the Mecca for the followers of Izaak Walton, but also the school of the inventor, brought about perhaps by the great industry of mining gold, silver, platinum, radium, zinc, lead, and many other minerals employed by man in the useful arts. What better



FIG. 1. SKETCH OF PROSPECTOR AND BURRO

incentive could man want to spur him on to the ultimate goal of success than the knowledge of that state's vast stores of wealth, and sunshine glowing from the heavens upon him like a benediction throughout 365 days of the year?

Cunning nature, running true to form, hid her treasures deep amid the hills, so that man must seek and toil to realize his desires, and so, from the green valley to timber line and over the snow-capped range, tawny men beat trails to Colorado's treasure store in the '50s of the last century, bringing with them the pick and the shovel and the single-jack and steel. This was the start of the gold fever in the State of Colorado.

Event succeeded event rapidly until 1879, when a new period set in with the discovery of the lead-carbonate silver ores of Leadville. It was about this time that man put aside his single-jack and steel in favor of the power rock drill, invented by J. J. Couch, of Philadelphia, in 1849, and perfected during the intervening years by Couch and J. W. Fowle, of Boston, patent rights finally being purchased by Charles Burleigh, about 1866. The Burleigh drill was used in driving the Hoosac Tunnel in 1867. Fig. 3 shows Couch's first rock-drilling machine, and Fowle's first rock-drilling machine is shown in Fig. 4.

In 1871 another power rock drill was invented by Simon Ingersoll, and other similar drills, such as those of Wood, Sergeant, Waring, Halsey and Githens, made their appearance. From this time on, man's primitive hand methods of mining faded rapidly, giving away to the so-called reciprocating piston rock drill, which comprised a cylinder carrying a piston with a projecting end, to which was rigidly fastened a drill steel.

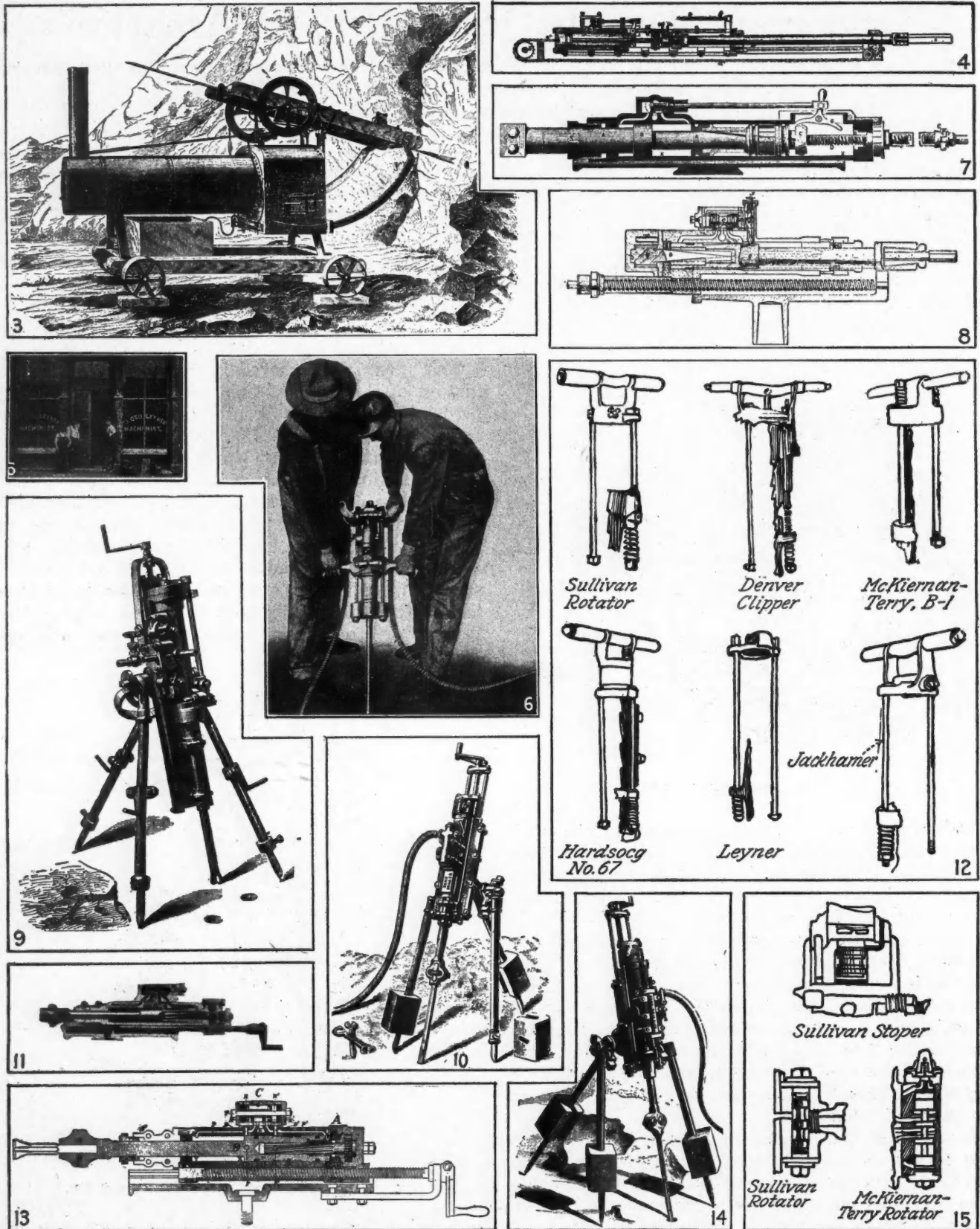
The year 1894 ushered in another period in the history of the State of Colorado, with silver mining predominant. It was about this date that J. George Leyner, a native of Colorado, born in Boulder County, opened the shop shown in Fig. 5, in the City of Denver, for the repair of mining machinery. This enterprise led him into numerous experiments with the power rock drill, finally culminating in the invention, about 1897, of the first hammer drill, a type in which the piston moves freely in the cylinder and strikes upon the drill steel instead of being attached fixedly to it, and pushing it as in the reciprocating type of drill, a direct reversion to the principle



FIG. 2. MINER WITH SINGLE-JACK AND STEEL

involved in the primitive method of single-jack and steel.

There is no questioning the debt which the mining industry owes to the invention of the reciprocating type of rock drill, but it remained for a Western man, Mr. Leyner, born and raised amidst the hustle and bustle of the mining camps of Colorado, to take a real scientific step forward in the art of drilling



GENERAL TYPES OF POWER ROCK DRILLS AND PARTS-I.

Fig. 3—The Couch Rock Drill, the first power rock drill. Fig. 4—Fowles First Rock Drill. Fig. 5—Leyner's First Shop. Fig. 6—The First Self-Rotating Hand Hammer Drill. Fig. 7—The Burligh Drill. Fig. 8—The First Wood Drill. Fig. 9—The Ingersoll Drill. Fig. 10—The Rand Little Giant. Fig. 11—Cross Section Rand Little Giant. Fig. 12—Side Rod Construction of Modern Drills. Fig. 13—Ingersoll Eclipse Drill, with Air-thrown Valve. Fig. 14—The Rand Slugger Rock Drill. Fig. 15—Modern Valve Actions of the Piston or Spool Type.

rock. It is not necessary to dilate at length upon the things he accomplished in the invention and development of the hammer drill—the introduction of water and air through hollow drill steel for cleaning the hole, automatic lubrication, enclosed-in-the-machine throttle control, mechanical rifle-bar-rotating drill steel chuck—in fact all hammer drills of the present day, irrespective of maker, have borrowed their most important features from the Leyner hammer drill.

In testimony of the value and correctness of Leyner's theories, his business grew to a point at which, in 1905, he was forced to build a modern manufacturing plant at Littleton, Col., to take care of a rapidly growing enterprise, finally ending in the purchase of license rights by the Ingersoll-Rand Co. of New York, since which time many modifications and refinements have been made, as typified in the Leyner-Ingersoll drill.

Still another product of Colorado's inventive genius is the creation of the stoper drill, which depends for its success upon an air-feed attachment to a drill cylinder, first experimented with by C. H. Shaw, of the C. H. Shaw Pneumatic Tool Co., Denver, Col., about 1906, followed rapidly by the Waugh slugger, also an air-feed type of machine; then the Crown air-feed drill of the Ingersoll-Rand, the Hardscog Wonder rock drill, the Sullivan, the Cleveland, the Leyner Stoper, and the Chicago.

The inventions chronicled proved the precursors of other styles of hammer drills; and the latter may fairly be termed modifications of design of these first types. For instance, the majority of the early hand hammer drills (excepting plug drills, employed for drilling shallow holes in granite and stone) were patterned largely after the air-feed stoper, the air feed being eliminated and a spade handle substituted; in fact, the manufacturers of these early stopers advertised the interchangeability of handle and air feed as a feature.

This early practice of interchangeability was, however, soon abandoned, for, though good in theory, it proved impracticable, and there is to be noted the appearance of the Little Jap drill, an Ingersoll-Rand product, followed rapidly by such machines as the Sullivan hand hammer drill, the Hardscog Little Wonder, Cleveland hand drill, Leyner Brownie, and numerous others.

In 1909 the first real self-rotated hand hammer drill made its appearance. Following the practice of making hand drills out of stopers, Mr. Leyner conducted extensive experiments with a Leyner drill cylinder removed from its shell. As will be seen from the illustration, Fig. 6, he placed a T-handle at the back, with additional handles part way down the cylinder. He built several of these machines, more particularly for shaft sinking. However, before he had gone very far the Ingersoll-Rand Co. obtained a license to manufacture and sell under the Leyner patents, and as early as 1912 the Jackhammer, the first self-rotating hand hammer drill employing Leyner rifle bar and sleeve chuck rotation, was placed

on the market. It proved such a success, that other manufacturers brought out modified designs.

It is often said that there is nothing new under the sun. To some extent this saying may be applied to present-day drill designs. Things which had been tried and tested in the early struggle with reciprocating drills, and later with the first Leyner drills, but abandoned because of their failure to perform as expected, and again in the latter case, because of the impossibility of securing suitable materials and a lack of knowledge in those days of refined methods of heat treating to enable materials to stand up under the particular work they were to perform, are today making their appearance in the designs of many drills and exploited as new.

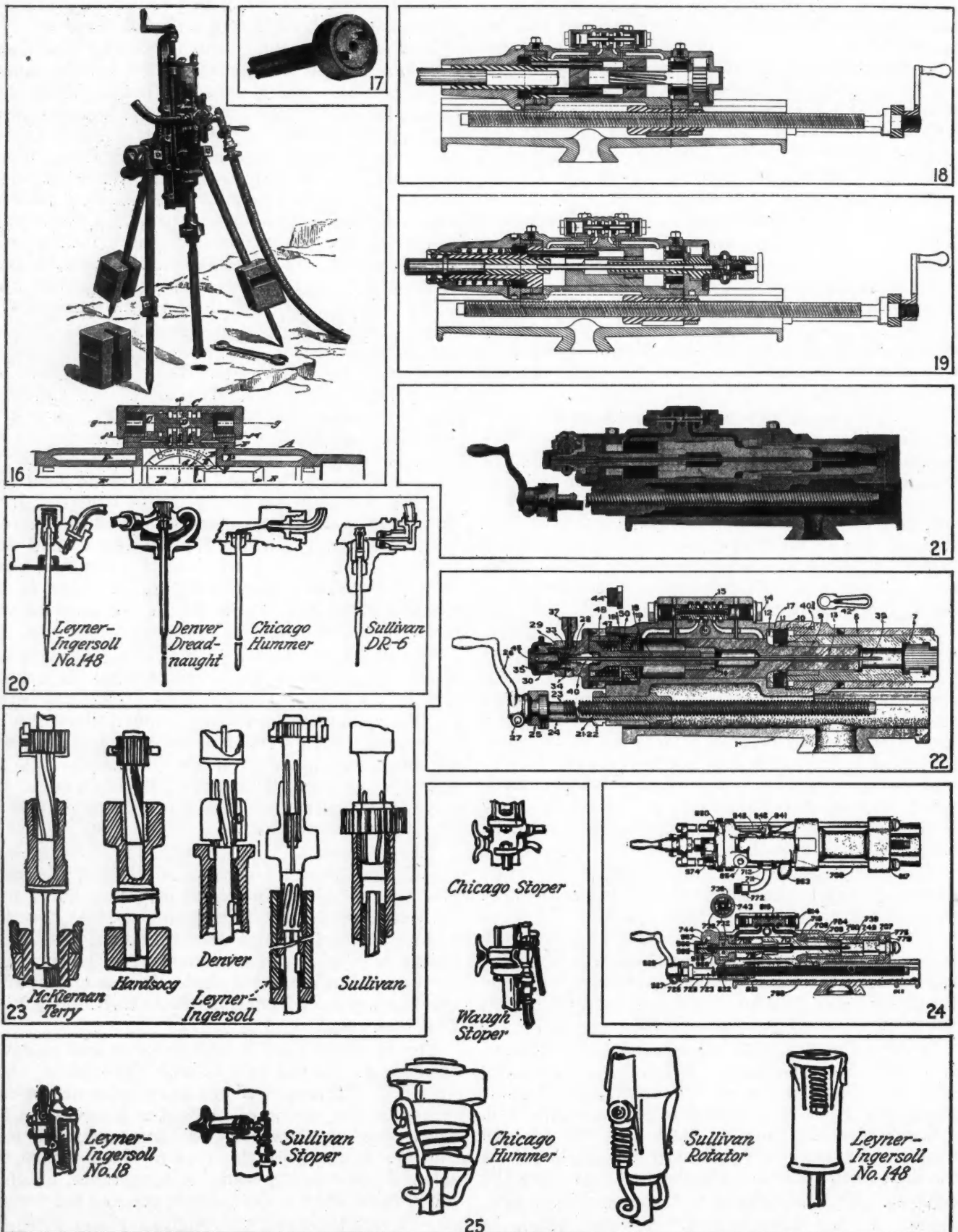
Fig. 7 shows the first reciprocating rock drill, as used by Burleigh in driving the Hoosac Tunnel in 1867, a project of construction fathered by the State of Massachusetts. The tunnel was five miles long, and was driven through hard rock. It was an ambitious scheme for those days, involving at its start the employment of hand drilling. That the work in driving this tunnel was carried to a successful conclusion was due largely to the efforts of J. W. Fowle, of Boston, who invented the Burleigh rock drill. Burleigh's part in the development of this first rock drill rested with certain improvements which he made as a mechanic in the shops of the Fitchburg Machine Works, where the machine was built.

The Wood drill shown in Fig. 8 was brought out soon after the Burleigh drill had made its appearance on the Hoosac Tunnel. In the testimony before the Massachusetts Legislature appears the following statement: "We were satisfied that this drill was an entire infringement on Mr. Burleigh's patents, and that our obligations to Mr. Burleigh ought not allow us to suffer the Michigan drill (Wood) to be used by our contractors."

The Ingersoll drill as shown in Fig. 9, which employed a tappet valve action and followed somewhat new lines of design in that it utilized a guide shell with feed screw for feeding the machine forward, making it much lighter and, therefore, possible to mount on a so-called bar mounting in place of a carriage mounting, came next. It was employed in the Musconetcong Tunnel of the Lehigh Valley R. R. This was about the year 1871.

Fig. 10 shows the Rand Little Giant drill as developed by A. C. Rand and George Githens in 1875. This drill also employed a tappet valve action controlled by the motion of the piston to operate a flat slide valve, as shown by the cross-sectional view Fig. 11. It was with this type of machine that the side-rod construction made its appearance, which is found even today in later drills, such as the present day Leyner-Ingersoll, the Sullivan Water drill, the Sullivan Piston drill, the Denver Dreadnaught, and many others. (See Fig. 12.)

The Rand Little Giant drill was adopted largely throughout the Lake Superior iron country, as well as in certain sections of the copper region. Some of



GENERAL TYPES OF POWER ROCK DRILLS AND PARTS—II.

Fig. 16—The Sergeant Rock Drill. Fig. 17—Sergeant Release Rotation. Fig. 18—Leyner's First Hammer Drill. Fig. 19—Leyner's Drill, the first hammer drill with the water feature. Fig. 20—Water Features of Modern Drills. Fig. 21—No. 5 Water Leyner Drill. Fig. 22—Cross Section of Model 6, Water Leyner Drill. Fig. 23—Hammer Drill Rotations, Modern Drills. Fig. 24—Cross Section No. 7 Water Leyner Drill. Fig. 25—Throttles and Front Heads, Modern Hammer Drills.

its notable work is the Hell Gate Channel excavation and the Weehawken Tunnels.

Fig. 13 shows the Ingersoll Eclipse air-thrown valve drill, which was an improvement over the Ingersoll drill invented by Henry C. Sergeant in 1873 and brought to its final state of development in 1878. This was the first independent valve motion control. The Ingersoll Eclipse drill was employed in driving such tunnels as the Cascade, Bozeman, Silverbow, Siskiyou, Snow Shoe, Vosburg, Coosa Mountain, Wickee, and Croton Aqueduct.

Fig. 14 shows the Slugger rock drill invented by Halsey and introduced by the Rand Drill Co., now the Ingersoll-Rand company, in 1883. This machine, it will be noted, is equipped with side rods and a flat-back head-spring to absorb shocks. The valve is of the piston or spool type. Though having an independent valve action, it was without variable stroke. It was used largely in mine work and in some of the big aqueduct tunnels.

Many modern day drills employ independent air-thrown valve actions patterned largely after these first two types. Even the first Leyner hammer drill borrowed the spool valve from these early constructions. Fig. 15 shows the valve action of a number of drills of today which fall under the same classification.

In 1884 the Sergeant auxiliary-valve drill came to the front, bringing with it the release rotation and a spool-valve motion controlled by a crescent-shaped piece in contact with the main piston, as shown in Fig. 16. This type of drill replaced to a considerable extent the Little Giant in the Lake Superior mines and drove the Catskill Aqueduct tunnels and many others, among them the Pennsylvania Tunnel under the East River, New York. The release rotation feature of this type of drill, shown in Fig. 17, gradually found its way into other makes of drill, including the No. 6 Water Leyner drill, brought out by Leyner in 1906.

From 1898 up to the present time many revolutionary changes in the mechanics of the rock drill are to be noted. This is the period of hammer drills, and during these years there was a gradual passing of the piston drill. Leyner's drill as shown in Fig. 18 made its appearance in 1897, followed by the type of drill shown in Fig. 19, in 1898, it being the first of his or any other drill to employ water and air through the drill steel.

Referring to Fig. 20 it will be observed that present day builders of hammer drills borrowed in its essential details the water-and-air principle of the Leyner drill. Fig. 21 illustrates the No. 5 Leyner drill, brought out about 1903, showing substantially the same type of rotation first employed in the later models of Leyner drills, except that it had a locking key for holding the steel in the chuck, which feature was abandoned in the Model 6, Fig. 22, already referred to, and later types.

Fig. 23 shows the rotations of various makes of hammer drills, which it will be noted correspond in main essentials to the Leyner type. In Fig. 24 is

shown the No. 7 Leyner drill, which may be said to be the real father of all present-day hammer drills. It includes in its design the Sergeant release rotation feature, the rifle-bar rotating-sleeve chuck feature, the water-and-air feature, and the first automatic lubricator, as well as inclosed machine throttle construction, and one piece solid front head, and, finally, split front head with through bolt retained by the front head cap. It is interesting to note the variations of features of these designs as found in other makes of machines, as shown in Fig. 25, including the mounted hammer drills, self-rotating hand-hammer drills, and stoper drills, with their air-feed attachments as well.

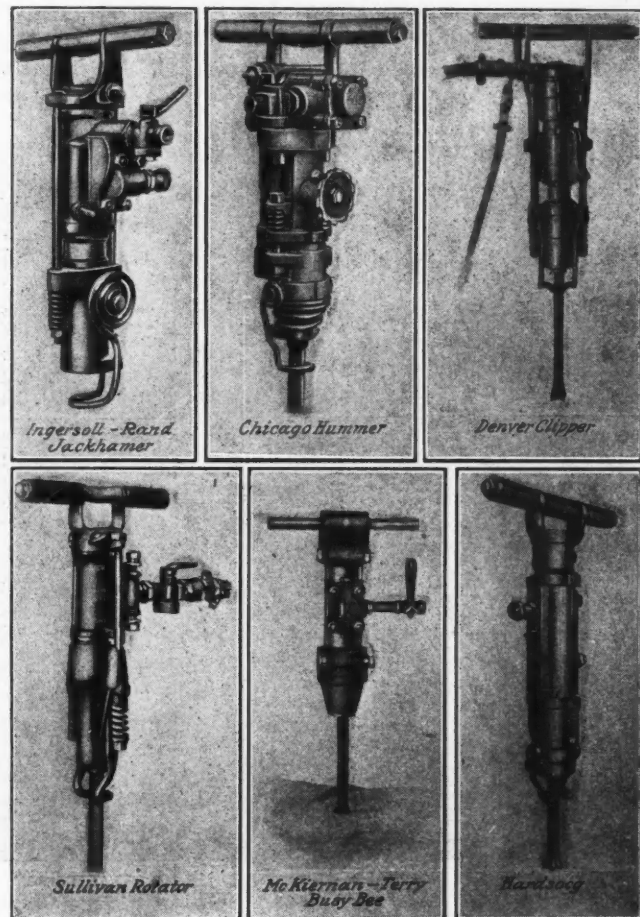


FIG. 26. MODERN SELF-ROTATING HAMMER DRILLS

The Leyner drill has been used in such notable work as the Newhouse tunnels, the Lucania Tunnel, the Los Angeles Aqueduct tunnels, the Laramie Poudre Tunnel, as well as in some of the biggest mines of the country, numbering among others the Calumet & Hecla, Anaconda, Homestake, as well as many other large mines abroad.

It is interesting to compare the advance which has been made in the self-rotating hand-hammer drill, starting with Leyner's first experiment in 1909, shown in Fig. 6, on through to the Ingersoll-Rand Co.'s various Jackhammer types, Sullivan Rotator, Denver Rock Drill Co.'s Clipper drill, Chicago Pneumatic Co.'s Hummer, McKiernan-Terry Busy Bee, and many others, as shown in Fig. 26.

Dedication of Pittsburgh Bureau of Mines Building

Exercises on September 29, 30 and October 1, Largely Attended. Speakers Praise Work of Bureau. Interesting Demonstrations at Experimental Mine and Explosives Testing Station at Bruceton, Pa.

BY EUGENE P. McCORKEN

THE new Bureau of Mines Building in Pittsburgh, Pa., was dedicated on Sept. 29, the ceremonies being attended by a large number of engineers and mining men from all parts of the United States. Representatives of Federal and state departments, of the engineering profession, and of labor delivered addresses, the tenor of which attested the great importance of the work of the Bureau in the conservation of human life and natural resources. These ceremonies were followed by an

burgh Chamber of Commerce, Sept. 29, 30, and Oct. 1, and the various events were of the highest technical and dramatic interest to the attending delegates.

The dedicatory exercises were held at 10:30 a. m. in the rear of the Bureau of Mines Building. After the invocation by Chancellor McCormick of the University of Pittsburgh, Chairman Gillespie introduced E. V. Babcock, Mayor of Pittsburgh, who made the address of welcome, extending the hospitality of the city to the visitors. Mr. Babcock



PANORAMIC VIEW OF FORBES FIELD, SHOWING FIRST AID TEAMS ON FIELD

exhibition of explosions of coal dust and black powder, demonstrating in a realistic manner the ever-present danger and the imminence of such occurrences in practical operations. The utility of liquid oxygen as an explosive was also demonstrated. Of especial interest was the presentation of the pageant, "The Hidden Treasures of Earth," by Thomas Wood Stevens.

The fourth national First Aid and Mine Rescue Contest was held on Sept. 30 and Oct. 1, and was the largest safety meet so far held in the United States, the teams coming from every section of the country and representing the coal and metal-mining and metallurgical industries.

The celebration of the dedication and the safety contest were held in co-operation with the Pitts-

referred to the efforts of the civic authorities, beginning ten years ago, to secure the new building for Pittsburgh, which is a strategic center of the great mining and manufacturing industries. Alexander T. Vogelsang, First Assistant Secretary of the Interior, representing Secretary Franklin K. Lane, responded. Mr. Vogelsang read a message from the Chief Executive, dated Sept. 23, from Ogden, Utah, as follows: "Will you not be kind enough to convey my most hearty greetings to the assemblage at Pittsburgh next Monday? I wish that I might be present to express my very deep interest in the work being done by such instrumentalities for the increase of production, the safeguarding of life, and the raising of the standard of labor and scientific endeavor. It is a very happy circumstance that with this

meeting should be associated the ceremonies connected with the dedication of the new building in Pittsburgh of the Bureau of Mines."

In his address, Mr. Voglesang said that the work of the Bureau was greatest in times of peace, but that during the war the Bureau "gave the country a service that was excelled by no mechanical or scientific association to any other country at war in any part of the world." In referring to the work of the Bureau, the speaker said, "If an industry does not elevate labor and prevent waste, it alone is responsible if the Government takes over and operates that industry." Mr. Voglesang also urged that all industrial differences be settled, and expressed the hope that this country might have a year of industrial peace.

Following Mr. Voglesang, William C. Sproul, Governor of Pennsylvania, spoke on the necessity of the Government teaching safety and rendering assistance in development of mechanical devices in the arduous labor of mining. The Governor said the question of housing was of much importance and that he was prepared to make recommendations at the next legislative session, which might be considered radical, but which would bring about better home conditions.

J. Parke Channing, representing Horace V. Winchell, president of the American Institute of Mining and Metallurgical Engineers, was then introduced. Mr. Channing chose for his topic "The Engineer in Industry," and in his address discussed the distribution of wealth, presenting statistics from an investigation made by W. R. Ingalls. Mr. Channing's speech will be published in a succeeding issue of the Journal.

John L. Lewis, president of the United Mine Workers of America, was represented by the next speaker, Van A. Bittner, who delivered an address, making a strong plea for improvement in certain sections of the country where loss of life and wastage of coal in mining were comparatively high. He referred to the work of the late Joseph A. Holmes, the first Director of the Bureau of Mines, which was received with applause. The record of the Bureau of Mines since its organization in 1910 was truly remarkable, the speaker said, in the saving of life. In 1909, there were killed in the coal mines of the United States 3.96 men per 1,000 employed, or one death per 174,416 tons produced. In 1918, the death rate was 3.39 per 1,000 men, or one death per 266,000 tons.

At the conclusion of the addresses, the key of the building was turned over to Director Van. H. Manning by Assistant Secretary Voglesang. Mr. Manning in receiving the key said: "It is indeed to me a very high privilege to accept from you this key to this magnificent structure which has been contributed to the cause of humanity by our Government. It is an honor to be the representative who has been selected to accept this emblem which stands for safety and efficiency in the universal industry, and I hereby pledge to you, Mr. Secretary, and to you who represent capital and labor, employer

and employee, in the mining and allied industries, my allegiance to the cause we represent."

Experimental Mine and Explosive-Testing Station

After the conclusion of the dedicatory exercises, the delegates were taken on two special trains to Bruceton, Pa., to the experimental mine and explosives-testing station, where actual demonstrations of various explosions and causes in connection with mining work were made. Also, a rockdust barrier for flame and the use of the "geophone" were shown. The program, which gives in detail the various events, follows:

(a) Explosion in experimental mine.

Pulverized Pittsburgh coal dust was used, placed on cross shelves overhead and on the floor and side shelves. Two pounds per foot of entry was applied from the mouth of entry to station 450, and one pound from 450 to 650, a total of 1,100 pounds.

The cannon loaded with three pounds of FFF black blasting powder was situated on the floor of the entry, 225 feet from drift mouth, pointing outby.



VAN H. MANNING RECEIVING THE KEY OF THE BUILDING FROM ALEXANDER T. VOGELSANG, FIRST ASSISTANT SECRETARY OF THE INTERIOR

Pressure manometers (gages) were situated 550 and 750 feet respectively from the mouth of the drift; flame recorders were placed near the dust barrier and matches were used throughout the test zone to indicate the presence of flame.

- (b) Inspection of and demonstration of rockdust barriers on outside of the mine.
- (c) Inspection of the interior of the experimental mine. Demonstration of the "geophone," an instrument used for locating imprisoned miners.
- (d) Demonstration of the use of liquid oxygen explosives (blasting stump).
- (e) Demonstrating the danger of an electric current making a circuit through metal powder containers.
- (f) Demonstrating the danger from the flame of miners' open-flame lamps coming in contact with kegs containing black blasting powder.

Fourth National First Aid and Mine Rescue Meet

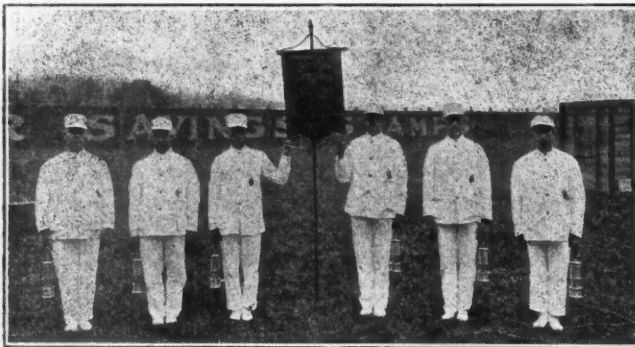
The fourth National First Aid and Mine Rescue meeting, in connection with the dedication, was the largest gathering of its kind ever held. Eighty-one teams, from fifteen different states, competed

for first place in First Aid, and twenty teams entered the Mine Rescue contest. The events, both in the eliminations and finals, were close, and a number of ties resulted, which were worked off in special events.

A feature of the events was a contest in artificial resuscitation, in which ten teams entered in the First Aid finals took part. It was won by the United States Coal & Coke Co., Inc., Gary, W. Va., of which F. S. Hock was captain. The team was awarded a large silver loving cup, to be held until the next national contest. The judges of this contest were Captain C. C. Gans, Medical Corps, U. S. Army; Dr. S. L. Underwood, and Dr. A. E. Torrence. The practical nature of the events is shown by the two problems given the Mine Rescue teams. The first was the recovery of a worker from under a fall of slate following a mine explosion, the teams being required to rescue the man and treat his injuries. The other

and Edward H. Coxe, general manager of the Snowden Coke Co., Brazzelle, Pa., chief judge of the Mine Rescue events. D. J. Parker, chief safety engineer, Bureau of Mines, headed the committee on grounds. E. E. Bach, director of the State Americanization Bureau, was chief recorder.

A smoker in the Chamber of Commerce rooms was the closing event of the meet, and here the winners were announced and the prizes awarded. The winning team in the First Aid contest received the Colliery Engineer cup, to be held till the next meet, and the National Safety Council cup, which becomes its permanent property. Each member of the winning team received a bronze medal from the American Red Cross and a gold medal from the National Safety Council, and the members of the second and third teams silver and bronze medals, respectively. The winner in the Mine Rescue contest received the Colliery Engineer cup and the gold cup

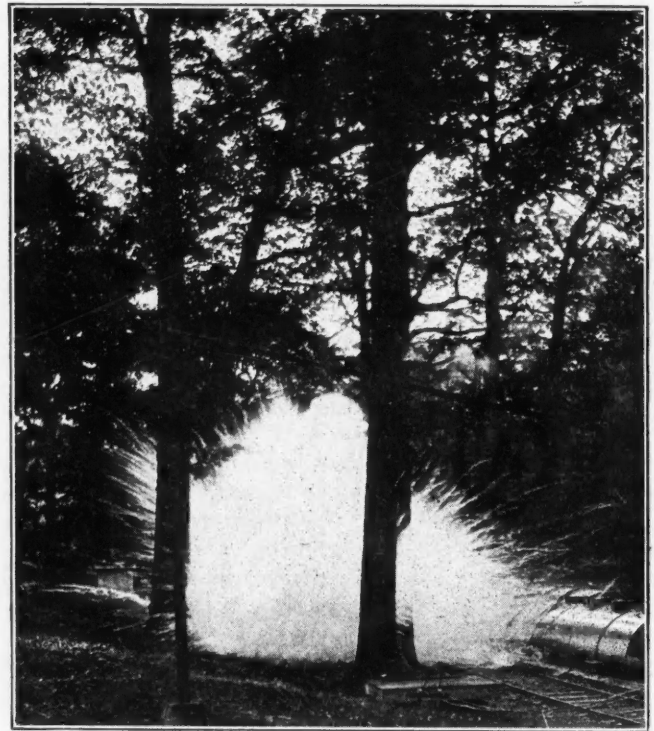


FIRST AID TEAM NO. 51, STANDARD MINE, H. C. FRICK CO., MOUNT PLEASANT, PA. WINNER OF FIRST PRIZE

problem dealt with the rescue of two men from a tunnel in which dynamite was burning. These problems were prepared by the Bureau of Mines.

The First Aid problems, five in all, were chosen by Major M. J. Shields, of the American Red Cross. These problems were also as practical as possible and covered treatment of a number of injuries frequently met in mine and mill accidents. The Standard Mine team of the H. C. Frick Co., of Mount Pleasant, Pa., won the First Aid contest in competition with twenty teams which survived the eliminations. J. C. Spence was captain of the team, which won with an average of more than 99 per cent in the five problems given. Second place was won by the Butte District team, of Butte, Mont., of which Joseph E. Watson was captain. A team representing the Roslyn Fuel Co., Seattle, Wash., was third. W. J. Evans was captain.

Unusually high percentages were made by the winning teams in the Mine Rescue contest. First place was captured by the Acme Mine No. 2, Union Coal & Coke Co., Bentleyville, Pa., headed by Mark Jones, with 99 per cent. The team representing Leisenring No. 1 Rescue Station, H. C. Frick Co., won second, with 98 per cent. The captain was Patrick Bradley. Buffington Rescue Station, H. C. Frick Co., led by Frank Hyde, won third. Major Shields was chief judge of the First Aid contests,



EXPLOSION OF 25-LB. KEG OF F.F.F. BLACK BLASTING POWDER PRODUCED BY OPEN FLAME LAMP

presented by Coal Industry. The members of the winning team received gold medals from the National Safety Council and the members of the second and third teams silver and bronze medals, respectively. The teams winning the championship of their respective states, as determined by their rating in the first day's contest, received state champion pennants and merchandise prizes contributed by firms in Pittsburgh and elsewhere. The list of state champions among metal-mining companies is as follows: Mine Rescue—Alabama, first prize, Republic Iron & Steel Co., Birmingham; Montana—first prize, Butte district. First Aid—Colorado, first prize, Primos Chemical Co., Vanadium; New Jersey—first prize, Raritan Copper Works, Perth Amboy;

second prize, New Jersey Zinc Co., Franklin; Montana—first prize, Butte district; Tennessee—first prize, American Zinc Co., Mascot.

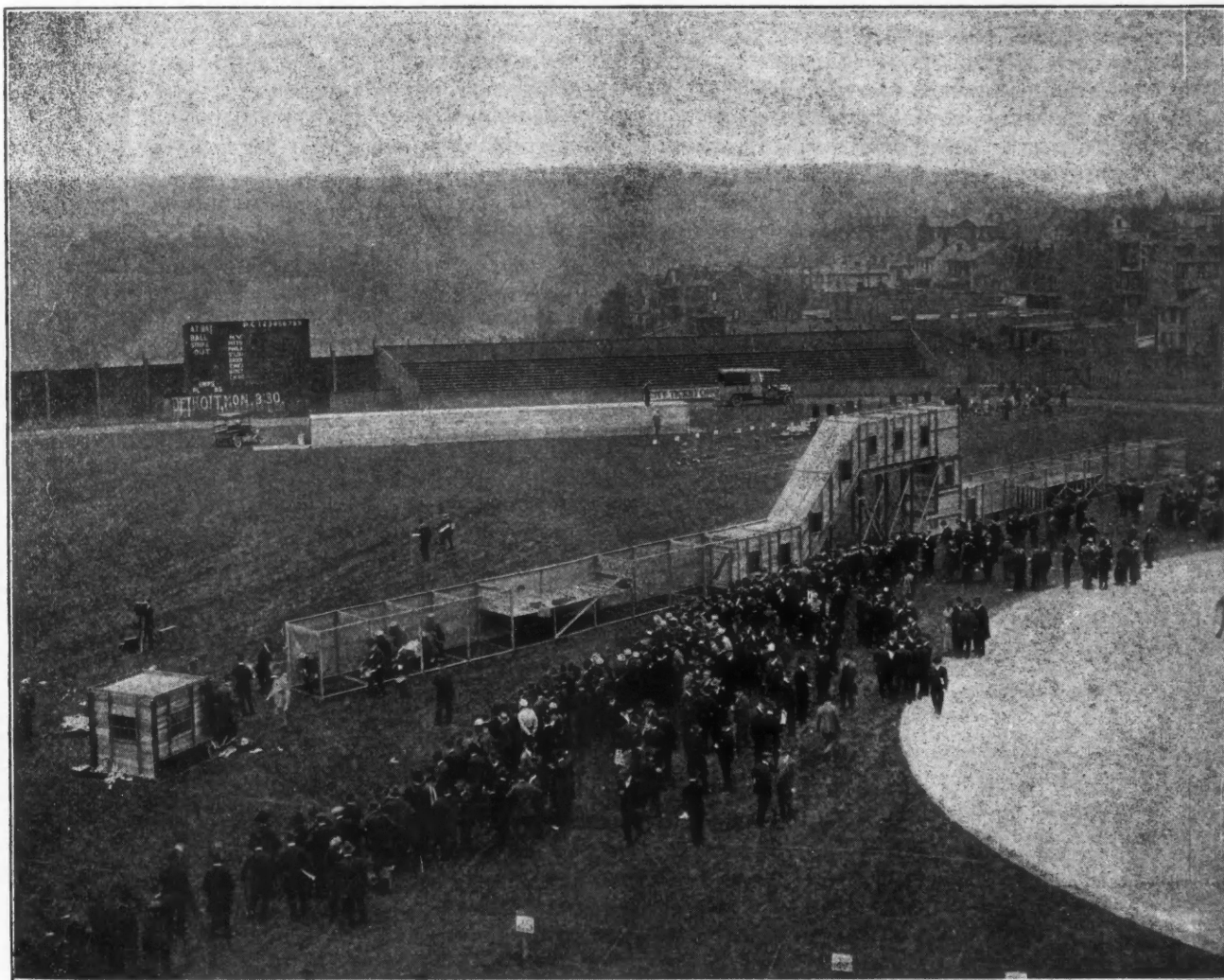
Man's Conquest of Nature's Forces Shown Dramatically in Pageant at Forbes Field

The romance of the mining industry was portrayed on the night of Sept. 30 in the pageant "The Hidden Treasures of Earth," which was presented at Forbes Field under the auspices of the Pittsburgh Chamber of Commerce. It was written and directed by Thomas Wood Stevens, and some of the

Emperor, who places it in the lap of the idol of the country. As the bystanders and the emperor kneel with bowed heads, the slave stabs the ruler and escapes with the nugget.

The third scene represented the development of iron. King Edward III visits the furnaces in Sussex, England, and is incensed at the cutting of his forests for fuel, but is so impressed by the development in the production of iron that he forgives the people and grants them the freedom of the forests.

The fourth scene portrays moments in the progress towards the safety of life in coal mining, begin-



SPECTATORS VIEWING MINE RESCUE TEAM LEAVING THE GAS GALLERY

actors of the company were employees of the Bureau of Mines, students of the Carnegie Institute of Technology and University of Pittsburgh, and members of the United Mine Workers of America. The pageant was composed of four episodes, depicting figuratively the discovery by man of the treasures of the earth.

The scene of the first episode was in the bronze mines of Tarshish, Spain, at the time of Solomon. The second episode was laid in India, where a Greek slave finds a gold nugget by mining, instead of washing the sand for gold, as his comrades were doing. The nugget is taken from him, finally reaching the

Emperor, who places it in the lap of the idol of the country. As the bystanders and the emperor kneel with bowed heads, the slave stabs the ruler and escapes with the nugget.

Two of the Old Mill Sites of the East Rand Proprietary Mines are being cleaned up to recover the gold and amalgam, which, in the course of many years' working, have escaped recovery and accumulated. Colonel Bottomley described the process in his last annual report, which was abstracted in the South African Mining and Engineering Journal. The location of the deposits is determined by panning promising waste material. The rubbish is burned and sluiced, the sluices being about 100 ft. long, set at an angle of 15 degrees.

E. and M. J. Quotations Recognized by Court

Price Disturbances Due to Government Control Did Not Render Contract Void—How Market Price of Copper During War Was Determined—The Question of Embargo

A CASE arising out of the disturbances of war upon the market price of ore was recently decided in the Appellate Division of the Supreme Court of New York. Incidentally, the decision handed down shows the regard in which the Engineering and Mining Journal is held in the metal trades and industries (*Boret et al vs. L. Vogelstein & Co., Inc.*, 177 N. Y. S., 402).

In this issue plaintiffs were doing business in London, England, and made contracts with the defendants, doing business in New York City, whereby the defendant agreed to purchase from the plaintiffs the total production of copper ore, or copper matte, in seller's option, produced by the South American Copper Syndicate, Ltd., from its Aroa mines, or other mines in Venezuela, for a period of eight years beginning Jan. 1, 1918. Also, contracts were made regarding the freights, which provided for the transportation of the ore or matte from Tucacas, Venezuela, to New York at a specified freight charge, payable on delivery at Chrome, N. J., or at any port other than New York, as ordered by defendant. The contracts were entered into on March 20, 1916. The controversy arose over that provision relating to the fixing of the price to be paid for the ore. No price was named, but it was "to be paid for at the average price of electrolytic wire bars as published in the Engineering and Mining Journal of New York. . . ."

Referring to the agency named in the contract through which the price was to be established, the court said: "The Engineering and Mining Journal, which was and is recognized by the metal trades and industries as a standard and reliable source of information, published the daily current market price of metals, including refined copper (electrolytic wire bars) as bought and sold and dealt with in the open market, and based said quotations on information obtained from the trade and sales reported by producers, agencies, and dealers in the open market, and correctly stated how quotations were obtained as follows: 'The above quotations are our appraisal of the average of the major markets. . . .'"

After making of the above contracts, war was declared between the United States and Germany, and in the statement of facts as agreed upon between the parties it is said that in September, 1917, the President and Government of the United States established, fixed, and prescribed the amount of 23½c. per lb. at which refined copper should be bought and sold in the United States, which sum was less than the market price prevailing before that time; and, says the decision, "Since that time the Engineering and Mining Journal of New York has quoted from day to day the sum thus fixed by the Government as the quotation on copper."

Now, the plaintiffs notified the defendant that they accepted all the modifications introduced by Government regulation of copper prices, and insisted that the written agreements between them were valid and enforceable. This was before any copper ore or matte had been shipped to the defendant. Prior to plaintiff's notice, however, the defendant had notified plaintiffs it regarded the contracts null and void by reason of the conditions created by the action of the United States Government, and it thereupon declined and refused to accept or transport any ore under the contracts. However, in June, 1918, a shipment of copper ore and matte made by the plaintiffs arrived in the United States, and by mutual consent of the parties, and without prejudice to the rights of either of them, and without recognizing any contract as existing, the defendant consented to receive this shipment, pay the freight and dispose of the ore "for the account of whom it may concern," and in accordance with this agreement defendant handled this shipment, remitting the net remaining proceeds to the plaintiffs in London.

During all of 1918 and later, the Federal Government refused to allow shipments of copper from South America to this country, except by special permit obtained from the War Trade Board. During this time plaintiffs, and defendant on plaintiff's behalf, made numerous requests for permits to import copper from South America, all of which were refused, except for the importation of the shipment the payment for which is the subject of this action, and one later shipment.

There was no controversy, said the court, as to the disposition of this shipment of ore, but the controversy submitted for the decision was whether or not, upon the foregoing facts, the plaintiffs were entitled to judgment against the defendant in the sum of \$9,996.80, being in addition to the amount remitted before to plaintiffs on account of the one shipment of ore dealt with as above stated; and the further deciding whether the agreements entered into in 1916 between the parties, relating to the sale of copper ore or matte, were valid and enforceable contracts under all the conditions, provisions, and circumstances specified above. If no such valid and enforceable contracts existed by virtue of the agreements as originally entered into, due to the intervention of governmental power and authority regulating the importation and price of copper, then the plaintiffs, the court held, were not entitled to recover.

The claim of the plaintiffs was that their acceptance of the lower price, as fixed by governmental orders, precluded said acts of the United States Government affecting the validity of the contracts, and also that any restriction imposed as to importation of copper was immaterial for the purposes of the cause, for the reason that the particular shipment which was the subject of this action reached the United States, as before stated.

In opposition, the defendant claims that under all the conditions, provisions, and circumstances, including the acts of the President of the United States and the Federal Government, these agreements had

been rendered void, the voiding of the smelting contract necessarily voiding the freight contract, without which there was no material to be transported.

The case was submitted to the court upon an agreed statement of the facts. Regarding the fixing of the price of copper at 23½c. per lb., in one place it was stated that the President and Government of the United States fixed and established the price; then again it was stated the price was fixed by agreement between American copper producers and the United States Government. However, the court held that from the stipulated facts the parties agreed that the conditions and regulations existing fixed and determined their rights to the same extent as if the price had been fixed by the Congressional action and Presidential proclamation; and the court stated that a careful search failed to reveal any act of Congress that either fixed the price of copper, or authorized the President or any executive department or commission to do so.

Further in its opinion, the court said that the establishment of 23½c. per lb. for copper was a fact, and this price was quoted in the Engineering and Mining Journal as the prevailing market price at the time of the delivery of the copper in question. The plaintiffs had accepted this and notified defendant. The contract had provided for a contingency of the price dropping as low as 16c. per lb. The contract did not fix the price. It clearly expressed the intention of the parties that the copper was to be paid for at the prevailing market price at the time of the various deliveries. The contract was to extend eight years, and was entered into after most of the great powers were at war with Germany. The parties may have contemplated that unusual and abnormal market conditions would be occasioned by the war, that the United States might become involved, and that the performance of the contract might become both difficult and burdensome. But, said the court, parties cannot be relieved from the performance of their contracts for those reasons, but only where, by acts of law, the performance therefore has become impossible or illegal.

If the contract had fixed the price of copper at a figure higher than 23½c., and the Government of the United States had thereafter legally fixed the price at 23½c., and forbidden sales at any other price, the contract would have been rendered illegal and unenforceable, said the court. But that was not the case.

The defendant contended that the parties had designated the Engineering and Mining Journal as a valuer to fix the price, and also argued that the price was to be fixed by the prices established in an open and competitive market. Neither contention was correct, said the court. The Engineering and Mining Journal was not to value and fix the price of this copper. Its statement of the prevailing market price was recognized and adopted by the parties as a correct statement, and payments were to be made on the basis of the market price as stated therein. Whether there was competition or agreement among the sellers of copper was immaterial. The price that other purchasers paid at the time of the various de-

liveries, as ascertained and published in the said Journal, was the price defendant agreed to pay, held the court.

As the shipment sued on was delivered despite the restrictions against importation, the effects of the embargo need not be determined, said the court, it merely holding that in so far as the contract was executed by the plaintiffs the defendant on his part was bound to pay. The final contention of defendant was that the freight contract was void, as the plaintiffs were not bound to furnish any specified quantity of copper for shipment; that is, this contract was void for the lack of definiteness. But it was held that the freight and ore agreements were so mutually interdependent as to constitute a single contract. In the ore contract the plaintiffs agreed to sell the entire production of the mines, and therefore the court held it was the entire production of the mines that the defendants were to transport. Said the court: "It is well settled that, where a party agrees to purchase the entire production of a plant, the seller impliedly agrees to deliver the entire production, and that the contract is not unilateral."

Judgment was accordingly rendered for plaintiff.

The Vapor Pressure of Lead Chloride

During the past few years interest has been revived in the possibility of treating certain complex ores, especially those of lead, zinc, silver, and copper, by a process involving a chloridizing roast, and subsequent volatilization of part or all of the valuable metallic constituents. In order to make a technical study of this process, a knowledge of certain fundamental data, such as the vapor pressures of the chlorides of the metals involved, is essential. There is a decided lack of such information in the literature. The Bureau of Mines has been making an experimental study of the volatilization process to determine its possibilities and limitations, and has also undertaken to determine the vapor pressures of the important metallic compounds concerned in the process. The vapor pressure of lead chloride was the first to be investigated.

The results of the work have been published by the Bureau of Mines as Technical Paper No. 225, which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents. The vapor pressures for lead chloride at temperatures from 500 to 850 degrees c. are given, together with the weights of lead chloride in unit volumes of saturated vapor between 500 and 950 degrees, and the vapor pressures of the solid salt down to 400 degrees. The melting point was found to be 498 degrees, and the heat of vaporization at that point 40,600 calories.

During the Daylight-Saving Season last year, according to the Compressed Air Magazine, the Edison Electric Illuminating Co., of Boston, saved 4,420 long tons of coal because of the extra hour of daylight utilized by turning the clock one hour forward. The decrease in kilowatt-hours from this cause was 5,000,000, representing a loss of revenue of about \$350,000.

Plans for the Fourteenth Census of Mines and Quarries

Census Bureau, Geological Survey, and Bureau of Mines to Co-operate—State Surveys Also to Assist in Collating Statistics

FOR some months negotiations have been in progress between the Bureau of the Census, the U. S. Geological Survey, and the U. S. Bureau of Mines, looking toward a fuller utilization of the technical experience and facilities of the two mineral bureaus of the Government in the coming Fourteenth Census than in previous censuses. An agreement covering this co-operation has finally been perfected. The co-operative arrangements are based upon the recognition of the necessity for eliminating duplicate work, the need of uniformity in the compilation of statistics, and the desirability of focusing upon this difficult task all the technical experience already available in the Government service.



Harris and Ewing

F. J. KATZ

Under the co-operative arrangements as finally perfected a considerable number of the technical specialists and statistical clerks of the Division of Mineral Resources of the Geological Survey, together with some trained specialists and clerks in the Bureau of Mines, will be assigned to duty with the Division of Mines and Quarries of the Census, although probably retained upon the payroll of the first-mentioned bureaus. This staff will be fused with the existing staff of the Division of Mines and Quarries of the Census, the entire organization, augmented by the addition of new members, to constitute the fusion statistical organization.

F. J. Katz, who for a number of years has been one of the specialists of the Division of Mineral Resources of the Geological Survey, and who re-

cently has been associated with the administrative work of that division, has been appointed chief of the Division of Mines and Quarries of the Census, effective Oct. 1, and will have immediate charge of the fusion statistical organization. Mr. Katz, in his new capacity, will be entirely a census official, but his long experience in the mineral statistical work of the Federal Survey will insure a sympathetic utilization of the organized experience of the Survey in the forthcoming mineral census.

The joint supplemental schedules relating primarily to the mineral production will receive the benefit of the technical knowledge of the Survey specialists in their preparation, and after they have been filled in they will be edited and criticised by the same technical specialists and statistical clerks of the Survey who for years have been intimately familiar with the particular subjects involved. The general schedules which will accompany the supplemental schedules will cover some of the broader features of the mineral industry, such as capitalization, and will be edited and tabulated by the Bureau of the Census in co-operation with the technical specialists of the Bureau of Mines and, in some cases, the Geological Survey. The technical talent of the two mineral bureaus will also be used in the preparation of the final report of the census dealing with the mineral industry during 1919. Though the Geological Survey will thus contribute heavily of the time and knowledge of its technical staff to the census work, the regular Survey reports dealing with various phases of the mineral industry will be continued and published in the usual form.

A significant feature of the Fourteenth Census is the fact that it will be conducted so far as possible by mail, and the field agents will be used only in the collection of delinquent schedules. In previous censuses virtually all of the census information was obtained through field agents. It is believed that the use of the mails will not only facilitate the co-operation between the census and the Survey, which has for years obtained its statistical returns largely by mail, but that this arrangement will also expedite the work.

For many years the statistics of the production of gold, silver, copper, lead and zinc in the Western states have been obtained by the Survey through branch offices at Denver, Salt Lake City, and San Francisco. During the census year the statisticians in charge of these offices will be designated as census agents, and the joint schedule covering the mineral production of the Western states will be sent out from and returned to these cities, thus insuring the full utilization of the intimate relationships between the statisticians in charge of these offices and the mining industries of the states which they serve.

That the delinquent mineral schedules shall be handled as intelligently as possible, it has been arranged that the field agents operating in states where mining is the predominant industry shall, as far as practicable, be men of some experience in mineral matters.

The Geological Survey has co-operative arrangements with a considerable number of state surveys, to insure complete co-ordination between the mineral statistical work of these state organizations and the Federal organization. Though it will be impossible during the census year for any of the mineral schedules to be returned to state organizations before they are sent to the Census Bureau, authorization has been secured whereby the Geological Survey may continue to furnish state surveys tabulations of the mineral production to such states as desire to continue such co-operation. In such cases the joint Census-Survey or Census-Bureau of Mines schedules will be rubber stamped to indicate co-operation with the state.

San Francisco Engineers Hear Hoover

At a Recent Dinner He Renews Acquaintances With Pacific Coast Colleagues—Discusses European Economic Conditions—Favors League of Nations

BY LEROY A. PALMER

THE engineering organizations of San Francisco gave a dinner to Herbert Hoover at the Commercial Club on Oct. 7. It was the first time that I had seen Mr. Hoover, and it may be that the impressions that he made on a fellow-member of his profession will be of interest.

As our guest passed through the gathering of 300 representatives of the engineering professions, who rose and applauded enthusiastically, my first thought was: In this the man who has done all of those wonderful things of which we have read, even to taking liberties with our menus, which no one, at the outset, supposed he or any one else could get away with? The man who passed my table was not of great stature, or of stern face and dominating appearance, but of average height, with a rather serious and almost quizzical expression of countenance that seemed to betray embarrassment, or perhaps a wish that the walk to the speaker's table was over and that we would let him move about without so much fuss.

After the dinner, T. A. Rickard made an address in which he referred to Hoover as "the most useful man in the world, whose name is known wherever civilization has spread . . . The man with a million children who pray for him every night and whom a million mothers bless every day."

During this address Mr. Hoover studied the table cloth directly in front of him and toyed with a lead pencil. He smiled in rather an embarrassed manner at an occasional personal sally, such as the reference to "this shy, stubborn fellow," and I could feel that under any turning over in his mind of what he was to say himself was an undercurrent of thought to the effect, "What does he want to spill all of that stuff about me for? Why doesn't he cut it short?"

I had heard that Mr. Hoover is not an especially brilliant speaker. I do not agree entirely. He is not an orator, but speaks in a low-pitched conversational

tone, with clear enunciation and without hesitation. The first person singular is noticeably inconspicuous. A sense of humor crops out, more in manner perhaps than in speech, and he impresses one as being thoroughly human.

In his address he paid tribute to engineers as a class as men of "quantitative" rather than "qualitative" minds, and stated that for this reason he had found them particularly helpful in carrying on the work he had been called on to do in Europe. He spoke briefly of what had been accomplished by the Commission for Relief in Belgium and by other relief organizations with which he has been connected since the armistice.

The burden of Mr. Hoover's address was the necessity for greatly increased productivity to meet the present unstable economic conditions. To this end we must set aside sentiment and revenge and re-establish trade relations with the Central Powers, assisting them to rehabilitate themselves so that they may discharge their obligations to the rest of the world. He favors the Peace Treaty and the League of Nations as they stand. Not that they are perfect, but that until peace is a definitely accomplished fact no one will extend to the Central Powers the financial assistance without which they cannot get into the producing class. Hence we should overlook the imperfections of the treaty and accept such risk as may be involved in order that we may effect a stabilization of economic conditions as soon as possible.

After the address, Mr. Rickard stated that Mr. Hoover would be willing to answer questions. It was here that we obtained an insight into his quick mind and extraordinary range of information. Without hesitation, he skipped from Russia to the famous telegram consigning the obnoxious German officials to "that place paved with good intentions"—to quote the questioner—from Silesia to prices of foodstuffs at home.

I think most of us were somewhat amused at one question as to the source of the power by which he had accomplished his ends, particularly when, as chairman of Allied Relief, he had had to deal with certain recalcitrant states. Mr. Hoover modestly assured us that he had found almost every one willing to co-operate; but when not, he had been in a position, through his control of foodstuffs, to apply pressure. I am sure that most of the audience would have answered that question with one word—"Hoover."

With respect to Russia, he expressed the opinion that Bolshevism is tottering, that Lenine has confessed its failure in certain vital respects, and that it will be better to let it fall of its own weight than to give any occasion for holding its leaders up as martyrs.

Doubtless the questioning would have continued indefinitely had Mr. Rickard not suggested that Mr. Hoover had been very generous in the matter, so what every one felt to have been an unusually interesting and satisfactory meeting broke up with "He's a Jolly Good Fellow."

Bankers and Mining

Successful Mining Investment Requires Discrimination Between Prospects and Mines—Meritorious Mining Enterprises Compared to Other Commercial Ventures—Basis for Bank Loans—Mining Risks are Reduced to a Minimum by Able Management

BY H. A. WHEELER
St. Louis, Mo.

THE average business man may be forgiven for his frequent inability to distinguish between a prospect and a mine, or between "wild-cat" drilling and developing a proven oil field. His knowledge of such matters is usually so superficial that he fails to recognize the great intervening gulf until after he has lost his money in trying to bridge over from the prospecting to producing stage. But a mining engineer is trained to discriminate clearly between *hunting* the game and *eating* the game, and he is not accustomed to regard a meritorious mining enterprise as being too hazardous for bank loans.

By the term prospecting, or "wild-cattling," I mean the searching or hunting for ores, minerals, or oil, which must always precede mining, or the *winning* or *production* of ores, minerals, or oils.

All mines were once prospects and all oil wells were originally "wild-cats," and the searching for properties that can subsequently be developed into paying mines or profitable wells is a hazardous venture. Time and money, no matter how liberally spent, cannot make a mine out of a prospect, or a well out of a "wild-cat," if the mineral or oil is not there in sufficient amount and under such economic conditions as to make it a profitable producer. Patience, persistence, and ample capital may finally succeed in discovering a prospect that can be developed into a mine, but the percentage of such successes is so small, and the risk is so hazardous, that only those who can afford thus to gamble the time and money should undertake it. It is a game for optimistic, red-blooded, strong men, who can afford to speculate with more or less of their capital and continue smiling if it results in total loss. However, the stakes are usually so large, if crowned with success, that, most fortunately for the progress of the human race, there are plenty of men who have the requisite nerve and backbone to "buck the tiger."

Prospecting, or "wild-cattling," is a genuine gamble, and although with good judgment and the accumulation of a ripe experience the chances of success can be greatly improved, it is hazardous to expect banking aid. But this applies exclusively to prospecting or "wild-cattling," or the searching for profitable deposits or pools.

After a deposit has been proven up by a prospector, or a pool of oil has been located by a "wild-catter," it becomes as legitimate a field for the consideration of the banker as any new enterprise. By proving up a prospect I mean the requisites of good modern mining practice that demand sufficient development work in shafts, drifts, and crosscuts, or ample drill holes, to demonstrate an orebody of sufficient size, richness, and character to make a paying mine—not an over-grown, excessively worked prospect that may count drifts by the mile, as the famous Sierra Nevada mine, on the Comstock lode. For the latter has never been more than a huge prospect, although more or less continu-

ously worked for fifty years through incessant assessments. It is extremely unfortunate that the term mine, without any qualification, is so loosely applied by the market to all underground workings, whether mere prospects or developed producers.

It is not surprising that the layman, who accepts the term mine without investigating whether it is a prospect or a producer, has been so frequently misled into a prospecting proposition under the supposition that it was a producing mine.

When the tonnage actually demonstrated by developments, whether by drifts or drilling; when the grade of the ore and working conditions show that it can be profitably operated—then, indeed, is the banker leaning backward if he is too conservative to advance the funds to assist in producing plant equipment or working capital.

With all precautions, there are still uncertain factors—risks that do not render the enterprise as safe as a Government bond, some of which are more or less inherent to mining, whereas others are due to changes in markets and local conditions that affect all mercantile business. But if those behind the enterprise have good judgment, ample experience, and integrity, without which any enterprise is a dangerous hazard, whether mining, manufacturing, merchandising, or banking, mining loans should be as favorably considered by the banker as those in any other mercantile calling.

The conservative investor is likely to be more familiar with the financial failures of mining enterprises than with those in general business. For the mortality record of the mercantile world, according to Dun and Bradstreet, shows that it is only a question of years when over 90 per cent fail or go out of business, and this merely means that the retiring party foresees the impending bankruptcy and quits before it overtakes him.

Every new business enterprise is a speculation as to its ultimate success, yet most banks are willing to grant more or less credit to the young merchant or manufacturer, who often struggles for several years before he has built up an organization and a sales record that assures success and independence of banking assistance. In fact, few mercantile houses, especially the growing ones, ever reach the stage where their working capital is sufficiently large that they can successfully carry on their business without substantial aid from the banker, and the larger the firm the larger the bank loans usually are to tide it over its lean and stocking-up periods.

In many lines of mercantile life there is nothing tangible, beyond goodwill and reputation, on which to make bank loans; whereas, in most mining enterprises, there are also real estate and plant investments, besides reputation, to furnish security for a bank loan. The vicissitudes and constantly changing factors in mercantile life make all mercantile paper more or less speculative, and the watchful banker is never free from

anxiety as to whether some of his best customers will be able to take up their notes promptly when they become due.

To say that no mining proposition can be called an investment—that money put into mining should only be for the purpose of reselling at a profit—is ultra conservatism. About fifty years ago, when producing mines were few, and legions of prospects were being floated as mines, there would have been a better foundation for an over-cautious attitude toward mining. But with the great strides that have been made toward putting mining on a healthy plane—with the large outlays in development work to prove up the magnitude and profitable character of ore-bodies before attempting to put them on a producing basis—such excessive conservatism is unwarranted.

A timid investor or speculator would have sold Calumet & Hecla stock, bought as a speculation for \$12 in 1872, for \$25 a share, and thus doubled his money. But the Boston investors who put it in their safes have seen it advance to \$1,000 a share, and have taken out over \$1,550 per share in dividends (\$10 to \$100 a year), besides being able to sell it today for over \$400 a share in the present depressed condition of the copper industry. Yet few mines have been more unfavorably received by the market than was the stock named when it was floated, and few mines have been more conservatively managed in carrying large ore reserves and in frequently re-equipping the property with improved plants at the expense of junking earlier machinery.

The stock of the Homestake mine could have been sold at a profit in 1885, but those who locked up their stock have drawn about \$6 a year in dividends since then, and it is selling around \$80 a share today (the par value being \$100).

Quincy copper stock could have been sold at a profit in 1862, when it paid its first dividend after organizing in 1848, but those who held their stock have drawn dividends of \$2 to \$18 a year (par value \$25) since then that total over \$250 per share, and today can realize over \$70 a share.

The St. Joe lead stockholder who in 1876 had held his stock for about ten years while the property was slowly being converted from a prospect into a mine could have sold at an attractive profit, but those who held their stock have received 60c. to \$40 annually in dividends that aggregate over \$21,000,000, and today can get about \$14 for the stock (par value \$10).

Though the number of mining stocks that could be held for years for their dividend return—held as investments for their income returns—is large, I emphatically disagree with those who assume that any investment—of whatever nature—“can be locked up in a safe for five years.” No investments—no matter how seemingly safe and secure—can be ignored and forgotten for even a year, much less five years. New conditions are constantly arising in the life of all enterprises that are likely to affect their value greatly, and he who thinks that any investment is absolutely safe is woefully ignorant, and will probably receive severe jolts and losses. Perpetual vigilance is the price of success in any investment, no matter on what industry it is based.

The New England families who put all their savings into the New Haven railroad stock, as a life-long investment based on a dividend record of 10 to 8 per cent per annum from 1887 to 1912, have received no dividends

for the last five years. Stock for which they paid \$150 to \$255 a share is selling around \$30. St. Paul railroad stock that paid continuous dividends from 1895 to 1917, and cost the “sleeping investors” \$80 to \$199 per share, is no longer paying dividends and is selling around \$45, although it was recently enlarged into a trans-continental system in order to protect its traffic.

British consols—the statnchest, safest bond known to the investment world—were selling a 113 in 1897, and today they are below 50. They sold as low as 54 in 1815 and were up to 102 in 1852. Absolute safety is unknown in any investment, as the only two sure things in this world are death and taxes, and even the former cannot be dated. Everything is speculative to a greater or less degree. We are always surrounded by risks and changing conditions—the latter sometimes moving very slowly and sometimes abruptly—and the successful investor is he who is constantly on the alert to foresee impending changes, and who buys or sells accordingly.

Anticipate—anticipate—anticipate—is the keynote of successful investment, whether it is in mining, manufacturing, railroading, merchandising, or banking, and the mining world, including oil, has as many opportunities for reasonably safe investment as any other industry, if intelligence and good judgment are exercised. Hence it is in equity as much entitled to receive intelligent banking support as any other line of business.

Discrimination must be shown by the banker in making any loan in any line of business, and all his loans are more or less speculative. When the mining business is conducted on conservative lines, with its normal risks reduced to a minimum by able management, efficient plants, large reserves, and ample working capital, it is fully as worthy of the confidence of the banker as any other industry.

Metal Production in Ontario In First Half of 1919

Returns received by the Ontario Bureau of Mines from the mines and metallurgical works of the province for the first six months of 1919 are as follows: Gold, \$4,666,759, an increase of only \$18,595 as compared with the corresponding period of 1918; silver, 5,744,172 oz., compared with 8,736,002 oz.; metallic cobalt, 59,337 lb., a decrease of 59,552 lb.; metallic nickel, 5,147,745 lb., an increase of 4,938,943 lb.; nickel oxide, 5,503 lb., a decrease of 16,265 lb.; cobalt oxide, 202,912 lb., a decrease of 56,459 lb.; other cobalt and nickel salts, 160,021 lb., compared with 222,039 lb.; pig lead, 1,481,204 lb., an increase of practically 100 per cent in quantity; blister copper, 3,080,491 lb., against no production in the corresponding period of 1918; nickel in matte, 7,072 short tons, as compared with 21,393 tons for the same six months in 1918; copper in matte, 4,341 tons, as compared with 10,708 tons; pig iron, 24,095 tons, compared with 38,130 tons.

The figures throughout show a serious decrease, owing to after-war conditions. The drop in silver is due to Cobalt being a declining camp. The decrease in nickel and copper is also serious, as it runs into such large figures. It is altogether likely that the next six months will show further decreases in copper and nickel, as production fell as low as 2,000 tons of matte a month. From that figure it is showing a slow increase, and at the present time is up to about 2,500 tons a month. The consumption is altogether domestic, however, and there have been no foreign orders.

Colorado Section; A. I. M. E.

National Department of Public Works and the Engineers' Licensing Bill Impel Action by Local Members—Co-operation of Other State and National Bodies Solicited

A MEETING of the Colorado Section of the American Institute of Mining and Metallurgical Engineers was held at 6:30 p. m., Sept. 19, 1919, at the Savoy Hotel, Denver. Thirty-three members and guests were present at the dinner, which was followed by a business session. U. S. Senate bill 2232, creating a department of public works, was discussed and explained in detail, and a motion in support of the bill creating such a department, now before Congress, was passed.

A motion instructing the secretary to write a letter to all members of the Colorado Section, explaining the purpose for which subscriptions from the members are asked, in connection with securing the passage of Senate bill 2232, was also passed.

Colorado Senate bill No. 339, creating a state board of engineers' examiners, and licensing engineers in the State of Colorado, was discussed. A motion was passed that the sentiment of the meeting was unanimously in favor of the repeal of this bill. A motion was passed that the chairman appoint a committee of three members to endeavor to secure the repeal of the engineers' license bill, and to communicate with the local sections of other national societies with a view to securing their assistance; and that every member of the Colorado Section of the American Institute of Mining and Metallurgical Engineers assist in this matter as far as possible. In accordance with the motions passed at the meeting, the following two letters, under date of Sept. 30, were sent to members of the Colorado Section:

Gentlemen: At the meeting of the Colorado Section held in Denver on Sept. 19 the following resolution was unanimously adopted:

"Whereas, There exists today in our Government in Washington a state of chaos in various departments, divisions and bureaus, caused by conflicting or overlapping calls for engineering services, therefore be it

"Resolved, That it is the sense of this meeting that no effort should be spared in securing the passage of Senate bill 2232, believing that economy in operation and co-ordination of government agencies affected will be secured by its passage; that the Secretary of this local section of the American Institute of Mining and Metallurgical Engineers be instructed to inform our various Representatives in Congress of this belief, requesting their wholehearted aid and assistance in obtaining its adoption; and that a copy of this resolution be sent to M. O. Leighton, Esq., chairman at Washington of the Engineers', Architects' and Constructors' Conference on National Public Works."

Senate Bill No. 2232 changes the name of the Department of the Interior to the Department of Public Works. It transfers the non-engineering activities of the Interior Department to other appropriate branches of the Government, and, in turn, transfers to the Department of Public Works the following bureaus:

- A. The Supervising Architects' office from the Treasury Department.
- B. Construction Division, U. S. Army, River and Harbor Improvements, Mississippi River Commission and California Debris Commission, from the War Department.
- C. Coasts and Geodetic Survey and Bureau of Standards from the Department of Commerce.
- D. Bureau of Public Roads and Forest Service from the Department of Agriculture.

The bill provides that all secretaries of public works shall be qualified by "training and experience" to administer the affairs of the department, and that there shall be four assistant secretaries, each especially qualified by experience and training to administer the functions under his control. These assistant secretaries are to serve an indeterminate period, and can only be removed for cause.

The Department of Public Works is necessary for the following reasons:

1. The United States is, with one exception, the only nation of importance not now administering its public works through such a department.
2. The public works activities are now spread out over many departments, with no co-ordination of effort. Duplication necessarily results as well as conflict of authority and great waste of public funds.
3. Public works are strictly technical in their character and require the services of a permanent and skilled personnel for their efficient construction and operation.
4. The creation of such a department would result in the formation of a technical organization competent to administer the engineering work of peace and further to provide the nucleus of an organization capable of being expanded immediately to meet the war construction and research needs of the country.
5. The formation of such a department would attract to its service competent men of a calibre not now available for Government work, and would create a permanent body of skilled, experienced men, competent to undertake new enterprises, whose permanence and pride of accomplishment would create an excellent esprit de corps.
6. There is no Government organization in existence capable of rendering this service.
7. It would permit of a unified control over public works and a comprehensive plan for their continuance over a term of years, according to a modern and businesslike financial plan based on an annual budget.

Any private or corporate business conducted according to the methods of the Government would speedily become bankrupt, and would deserve such a fate. There are twelve federal organizations engaged in making surveys, more than a score in chemical investigations, some of them competing and quarreling for preference under the same departmental rule. In the "Congressional Directory" there are listed twenty-nine bureaus and agencies of the Government engaged in construction of one or another kind, while four Government departments are engaged in fuel tests. To educate the people concerning the need of consolidating the vast public enterprises of the nation under one central department, which would be known as the Department of Public Works, there has been organized the Engineers', Architects' and Constructors' Conference on National Public Works. At the formation of this conference in Chicago in April, 1919, there were represented seventy-four technical societies, with a membership of 105,000.

At a recent meeting of the Engineering Council of the State of Colorado the movement to obtain the passage of this bill was unanimously endorsed. The Engineering Council consists of representatives of all the national engineering societies and several local societies. The purpose of the Engineering Council is to secure greater co-operation among engineers in matters of public policy, and the enactment of laws which concern the welfare of the engineering profession.

To carry on successfully the work of securing the passage of the above-mentioned bill, a minimum of \$100,000 is necessary for educational purposes. These funds must be furnished by professions and industries making up the conference. For the first time there is a united movement of the engineering professions and industries to support a movement of national interest and importance. To succeed, it must be supported with our efforts and with our money. We as engineers cannot afford a failure. The funds will be controlled and accounted for by men of national standing. The quota of Colorado is about \$900, which means a minimum contribution of \$1 from each engineer in the State. Send it today to our State Chairman, Mr. Richard A. Parker, 802 Equitable Building, Denver, Col.

Yours respectfully,

Robert M. Keeney,
Secretary.

Gentlemen: At a meeting of the Colorado Section of the American Institute of Mining and Metallurgical Engineers, held on Friday, Sept. 19, 1919, a resolution was unanimously passed condemning the Engineers' Licensing Bill passed at

the last session of the State Legislature, and requesting the chairman to appoint a committee to act in conjunction with the other national engineering societies and the Colorado Metal Mining Association, with a view to securing its repeal at the extra session of the Legislature which the Governor has expressed his intention of calling.

It may be within your knowledge that the bill in question was passed by the Legislature and signed by the Governor without the knowledge of any of the national societies, and of few if any of their members. Under its provisions residents of other states cannot even come into this to examine a mine without securing a license, and aliens (among whom are many honored members of the profession in Colorado) cannot obtain such a license at all. The mining industry in this state needs the co-operation of outside engineers, and we should welcome any assistance from them that will tend to develop our resources. To attempt to discourage the activity of visiting engineers will inevitably react on us, and brand the state as being hostile to brains and capital from outside.

The difficulty of securing a license will prove a serious handicap to young engineers starting out in the independent practice of their profession. Moreover, a license issued to an engineer qualified in one branch will entitle him to practice in any other; so that the license is apt to mislead the public.

All members of the Institute are requested to communicate immediately with State Senators and Representatives, and to request them to write to the Governor expressing their readiness to co-operate in the repeal of this obnoxious measure.

The Governor of the state has expressed a willingness to include the repeal of this bill as one of the objects of the special session of the Legislature which he is about to call together, if a general sentiment is shown to exist sufficient to assure him that its repeal is generally desired.

Yours respectfully,

George E. Collins,
Robert Hursh,
J. C. Roberts,
Committee.

Tungsten Bill Protested

At a recent meeting of consumers and importers of tungsten and tungsten ore, the following resolution was passed in protest against the tungsten ore tariff as proposed in the Timberlake bill, H. R. 4437, which has been passed by the House and is now pending before the Senate Finance Committee:

Resolved, That this meeting, representing a large majority of tool-steel manufacturers, exporters of finished tools, ferro-tungsten producers and refiners, and consumers of tungsten ore in the United States, unanimously declare its undivided and determined opposition to the Timberlake tungsten tariff bill, H. R. 4437, as passed by the House of Representatives, as being against the spirit of the time as indicated by the balance of trade exchange, etc.

It is further resolved, That in the opinion of this meeting no case has been made out by the Western producers before the Ways and Means Committee during the consideration of this measure in Washington in favor of such an exorbitant duty as \$10 per unit and per ton of tungsten ore.

It is further resolved, That it is of vital interest to the country that the small and available deposits of tungsten ore in the United States, which were estimated by such a high authority as Frank L. Hess, of the U. S. Geological Survey, as sufficient to last only for three years, be conserved to meet the emergencies of the steel industry should foreign supplies of tungsten ore be cut off by reason of international complications.

Resolved, further, That this resolution be brought to the attention of Senator Penrose, Chairman of the Committee on Finance, and to each member of the committee.

David Dows,
Secretary.

Monthly Copper Production in 1919

The table which appears herewith is compiled from reports received from the respective companies (except in the cases noted as estimated), together with the reports of the U. S. Department of Commerce as to imported material, and in the main represents the crude-copper content of blister copper, in pounds.

Production of the United States by months since the beginning of the year and the corresponding figures for 1918 were as follows:

	1918	1919
January	165,431,568	135,733,511
February	160,011,364	111,649,512
March	185,525,168	102,040,460
April	163,207,096	95,808,998
May	181,070,350	92,652,975
June	166,723,599	95,856,570
July	159,329,031	100,369,247
August	165,550,799	107,994,040

The grand total includes, under "Imports in ore and blister copper," the production of such companies as Granby, Cananea, Braden, Cerro de Pasco, and Chile. As a matter of record, however, the individual figures are given after the total. We also report the copper output of the Boleo and Katanga companies, which does not come to the United States.

MONTHLY CRUDE COPPER PRODUCTION, 1919

	June	July	August	September
Alaska shipments (c)	2,374,843	3,021,912	4,333,009	6,208,840
Arizona:				
Arizona Copper	2,400,000	2,400,000	2,900,000	2,900,000
Calumet & Arizona	4,872,000	4,802,000	4,814,000	4,494,000
Cons. Ariz. Smelting	625,000	650,000	650,000	600,000
Inspiration	6,300,000	6,000,000	6,500,000	5,800,000
Magma	936,117	903,179	638,483	770,937
Miami	4,385,865	4,113,452	3,999,120	4,139,103
New Cornelia (a)	2,708,000	2,756,000	3,066,000	3,092,000
Old Dominion	2,015,500	1,629,000	1,937,000	2,460,000
P Phelps Dodge	6,680,335	7,239,075	7,150,731	6,402,000
Ray	3,890,000	3,865,000	3,895,000	3,850,000
Shattuck Arizona	Nil	Nil	386,027	70,412
United Verde	3,525,000	4,040,000	4,970,000	4,990,000
United Verde Extension	2,806,849	4,582,572	3,275,452	3,247,216
California:				
Mammoth	Nil	Nil	Nil	Nil
Michigan:				
Calumet & Hecla	5,439,761	6,208,517	7,586,601	8,505,991
Other Lake Superior (b)	5,750,000	5,750,000	5,826,000	6,490,000
Montana:				
Anaconda	10,530,000	11,122,000	12,600,000	12,780,000
East Butte	1,613,360	1,458,420	2,054,760	2,093,780
Nevada:				
Nevada Cons.	3,715,482	3,706,103	Nil	4,250,000
New Mexico:				
Chino	3,615,458	3,626,354	3,321,857	3,538,704
Utah:				
Utah Copper	9,528,000	8,405,863	8,640,000	8,220,032
Eastern Smelters	1,400,000	1,400,000	1,400,000	1,400,000
Total reported	85,011,570	87,659,247	89,994,040	.....
Others, estimated	10,845,000	12,710,000	18,050,000	.....
Total United States	95,856,570	100,369,247	107,994,040	.....
Imports: Ore and concentrates, etc.	7,732,950	13,417,814	7,434,970	.....
Imports in blister, etc.	19,842,478	18,033,812	15,954,604	.....
Grand total	123,431,998	131,820,873	131,383,614	.....
British Columbia:				
Granby Cons.	2,072,964	2,050,000	2,171,204	1,477,280
Mexico:				
Boleo	1,256,640	1,256,640	1,597,040	1,477,280
Cananea	3,000,000	3,200,000	4,200,000	4,200,000
P Phelps Dodge, Mexican properties	1,735,000	2,516,000	3,422,000	2,827,000
Other foreign:				
Cerro de Pasco	4,026,000	3,984,000	5,726,000	5,266,000
Chile	5,003,430	7,161,444	8,994,210	7,044,000
Katanga	4,519,430	4,442,270	5,026,488	4,440,064
Backus & Johnston	2,107,000	2,174,000	2,118,000	1,280,000

(a) Only electrolytic cathodes are entered. New Cornelia also produces some copper from ores sent to Calumet & Arizona smeltery. (b) Estimated. (c) Official figures of the U. S. Department of Commerce; includes Kennecott production from its Alaska mines.

The Federated Malay States in 1918 exported the following metals, according to Commerce Reports: Gold, 18,309 oz.; wolfram, 710 tons; scheelite, 111 tons; tin and tin ore, 37,370 tons. In 1917, the metal exports were: Gold, 18,154 oz.; wolfram, 421 tons; scheelite, 340 tons; tin and tin ore, 39,833 tons.

PETROLEUM SECTION

Engineering Notes and Equipment Details
Production Statistics — Progress
in Important Fields

West Virginia Oil Output

West Virginia now ranks higher than Pennsylvania, according to information by Henry L. Doherty & Co., in both quantity and value of oil produced. In 1918, the state produced 7,868,000 bbls. valued at \$31,652,000, or \$4.02 a bbl.; Pennsylvania produced 7,408,000 bbl., valued at \$29,606,000, or \$4 a bbl. West Virginia did not begin to produce oil until 1876, and oil was not found in important quantities until 1891. Pennsylvania began producing oil in important quantities as early as 1861.

The West Virginia fields have declined greatly since 1900. In that year production reached its high point, amounting to 16,200,000 bbl. Efforts are being made to find additional oil-producing territory, and some wells have been put down 7,500 ft., but with no success up to the present. The theory is that the rich Clinton sand of Ohio can be reached in the state at a depth of between 7,000 and 8,000 ft.

West Virginia has produced 294,745,000 bbl. of oil since 1876. The state's production in recent years is shown in the following table:

1918.....	7,867,000	1911.....	9,795,000
1917.....	8,379,000	1910.....	11,753,000
1916.....	8,731,000	1909.....	10,745,000
1915.....	9,265,000	1908.....	9,523,000
1914.....	9,680,000	1907.....	9,095,000
1913.....	11,567,000	1906.....	10,120,000
1912.....	12,129,000	1905.....	11,578,000

The West Virginia fields produce oil which is especially good for lubricating purposes. This oil is worth more than \$4 a bbl. at this time.

Latest Gusher of the Standard Oil

California's oil production was increased during the week ended Oct. 7 by more than 12,000 bbl. of oil daily as a result of the Standard Oil company's gusher which was brought in on Section 36 of the Elks Hills district, about ten miles northeast of Taft. The well is known as the Carmen No. 1 well. It has been spouting oil 30 to 40 ft. above the derrick, and the flow has varied from 10,000 bbl. to more than 15,000 bbl. It is probably the largest gusher since the famous Lakeview No. 1 was brought in, in the Sunset field, on Mar. 15, 1910. The Lakeview spouted from 35,000 to 60,000 bbl. daily for six months.

This is the first big gusher in the Elk Hills field, although several big gassers have been brought in. The well is regarded as an indication of unusual development activity in this section in the near future. It is situated about one mile east of the big gasser brought in in June of this year, and the oil is of high gravity.

This well has been under drilling operations for about six months, and has a 6-in. drill casing with a 10-in. well casing at the mouth. The crown of the

casing was left intact by the blow-off, and this facilitated the work of bringing the enormous producer under control.

Anglo-Persian Oil Co. Plans Pipe Line to Mediterranean

Plans are under way for the construction by the Anglo-Persian Oil Company of a pipe line, 350 to 400 miles in length and costing approximately \$48,665,000, to provide an outlet for the company's products on the Mediterranean, according to a report received by the Bureau of Foreign and Domestic Commerce. It is anticipated, according to the report, that the saving in freight on oil for European countries would more than compensate for the heavy initial cost.

No decision as to the route of the pipe line has yet been reached. It is understood that the terminus of the line will be at Haifa, whether the route is along the Bagdad railroad or a direct line across the country. In the event that the direct line be chosen, it is reported that an all-British railroad across Mesopotamia from side to side may become probable.

Distillation of Oil Shale in Germany

Prior to the outbreak of the Great War, shale was worked in the Rhine provinces and near Reutlingen, but only one company was occupied in producing paraffin and mineral oils, according to an article in the Zeit. d. Ver deut. Ingen. of July 19, 1919, abstracted in the Journal Soc. Chem. Ind. From the bituminous shale which occurs near Messel (containing 40 to 45 per cent water, 6 to 10 per cent tar and 40 to 50 per cent residues), the following yields per ton of shale are obtained: 32 gal. of crude oil, together with 71 gal. of ammonia water and 1,900 cu. ft. of gas, which is burned as fuel in gas engines or under the vertical retorts. During the war the oil-shale deposits in South and North Germany have been investigated in regard to their yield, but the results have not been published.

El Progreso District, Mexico

In answer to inquiries from American firms regarding the mining probabilities in the Progreso Consular District, Mexico, the American Consul at Yucatan, Mexico, in a report to the Department of Commerce, states that there is no mineral production in that district.

The efforts of several Americans, the report states, who have worked in connection with oil production and who have prospected through portions of that district, led to no discovery of formations that would indicate the existence of mineral oil.

Two large tanks and a pumping station, which are owned by the Compania de Fomento del Suresta de Mexico, in the district of Progreso, it is reported will be offered for sale.

Fuel Supplies For the New American Oil-Burning Ships

Greater Cruising Radius Reduces the Number of Fuel Stations Necessary—The Need of Foreign Supplies For American Ships—Advantages of Oil-Burning Type

During the early stages of the war, Great Britain put into effect a system of bunker license as a necessary military measure. The United States Shipping Board realized that after-war conditions might develop a situation with respect to coal supplies which would dictate the necessity of a modified application of bunker license at British stations. In that event we would have been at a serious disadvantage unless immediate steps were taken to assure unrestricted operation of our ships in the world's trade. To accomplish this it was necessary to have oil-burning steamships, instead of coal burners, with a large steaming radius, and so far as practicable, this to be fixed at a minimum of 10,000 miles. The British order of Sept. 29, 1919, justified these apprehensions.

The next task was to find suitable places for the establishment of fuel stations along the trade lanes or adjacent to them. At the Panama Canal, the turn at the world's cross road, facilities already existed and only required to be amplified. To take care of the east coast trade of South America, a station was erected at St. Thomas. This station, which had an initial capacity of 15,000 tons of storage, was opened on Oct. 2.

Arrangements have been made for establishing a station at the Azores and another at Bizerta, a small French island off Tunis and situated on the ocean highway to the Indies. Material has been assembled at Manila where another large storage tank is to be erected.

"Despite what has been done," said J. H. Rosseter, Director of the Shipping Board's Division of Operations, "we feel that we are still at the threshold of the major part of the question, this involving an increase in storage capacity of fuel stations and additional tank steamships for transporting oil to them. We must also take into account the fact that we must now carry oil to our Atlantic seaports, not only from Mexico but from the Texas and Louisiana fields as well.

"Finally we must awake to the importance of encouraging the establishment of national interest in other known and probable oil regions of the world. For two years our British friends have been admirably directing their attention to new oil regions, notably those of Colombia, Venezuela and Ecuador, and also to the fields of the Levant in which it is surmised that the fields of Turkey promise results exceeding the output of the great oil fields of California, which the Turkish fields are said to resemble. It has become necessary for us to look far afield, to safeguard the future. The value of this great mineral wealth can fairly be stated as three to one for sea use as compared with use on land."

Today, the United States possesses a fleet of 486 oil-burning steel steamships, representing 3,798,733 deadweight tons of new construction. In addition,

there are forty-nine freighters of the oil-burning type which have been reconveyed by the Shipping Board to their American owners, and still another group of eighteen which have been sold by the board and which are under the American flag. Of the 720 steel vessels under construction and contracted for, 636 are oil burners, these aggregating 4,691,659 deadweight tons. When the steel program has been completed there will be a total of 1,731 of the oil-burning type under the American flag.

Our new merchant marine was a by-product of the war and its creation brought with it this problem of bunker facilities, one that demanded immediate consideration, for upon its solution depended the success or failure of our re-entry upon the seas. Great Britain's control of the supplies of bunker coal along the main trade routes of the world has been one of the chief factors in the maintenance of her maritime supremacy. The other lies in the fact that the imports of Great Britain consist largely of produce and raw materials requiring a large amount of tonnage and that the British use coal as cargo for the outward voyage.

Coal does not command a high freight rate, but by carrying this product on their outward voyages, British ships are able to bring back raw materials at a rate that shows a profit for the round trip. After being worked into finished products by British labor, these imports are exported in British bottoms at rates remunerative to the ship operators, and so the cycle goes.

With the United States, shipping conditions are practically the reverse. The bulk of this nation's trade comprises exports rather than imports; moreover, the goods moving in the export trade have been of a greater value than coal, and have borne a higher rate of freight. This American coal has not had a ballast value comparable to that of the British product.

With Shipping Board fuel stations established on the important trade routes, the enormous advantages which this fleet of oil burners will possess, may be summarized as follows:

Oil requires less bunker space than coal for a given steaming radius.

It can be carried between double bottoms and in other places where neither coal nor cargo can be stored.

The space usually given to coal can be occupied by freight-paying cargo.

Bunkering can be effected with greater dispatch, and is not interfered with by darkness or the state of the weather.

It is not attended with the dirt and other discomforts incident to coal bunkering.

Labor and machinery are not required for handling ashes.

Oil fuel eliminates stoking, thus reducing the size of the crew and labor costs.

It possesses greater thermal efficiency than coal and reduces fuel costs.

Uniform steam pressure is easily maintained, thus insuring a steady rate of speed.

Oil and Gas in Utah

U. S. Geological Bulletin Summarizes the Possibilities Of Petroleum and Gas Production of the Farnham Anticline and Reviews Natural Conditions*

BY FRANK R. CLARK

THE Farnham anticline, about ten miles south-east of Price, Carbon County, Utah, is structurally favorable for the accumulation of oil and gas. It is a small uplift in a great northwestward-dipping monocline. The south and east flanks are short compared with the north and west flanks, and within a short distance from the crest of the anticline conform to the regional monoclinical dip. If petroleum were present in any of the underlying rocks and were associated with water under pressure it would migrate up the dip. Under such conditions the west and north flanks would afford a good gathering area, and oil might be expected to accumulate in the crest of the anticline and on its northwest flank. The Farnham fault, west of the axis of the anticline, may, however, have cut off any migration, and petroleum may have accumulated on the west or down-dip side of the fault unless the displacement dies out below the surface or unless the oil- and gas-bearing stratum is offset and abuts against a higher or lower porous rock on the east side of the fault.

The known occurrences of petroleum in the Rocky Mountain States in rocks older than Cretaceous are few and widely separated. In Utah A. R. Shultz noted considerable evidence of petroleum in the Nugget sandstone and Park City formation on the south flank of the Uinta Mountains. The Nugget sandstone in many places is highly saturated with asphaltic substances, and the Park City formation contains cavities filled with asphalt, gilsonite, and related hydrocarbons. In some places the material is soft and waxy, and in others it is hard and brittle. Schultz considers it unlikely that the asphaltic material originated in the Nugget, and states that it may have migrated from the beds beneath, probably the Park City. This suggestion seems improbable, however, because the Nugget and Park City are separated by 1,000 to 1,200 ft. of impervious shale.

In southeastern Utah asphaltic-saturated sandstones are reported in the Jurassic of Castle Valley. Oil is reported in the Permian in the Virgin River field; several sandstones in the Pennsylvanian are oil bearing in the San Juan field; and oil seeps are reported in the Shinarump conglomerate (Triassic) and in the Pennsylvanian (?) in the Green River Desert. The only other known occurrences of petroleum in beds older than Cretaceous in southeastern Utah are several reported oil seepages along Colorado River, probably in rocks of Carboniferous age.

From the above descriptions it seems possible that in eastern Utah the upper Carboniferous and in places the Triassic rocks may yield petroleum in commercial quantities. The Farnham anticline is structurally favorable for the accumulation of oil and gas, and the nearest exposures of Triassic and Pennsylvanian rocks contain oil seepage. These conditions appear to warrant one or more test holes of this fold, though

it should be clearly understood that such tests would be purely "wildcatting."

San Juan Field—Oil occurs in the San Juan field in rocks of upper Pennsylvanian age (Goodridge formation), which contain five reported oil-bearing sands at about the following depths below the top of the Goodridge formation: Baby, 29 ft.; Goodridge, 74 ft.; Third, 190 ft.; Mendenhall, 231 ft.; Little Loop, 381 ft. Oil seepages are reported to occur at several localities in the Goodridge formation along San Juan River westward from Goodridge to the boundary of the field. At some places the oil seeps from crevices and at others it saturates the unbroken rock, but the oil impregnation seems to be local and to occur at no definite horizon in the sand. Several wells were drilled no deeper than the Baby sand, but most of them went as far as the Goodridge sand and a few penetrated to a depth of 1,425 ft. E. G. Woodruff believes that as all the wells with more than a good showing of oil are in the syncline, the area of basin structure contains most of the oil. In this field during 1916 one dry hole was completed and one well formerly classed as a producer was abandoned. The five other wells in the field reported as capable of producing were closed through lack of marketing facilities.

Green River—Prospecting for oil near Green River has extended over twenty years, and interest has several times been revived by the increasing demand for petroleum and by the discovery of other oil seeps. Two wells, Levi No. 2 and Collins, have penetrated Lupton's McElmo and entered the underlying La Plata sandstone. The Levi well, in Sec. 35, T. 22 S., R. 17 E., was drilled to a depth of 1,500 ft.; and the Collins well, in Sec. 20, T. 21 S., R. 17 E., to a depth of 2,100 ft. No oil or gas was reported from the Levi well, but gas was reported in the Collins well at 850 ft., (in Dakota sandstone) and at 976 ft., gas and salt water at 1,840 ft., and dry gas at 1,980 ft. Rainbow colors on the water accompanied each flow of gas. Most of the other wells in this area were drilled into the McElmo, but a few stopped in the overlying Mancos shale, from which most of the gas was derived.

The results of drilling up to 1912 gave little encouragement for further exploration, because three out of seven wells proved to be dry holes, three encountered traces of oil and small quantities of gas, and one struck "pockets" of gas without oil. The Green River field contains no anticlines or domes favorable for large accumulations of oil or gas.

San Rafael Swell—Several wells have been drilled for oil or gas southeast of the San Rafael Swell and northeast of Hanksville, near the junction of Fremont and Dirty Devil rivers, in T. 26 and 27 S., R. 12 and 14 E., in Emery and Wayne counties. A well 600 ft. deep was drilled just south of the "Flattops" in Sec. 18 or 19 (unsurveyed), T. 26 S., R. 13 E., which possibly passed through Lupton's McElmo formation and penetrated about 35 or 40 ft. into the La Plata sandstone, but found no oil or gas. The Des Moines Oil Co.'s well near the center of Sec. 29, T. 26 S., R. 14 E., had in November, 1912, been sunk to a depth of 2,140 ft. but did not obtain oil or gas. It is estimated that the upper 600 ft. of this well was in the Navajo and Todilto; from 600 ft. to 1,325 ft., the drill penetrated the Wingate. Fresh water was

*Excerpt from Bull. 711-A, U. S. Geological Survey.

encountered at several horizons from 310 ft. down. The Mount Vernon Oil Co.'s well, ten or twelve miles southwest of the Des Moines well, in the NE. $\frac{1}{4}$ Sec. 9, T. 27 S., R. 12 E., probably started in the Navajo and penetrated to a depth of 2,715 ft. Oil is reported to have been found in this well at 2,175, 2,530, and 2,655 ft. below the surface, all of which may be in the Pennsylvanian (?), but it is possible that the first show of oil, at 2,175 ft., was in younger rocks. These wells, according to C. T. Lupton, are near the axis of a broad, nearly flat east-west anticline which connects the San Rafael Swell, on the west, with another reported anticline occupying a position near the junction of Grand and Green rivers on the east.

Southwestern Utah—The rocks exposed to the Virgin River field range in age from Carboniferous to Eocene, and so far as known contain oil only in the lower red beds, of probable Permian age. Oil seepage near Virgin, on Virgin River in Washington County, southwestern Utah, has probably been known for many years, but no prospecting by drilling was undertaken there until recently. The first well, in the flood plain of North Creek about two miles north of Virgin, was drilled in the summer of 1907 to a depth of 610 ft. and struck oil in the Permian (?) rocks at 556 ft. This well yielded oil at the rate of ten barrels a day and stimulated the drilling of six other wells, none of which produced oil in paying quantities, but it is reported that some oil was found in all the wells. Interest in the Virgin River field has again been revived, but, although some drilling is reported, at the date of writing (September, 1918) there had been no commercial production. The oil has a specific gravity of 0.9225 (22° Bé.), contains some paraffin and a large percentage of asphalt, and is essentially a fuel oil. G. B. Richardson believes that the source of the oil is in the underlying Carboniferous limestone, that the oil-bearing rocks occur as lenses rather than as persistent beds, and that oil accumulated in this field only in lenticular beds and not in folds, because the rocks are flat-lying.

Great Salt Lake and Sevier Lake Basins—At many places in the Great Salt Lake and Sevier Lake basins considerable drilling for oil and gas has been done, but, so far as I know, oil has not been encountered in commercial quantities.

Juab Valley—Several holes have been drilled in Juab Valley, near Juab, in Juab County, but no production of oil has been reported. The rocks exposed in the valley are probably Lake Bonneville beds. Rocks of Eocene age dip westward from Gunnison Plateau beneath the valley floor, but I have no knowledge of the local structure of the rocks in the vicinity of the wells.

San Pete Valley—A hole was drilled in the north end of San Pete Valley near Mount Pleasant, but no information is available regarding the results. The beds that crop out on both sides of the valley are Tertiary.

Shores of Great Salt Lake—More or less interest and some excitement has for many years attended the drilling for oil and gas along the shores of Great Salt Lake. Oil has not been encountered in commercial quantities, but considerable gas was produced by wells about twelve miles north of Salt Lake City. This drilling has probably been stimulated at various times by the gas bubbling from hot-water springs, by reports regarding "showings" of oil in water wells and springs, and by the occurrence of solid asphalt deposits such as those

south of Rozel Hills, on the west side of the Promontory Range, on the north shore of the lake.

A well was drilled to a depth of 2,480 ft. near the Southern Pacific R.R. track at Lemay, about eighty miles west of Ogden, but found no oil or gas. The drill penetrated, according to reports, 850 ft. of clay carrying gypsum, fossiliferous limestone, and brown sandstone. Another well along the same railroad was drilled to a depth of 800 ft. at Strong Knob, at the north end of the Lakeside Mountains, about fifty-two miles west of Ogden, and obtained some gas but no oil. Several shallow wells were drilled south of the Rozel Hills, on the west side of the Promontory Range, to test the extent of asphalt beds, but no wells deep enough to test the oil or gas possibilities of this region are reported.

A well about one mile southwest of Farmington was drilled to a depth of 2,000 ft. in unconsolidated lake beds, but found no oil or gas. It is reported that another well is now (September, 1918) being drilled near the site of the old well, but no information is available regarding the results. Several wells drilled a few miles south of Farmington and about twelve miles north of Salt Lake City produced considerable gas. The deepest well was 1,400 ft. deep, but did not pass through the unconsolidated lake beds. The gas in most of the wells came from depths of 500 to 700 ft. below the surface and was piped to Salt Lake City, where it was used for about nineteen months, until the wells failed to yield sufficient gas to pay the costs of operation. A deep well has been drilled on the south shore of the lake near Grants Station, on the Western Pacific R.R., and in April, 1916, oil was reported to have been encountered at a depth of 1,900 ft. Many shallow wells have been drilled for water on the east and south sides of the lake, but so far as known these wells have found no oil or gas.

Drilling in the Lake Bonneville beds for oil or gas is attended with great uncertainties and is purely "wild-cattling," because the nature and thickness of the lake beds and the underlying bedrock are not known.

California Crude-Oil Prices

Prices offered by the Standard Oil Co. of California under date of June 10, 1919, and which prevail at present for crude oil delivered at the well in California oil fields, according to the *Standard Oil Bulletin*, are as follows:

CRUDE-OIL PRICES IN CALIFORNIA FIELD	
SAN JOAQUIN VALLEY FIELDS	
(Kern River, Midway-Sunset, McKittrick, Lost Hills-Bridge, Coalinge)	
	Per Bbl.
14° to and including 17.9° gravity	\$1.23
18° to and including 18.9° gravity	1.24
19° to and including 19.9° gravity	1.25
For each increase in gravity of one (1) full degree above 19.0° gravity, up to and inclusive of 36.9° gravity, two (2) cents per barrel additional	
37° to and including 37.9° gravity	1.62
For each increase in gravity of one (1) full degree above 37.0° gravity, three (3) cents per barrel additional	
WHITTIER-FULLERTON AND SANTA MARIA FIELDS	
	Per Bbl.
16° to and including 17.9° gravity	\$1.23
18° to and including 18.9° gravity	1.24
19° to and including 19.9° gravity	1.25
For each increase in gravity of one (1) full degree above 19.0° gravity, up to and inclusive of 36.9° gravity, two (2) cents per barrel additional	
37° to and including 37.9° gravity	1.62
For each increase in gravity of one (1) full degree above 37.0° gravity, three (3) cents per barrel additional	

Good Analytical Weights are made of three metals: 2 gr. and over of brass, gold plated; 0.05 to 1.0 gm. of platinum; and 0.001 to 0.02 gm. of aluminum.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

War Minerals Relief

Legislation which will liberalize the War-Minerals Relief Act is to be considered at once by the Committee on Mines and Mining of the House of Representatives. The bill which will be taken up by the committee is House Joint Resolution 170, which was introduced by Representative Garland, the chairman of the Committee on Mines and Mining. Mr. Garland states that he is not wedded to the terms of this bill, but has introduced it as a basis for such action as the House may see fit to take. In the bill he brings out that war-minerals claims in excess of \$15,000,000 were filed, but that a considerable proportion of the claims are being denied because of the Attorney General's interpretation of the act. He also includes in the bill the statement that it was the intention of Congress in passing the War-Minerals Relief Act "that all producers of the minerals mentioned should be repaid such sums as they were in equity and good faith entitled."

Mr. Garland's resolution provides that all claimants "who in response to any personal, written or published request or demand from any of the Government agencies mentioned in said act in good faith expended money in producing or preparing to produce any of the ores or minerals named therein, . . . and have heretofore filed their claims within the time and in the manner prescribed in said act," are to be reimbursed for the net losses incurred.

Another important feature of Mr. Garland's resolution is that in the event that the appropriation is not sufficient to liquidate all claims allowed, a pro-rata share of the appropriation is to be awarded to the claimants. The resolution also provides that 50 per cent of the amount of any adjudicated claim is to be paid immediately.

American Petroleum Institute

Details are now available regarding Van. H. Manning's proposed plan of organization for the Division of Research and Statistics of the American Petroleum Institute, which it is understood will be accepted. The amount to be expended is placed at about \$500,000 annually, which the industry can well afford, as this sum is only one-fiftieth of 1 per cent of the value of the 1918 output of crude oil and refined products in the United States.

The plan provides for a technical director, in general charge of all the work, assisted by consulting experts, who are to serve without pay. In addition, there will be an advisory committee, to meet regularly, consisting of one representative from each of the following: Bureau of Standards, Bureau of Mines, Geological Survey, Society of Automotive Engineers, National Automobile Chamber of Commerce,

American Institute of Mining and Metallurgical Engineers, American Society for Testing Materials, American Chemical Society, and the National Research Council.

The principal officials under the director are to be the chief economist and an engineer. The economist will be in charge of statistics, economic phases of the industry, and publicity. He will also give particular attention to international policies affecting the petroleum industry of the world. It is suggested that the petroleum industry in the United States, following the example set by other governments, "should unite to see that Americans engaged in development of foreign oil fields are protected properly, and that this country act as a unit to that end." Agents will be stationed in important foreign commercial centers in order that economic studies of the petroleum industry in foreign countries may be made. Uniform cost accounting and uniform laws and regulations in the industry are to be sought.

The engineer of the division is to co-ordinate the research work undertaken by the subdivisions of production, chemical engineering, utilization, and correlated activity. Systematic study will be made of the questions of leasing and bonuses, drilling, pipe lines, storage, and tank cars, and active steps will be taken in an effort to improve the internal-combustion engine for use of heavy oils.

The policy of the American Petroleum Institute, it is announced, will be to employ only the highest type of men and to pay them salaries attractive enough to insure continued service.

Leasing Bill Reported in the House

After extended consideration, the general mineral leasing bill has been reported out by the Committee on Public Lands of the House of Representatives. The committee struck out all of the bill passed by the Senate and rewrote the text. Though the general features of the Senate bill were maintained, material changes were made by the House committee. The Senate bill provides maximum as well as minimum royalty. This was changed by the House committee to provide for a minimum royalty only. The determination of the maximum royalty is left to competitive bidding or to the discretion of the Secretary of the Interior. Changes were made in the matter relating to alien ownership, due to the fear that retaliatory action against American investors in foreign countries might result.

Sections 40 and 41 of the Senate bill, which were attached to that measure in the form of a rider, are stricken out.

At the request of the Secretaries of War and Navy, the House committee added a provision reserving to

the United States all deposits of helium in public land. The United States is to have preferential right to remove helium from all lands and all deposits leased under the act.

Safety Meet at Cleveland

Sessions Marked by Lively Discussions of Numerous Papers on Various Phases of Accident Prevention—Election of Officers

THE eighth annual safety congress of the National Safety Council was held on Oct. 1 to 4 at the Hotel Stattler, Cleveland, Ohio. More than 2,100 persons registered, and it is estimated that 3,000 attended the sessions and many more witnessed the safety show.

The annual meeting took place on Oct. 1. It was opened with an invocation pronounced by Ferdinand A. Blanchard, president of the Federated Churches of Cleveland, and was followed by an address of welcome delivered by Harry L. Davies, Mayor of the convention city, to which President D. Van Schaak of the National Safety Council responded. Mr. Van Schaak then read his annual report. He referred to the removal of the council to larger and more adequate offices, the resignation of W. H. Cameron, "that far-seeing enthusiast whose works justified his faith"; the appointment of C. W. Price, "whose administration of his new office has proved, even in a few months, that we made no mistake in advancing him to a wider field of opportunity"; the addition to the staff of a new safety engineer, a librarian, a director of publicity, two regional secretaries, and a public-safety field secretary.

The meeting of the mining section was called to order by B. F. Tillson, the chairman, on Oct. 2, and after the annual reports of the committees had been made, A. H. Fay read an article on "Mine Accidents of English Speaking and non-English Speaking Employees." Five papers followed, one by W. W. Gidley, safety inspector of the Phelps-Dodge Corporation, Copper Queen Branch, Bisbee, Ariz., entitled "The Management and Training of Men," and one by Charles F. Willis, consulting supervisor of industrial relations of the Phelps-Dodge Corporation, Bisbee, Ariz., on "Industrial Relations in the Mining Industry." These were followed by "Labor Turnover and Its Relation to Mine Accidents," by E. E. Bach, chief of the Americanization Bureau of the State of Pennsylvania, which was read by B. F. Tillson. C. W. Goodale, in discussing this paper, said that turnover certainly did increase accidents, but not altogether in proportion to the degree of turnover. The peaks of turnover and the peaks of accident frequency of the Anaconda Copper Mining Co. occurred on the same ordinates of the time curve, but did not seem in any way proportional. Mr. Goodale also said that 52½ per cent of the Anaconda Copper Mining Co.'s employees were from non-English speaking countries. B. F. Tillson commented upon the fact that people were willing to spend large sums of money for accident prevention and yet had little inclination

to install a complete accounting system of accidents which would show the results obtained from the expenditure.

On Thursday afternoon, a luncheon was held by the Employee's Publications Section and a general session dealt with Americanization. Four speakers were on the program.

On Friday morning, the mining section held a meeting at which the following papers were presented: "The Desirability of Standardizing Mine Rescue Training and a Plan for Standardization," by D. J. Parker, mine safety engineer of the U. S. Bureau of Mines Experiment Station, Pittsburgh, Pa. In the absence of the author, the article was introduced by A. F. Knoefel, of Terre Haute, Ind. A lively discussion followed on the proper use and care of the oxygen breathing apparatus and training of rescue crews.

Other papers presented at the meeting were: "Effective Use of Rescue Apparatus in the Fighting of Mine Fires," by J. T. Ryan, of the Mine Safety Appliance Co., read by Mr. Riggs, followed by discussion by J. C. Roberts, F. F. Morris, J. L. Boardman, Robert H. Seip, and Mr. Woodburn; and "Fire Prevention in Anthracite Coal Mines and Necessary Equipment for Fighting Mine Fires," by N. W. Price, which was read by the chairman.

On Saturday morning, B. F. Tillson read for C. A. Mitke a paper entitled "A Compilation of Chute Types for Loading Ore Into Tram Cars in Metal Mines," which paper will be republished in the Journal. This was followed by an extended discussion. Major Arthur S. Dwight read an article on the "Importance of Safety Measures to the Miner."

Oil Resources of the United States

ACCORDING to an estimate of David White, oil geologist of the U. S. Geological Survey, the amount of oil underground in the United States is equal to about sixteen years' supply at the present rate of consumption. The total amount existing underground is estimated at 6,740,000,000 bbl., distributed as follows: California, 2,250,000,000 bbl.; mid-continent (excluding Texas), 1,725,000,000 bbl.; North Texas, 450,000,000 bbl. The following table has been compiled from figures of the Geological Survey, and shows the available oil left in the ground and the oil production in the United States in 1917 and 1918, in barrels:

Field	Marketed Production, 1918	Marketed Production, 1917	Available Oil in Ground
Appalachian	25,300,000	24,900,000	550,000,000
Lima, Indiana	3,100,000	3,700,000	40,000,000
Illinois	13,300,000	15,800,000	175,000,000
Mid-Continent	139,600,000	144,000,000	1,725,000,000
North Texas	15,600,000	10,900,000	400,000,000
North Louisiana.....	13,000,000	8,500,000	100,000,000
Gulf Coast	21,700,000	24,300,000	750,000,000
Wyoming	12,400,000	9,000,000	400,000,000
California	101,300,000	93,000,000	2,250,000,000
Alaska, Colorado, Michigan, Montana, etc.	230,000	230,000	350,000,000
Totals	345,530,000	335,330,000	6,740,000,000

The present conditions have been summed up by Mr. White in the following:

"To fill the gap between our actual domestic production and the requirements of domestic consumption, it has been necessary to reduce oil in storage to the extent of 27,000,000 bbl. and to supplement this

with a net importation of 31,000,000 bbl., chiefly from Mexico. The deficiency of our current production during 1918 has, therefore, amounted to 58,000,000 bbl., nearly half of which has been withdrawn from storage.

"According to general expectations, the consumption curve is destined during the next year, and probably longer, to continue its present upward trend beyond the 400,000,000 bbl. mark.

"The situation demands not only prevention of waste, but the most economical and efficient use of our oil. Also, it warns operators to consider more thoughtfully and promptly the acquisition of foreign oil reserves. Mexico, to which the American public looks optimistically, probably contains less oil than remains in the ground in the United States.

"The discovery of deep sands in this country is likely to give new life to many old or even abandoned fields. Pools will be found after prolonged search and repeated wildcatting in old as well as new regions, and this is probably especially true of the Gulf Coast, where, unless geologic discovery and consequent new methods of search, come to the aid of the driller, it may be seventy-five years before some of the productive salt domes are revealed.

"The most significant feature of the prospect, however, is the probability that the peak of production will soon be passed—possibly within three years."

27th Engineers

The administration of the Comfort Fund for the 27th Engineers was considered to have ended with April 30, 1919, the demobilization of the regiment having been completed a few days previously. The fund was solicited and administered under the auspices of the Engineering and Mining Journal, and the promise was made that all contributions should go to the regiment, for its purposes, without any deductions for administrative expenses. Judd Stewart, at the request of the officers of the Association, as a personal contribution of his own, arranged to have the accounts audited by Loomis, Suffern & Fernald, Certified Public Accountants, 54 Wall St., New York. Their report follows:

Oct. 29, 1919.

Walter R. Ingalls, Esq.,
President, Association of the 27th Engineers, 115 Broadway, New York City.

Dear Sir:

We have audited the cash records of the Comfort Fund of the 27th Engineers for the period from February 6, 1918, to April 30, 1919. The receipts of cash as shown by the cash book were traced into the bank, and all disbursements reported were supported by vouchers or other evidences of payment and by canceled checks returned by the bank. The balance of cash shown to be on hand at April 30, 1919, \$6,884.32, was reconciled with the balance reported by the bank at that date, as follows:

Balance of cash—April 30, 1919, as per cash book.....	\$6,884.32	
Outstanding checks:		
No. 51 H. Hanks	5.00	
No. 52 W. A. Holt	5.00	10.00
Balance of cash—April 30, 1919, as per statement of Guaranty Trust Co.		\$6,894.32

The following is a statement of the receipts and disbursements to April 30, 1919:

Receipts		
Contributions	\$20,853.26	
Less check of W. R. Davis, protested and uncollected	590.36	\$20,262.90
Dues		10.00
Sales of wool		651.28
Interest on bank balances		260.45
Repayment of portion of money granted to Mrs. K. for assistance		10.00
Repayment of loan to Pvt. M.		75.00
Total receipts		\$21,269.63

Disbursements		
Athletic goods		\$2,054.68
Musical instruments and music		2,809.84
Cigarettes, tobacco, etc.		2,165.97
Games		95.75
Typewriters		341.50
Wool, garments and knitting apparatus		1,834.82
Assistance to men and families		958.65
Miscellaneous purchases, etc.		28.95
Company funds, representing remittances to the companies for purchases made by them in camp and abroad		1,501.62
Special 1918 Christmas remittance through Lieut.-Col. O. B. Perry, disbursed for dinners, presents, and sundries.....		2,500.00
Total Disbursements for account of the members of the Detachment		\$14,291.78
Bank exchange and charges		15.53
Protest fees—check W. R. Davis.....		3.00
Loan to Pvt. M.....		75.00
Total Disbursements.....		14,385.31
Balance of Cash on hand—April 30, 1919.....		\$ 6,884.32

The distribution of the receipts and disbursements in the above statement is substantially the same as shown in the reports rendered by the treasurer and is a verification of the totals so reported.

No charges were made for the collection or administration of the fund, and the entire revenue accrued to the benefit of the Association.

Respectfully yours,
(Signed) Loomis, Suffern & Fernald,
Certified Public Accountants.

The mission of the original Association having been fulfilled, the Association was reorganized in such a way that the former members of the regiment participate in it, in order to keep alive their regimental associations, and the balance of cash, as of April 30, 1919, was taken over by the reorganized association and has been used in part for the issuance of a service medal to the men, in part for the relief of men and their families, who were in need, and a further part will be appropriated to the publication of the regimental history. The remainder will be reserved as a relief fund. Members of the regiment are now paying dues of one dollar per annum to the association, which payment is, however, optional, and the money received from that source pays for postage, stationery and sundry expenses of administration.

W. R. Ingalls.

Measuring Liquid Flow by the Orifice Method

The selection of the type of meter to be employed in measuring the flow of liquid through a pipe should be based upon a consideration of the difficulties of installation, permanency of operation, accuracy of measurement, and the cost of installation and maintenance. Tests to determine the practicability of employing thin-plate orifices in pipe lines, and the conditions most favorable for their use as measuring devices, have been completed by the Engineering Experiment Station of the University of Illinois. The results are given in detail in Bulletin 109 entitled, "The Orifice as a Means of Measuring Flow of Water Through a Pipe," copies of which may be had without charge by addressing the Engineering Experiment Station, Urbana, Ill.

A Process for the Treatment of Zinc Retort Residues has been patented by Spitzer and Conover (U. S. Patent No. 1,315,349, Sept. 9, 1919). Instead of burning up the carbon, sintering the residues, or washing out the carbon, the residues are first artificially cooled in a non-oxidizing atmosphere and then subjected to magnetic separation before the magnetic particles become sufficiently oxidized to lose their magnetic permeability. This leaves the metals in a condition to be sent direct to the smelteries without further treatment, and the unconsumed carbon is in a condition to be used again in charging of the retorts.

BY THE WAY

Tin for War Memorials

Cornish mining authorities, suggests the Financial Times, of London, would welcome the adoption of the suggestion made by Sir Herbert Maxwell that tin should be used as a material for war memorials. "It does not tarnish," he says, "but retains its beautiful silvery appearance for an indefinite period." Adoption of this suggestion would certainly be a more practical way of assisting the Cornish tin-mining industry than any proposal the government has yet made.

Welcoming Hoover in Verse

An incident in the rousing welcome given Hoover upon his return to the United States a short time ago, was the following poem which was published anonymously in the A. I. M. E. bulletin "Mining and Metallurgy" for October:

HAIL HOOVER!

Old Abou Ben Adhem, in his "deep dream of peace,"
Had nothing on Bert Hoover with his bread recipes;
For Abou loved his fellow men, according to the scribe,
While Hoover loved and fed them too, of every race and tribe.
Through war's dread reign he garnered grain in all the seven
seas;
To every famine-stricken land he sent his argosies.
That he's our leading dough-boy is clearly manifest;
In head-lines and in bread-lines "his name led all the rest."
Then cheer, cheer for Hoover, the mining engineer,
Philanthropist and statesman and matchless financier!
No chronicle of history a worthier feat narrates.
Thrice welcome, Herbert Hoover, home to United States!

Apologizing in Advance

American aviators flying into Mexico will be fired upon by Mexican troops according to a message received recently from Mexico City by El Nacional, a Mexican newspaper published at El Paso, which stated that Ignacio Bonillas, Mexican ambassador at Washington, had been instructed to convey this information to the State Department. It will be recalled that shortly after the wounding of an American lieutenant while flying over American territory, first it was denied that the firing was done by Mexican troops; then it was asserted that he was flying over Mexican territory; and finally an apology was proffered and the incident was happily closed as far as our Government was concerned. Present conditions recall an anecdote of the penitentes of the Vermejo district of northern New Mexico, where the custom of self-torture with barbed whips was prevalent. A mestizo was trudging along the road with bowed head, going through the orthodox motions of torture without inflicting any visible wounds. Interspersing some explanatory remarks with his mumbled prayers, he chanted "That lashing was for the sheep that I stole last week from the gringo at Laguna Colorada." Then, with an extra flourish of the whip that never touched his skin, he grimaced, "This is for all the sheep I am going to steal from him next month."

The Great Divide

"Speaking of the latest Nevada mining-stock boom," said a canny mining engineer who sometimes takes a flier himself, "I know of one stock booster who may be regarded as quite reliable when it comes to the point of collecting accurate information about mining prospects. In fact, he is almost too conservative nowadays. You see, he had his lesson. In the early days of —field, the telephone service was not what you might call perfection. Most of us had to be contented with being tacked on to a party line already loaded up with subscribers. It got to be as bad as one of those farmer lines where every Jane, Samantha and Maria cuts in and listens to the neighborhood gossip every time the bell rings. Well, the buying and selling activities of this wise guy gave our crowd the impression that he was getting the habit of using the gossip he milked from our telephone talk. So one day we framed up a highly-confidential talk about a deal being made for some \$50,000 to be spent in developing a certain hole in the ground. Care was taken not to give the actual name, under the guise that secrecy would be essential if we hoped to buy in much stock below 10c. per share; but the description of the worthless prospect was unmistakable. Our little group had corraled all available certificates for practically nothing. Next day various agents of our dupe took it off our hands at rising prices that averaged a little better than 6c. per share. We whacked up a net profit of about \$12,000 on the practical joke."

Gold Placers in Sonora

An item in the New York Sun of Sept. 22, purporting to be a despatch from Guaymas, Mexico, dated Sept. 21, announces the discovery of gold deposits in the district of Altar in the State of Sonora as having caused considerable excitement in that region. It is stated that the best deposits have been discovered near Sauqui (sic), northeast of Hermosillo and that only the lack of water has prevented a great rush of gold seekers to the region. A glance at the map of Sonora and a careful perusal of the report of Consul Bartley F. Yost, dated Guaymas, Sonora, July 8, 1919, and published in Commerce Reports of Sept. 12, 1919, leads one to remark, "Oh, scissors."

In the consular report the lack of water in the Altar district is emphasized; but it is stated definitely that there is plenty of water in the Suaqui district, northeast of Hermosillo, where the 18c. gravel can only be worked by dredges. The Altar field was described in the Journal, vol. 63, 1897, by W. George Waring. In the Boletin Sociedad Geografica, vol. 11, 1865, p. 138, M. Parades had a few words to say about silver placers, as well as gold placers of Sonora. Doubtless a reference to the personal narrative of John Russell Bartlett, on explorations in connection with his work as Boundary Commissioner during 1850, '51, '52 and '53, might demonstrate that the gold placers of the Altar region of northwest Sonora were not unknown at an even earlier date.

PERSONALS

J. A. BATTLE, JR., who has been acting as chief engineer in the investigation of claims filed with the War Minerals Relief Commission, has resigned to enter private practice. Prior to entering the Government service, Mr. Battle served in a managerial capacity at several Canadian mines. His professional education was obtained at Cornell and Columbia Universities.

H. R. Plate is in New York in consultation with his associates concerning their Western properties.

Louis A. Wright sailed from New York on Oct. 22 for Italy. His address will be Via Parlamento 22, Rome, Italy.

C. V. Corless, General Manager of the Mond Nickel Co., Coniston, Ontario, was in New York the first week in November.

Edward H. Benjamin, of San Francisco, and **Mrs. Lucile Joullin** were married in Pacific Grove, Cal., on October 17.

Harley E. Hooper, of the Kanbauk (Burma) Wolfram Mines, Ltd., Tavoy, Burma, is returning to Australia on six months' furlough.

N. H. Kuryla, general manager of the Sunnyside Department of the United States Refining & Mining Co., left for the East on Oct. 7.

Orvil R. Whitaker recently returned to Denver after a tour of inspection of the properties of the Cia de Minerales y Metales, in Mexico.

Montrose L. Lee, who has been on examination work in the Far East, is en route to London, where his address will be 47 Parliament St., S. W.

C. W. Van Law has an executive engagement on the staff of the Sinclair Consolidated Oil Corporation, and has moved from Boston to New York.

Russel B. Paul, general superintendent of mines of the Empire Zinc Co., is making a tour of inspection of the company's properties in the Southwest.

Max W. Ball, general manager of the Rocky Mountain Division of the Roxanna Petroleum Co., is making a tour of inspection of the company's holdings.

E. H. Jones, assistant superintendent of the International Nickel Co. at Copper Cliff, Ontario, arrived in New York on Nov. 3 for a stay of two or three weeks.

C. Quimby Schlereth, general manager of the Cia de Minerales y Metales, South America, is in the United States on a short vacation from Monterey, Mexico.

W. H. Wright, of the Malm-Wolf Co., has returned to New York from Alaska, where, for three months, he had been engaged in examining power and gold-dredging projects.

Alpheus F. Williams, general manager De Beers Diamond Mines, Ltd., Kimberley, South Africa, concluded his stay in San Francisco on Oct. 15., when he left for New York.

K. H. Matheson, superintendent of the San Marcos mine, Sabana Grande, Honduras, is in Denver on a vacation. Mr. Matheson expects to return to Honduras when the revolution subsides.

J. W. Bennie, for fourteen years manager of Shannon Mines and Smelter at Metcalf and Clifton, has moved to Gleeson, Cochise County, Ariz., to take charge of the Amster interests there.



Harris and Ewing

JOHN A. DAVIS

John A. Davis, the superintendent of the Alaska Mining Experiment Station, is in Washington discussing plans for an expansion of the work being done at his station. The certainty that the railroad is to be completed in the near future is stimulating mining activity in the Fairbanks region, making advisable Government assistance in solving the various problems which confront the mining industry in Alaska.

Charles W. Wright, formerly a geologist of the U. S. Geological Survey, who has been visiting the United States for a month, has returned to Sardinia and Rome, where he has offices as consulting mining engineer.

E. P. Mathewson has been engaged to act as consulting engineer of the Consolidated Coppermines Co. Under Mr. Mathewson's direction plans will immediately be prepared for the construction of the reduction works at Kimberly, Nev.

Wallace Macgregor, who was formerly with Phelps-Dodge Co., and more recently acting as consulting engineer in Nevada, has opened an office at 2120 Channing Way, Berkeley, Cal., as consulting engineer and metallurgist.

R. T. Walker has resigned as superintendent of the Virginia-Louise Mining Co. at Pioche, Nev., to accept the position of manager of the ore-purchasing department of the United States Smelting, Refining & Mining Co. at Salt Lake, Utah.

R. C. Allen was incorrectly reported to have taken a position as secretary of the Lake Superior Iron Ore Association in the Sept. 13 issue of the *Journal*. Dr. Allen has been elected vice-president of the Association and **W. L. Tinker** is secretary.

George K. Burgess, chief of the division of metallurgy of the Bureau of Standards, has accepted an invitation to speak before the members of the Royal Canadian Institute, Toronto, during the early part of December. Dr. Burgess will talk on recent metallurgical developments at the Bureau of Standards.

E. C. Morse has been appointed director of sales of the War Department. He succeeds **C. W. Hare**, resigned. Mr. Morse has been assistant director of sales since the organization of the office. The director of sales is in immediate charge of all the surplus property which the War Department is called upon to sell.

SOCIETIES

Society of Chemical Industry failed to hold the general meeting on Sept. 5, as previously announced. The meeting was postponed to Oct. 23.

Mining and Metallurgy Society of America, New York section, held a meeting at the Columbia Club, 4 West 43d St. on Oct. 21. **Walter Renton Ingalls** addressed the meeting on "The Wealth and Income of the United States."

Associated Engineers held the annual excursion, Oct. 10-11. The itinerary included visits to the Loon Lake Copper Mines, Northwest Magnesite mill and quarry, United Silver Copper Mine, American Minerals Production Co.'s property, and Colville Valley coal mine.

American Institute of Mining and Metallurgical Engineers, New York Section, will hold a meeting at the Machinery Club, 50 Church St., on Nov. 5. The dinner will be at 6.30 p.m. with a program devoted to the subject of Oil at 8 p.m. **Chester W. Washburne** will make an address on oil prospecting, to

be followed by a discussion by prominent oil geologists and operators. Captain Altmayer, late of the French Army, will give his impressions of United States metallurgical plants.

OBITUARY

Captain Kenneth A. Mickle, D.S.O., R.G.A., metallurgist, died in Melbourne on July 30, aged thirty-three. Captain Mickle served two years in France with the 9th Division of the British army, and was invalided home after having been severely gassed. He was a government research scholar at the Melbourne University, and in 1912 won the Grimwade prize. Captain Mickle as a young man was employed by the Cassilis Gold Mining Co., and there gained experience in the treatment of complex ores. Subsequently he carried out a great deal of experimental work in connection with the flotation of minerals and contributed a paper on the subject to the Royal Society of Victoria in 1910. At the outbreak of the war he was on the staff of the Burma Mines.

TRADE CATALOGS

National Tube Co., Pittsburgh, Pa., has recently issued its National Bulletin No. 7 describing the manufacture and advantages of "National" welding scale free pipe.

Davis Bournoville Co., Jersey City, N. J., has issued an eight-page pamphlet describing a portable cabinet truck for oxy-acetylene welding and cutting, made in large and small wheel types.

Steel Gears. R. D. Muttal Co., Pittsburgh, Pa. Bulletin 25, covering the heat treatment of steel gears for mining and electric railway purposes. Bulletin 26 describes the use of helical gearing.

The New Jersey Zinc Co., New York, has issued a series of five books, "Rolled Zinc," "Zinc Dust," "Metals," "Chemicals," and "Pigments," which describe in detail the various products manufactured by this company.

"Asbestos" is the name of a monthly market journal devoted to the interests of asbestos and magnesia industries recently published by Secretarial Service, 721 Bulletin Building, Philadelphia, Pa. Price, \$1.00 per year in advance.

Typical Graphic Records. The Esterline Co., Indianapolis, Ind. Describes the applications of curve-drawing instruments to particular problems. In-

strument engineers and files of data on graphic meters are available upon request.

Fluid Meters. Bailey Meters Co., Cleveland, Ohio. Bulletin No. 30; 8 x 10½; 16 pp.; illus. Describes fluid meters for low-pressure gas and air, the design of which, it is claimed, will give the same power and accuracy on a two-inch water differential as the standard fluid meter gives on two pounds' differential.

Alberger Centrifugal Pumps. Alberger Pump and Condenser Co., New York. Catalog F; 64 pp.; illus. Describes the various types of centrifugal pumps and steam turbines for pump drives manufactured by the company. Designs and construction of pumps for different uses and information required for making estimates, along with formulae and tables, are included.

Weber Chimneys. The Weber Chimney Co., Chicago, Ill. Catalog 19; 56 pp.; illustrated. Describes the reinforced-concrete construction of coniform chimneys, using a series of wooden units held together in a rigid manner which is claimed to be superior to iron or steel forms. The chimneys are stated to be monolithic, airtight, smooth inside, to possess a high working capacity and to be unaffected by the influence of the atmosphere. Illustrations of a number of the 1200 chimneys of this company's construction are reproduced, including what is said to be the highest chimney in the world, 570 feet, at Saganoseki, Japan.

INDUSTRIAL NEWS

Chicago Pneumatic Tool Co. has appointed C. W. Cross the manager of Western Railroad Sales, with headquarters at Fisher Building, Chicago.

The Oliver Continuous Filter Co. announce the removal of their New York offices to the Aeolian Bldg., No. 33 42nd Street, New York City. The rapidly increasing business of the company requires much larger space than they were able to obtain at the old quarters. Gordon Walker is in charge of the New York office.

Westinghouse Electric and Manufacturing Co. has announced the awards of four annual War Memorial Scholarships of \$500 each. Each scholarship carries with it an annual payment of \$500 for a period not to exceed four years, the payment to be applied toward an engineering education in any technical school approved by the scholarship committee.

NEW PATENTS

U. S. patent specifications may be obtained from the Patent Office, Washington, D. C., at 5c. each.

Roasting—Process of Roasting Ores, Furnace Products, Ore Mixtures and the Like. Edmund B. Kirby. (1,316,726; Sept. 23, 1919.)

Screen—Gyratory Screening Device. Henry William Falker. (1,314,135; Aug. 26, 1919.)

Screening—Portable Screening Apparatus for Coal and Other Materials. Charles Milton Morton, Newcastle, and Charles Herbert Steavenson. (1,315,835; Sept. 9, 1919.)

Separating and Grading Material—Process of and Apparatus For. Henry M. Sutton, Walter L. Steele and Edwin G. Steele. (1,315,881; Sept. 9, 1919.)

Separation—Process of and Apparatus for Sizing and Separating Comminuted Material. Henry M. Sutton, Walter L. Steele and Edwin G. Steele. (1,315,880; Sept. 9, 1919.)

Settling Tank. Lachlin Donald MacRae and Peter A. MacEachern. (1,313,714; Aug. 19, 1919.)

Sintering Machine. William Miller Davison and Guy Crosby Riddell. (1,315,910; Sept. 9, 1919.)

Smelting Furnace or Cupola. Andrew Poulson and William Charles Augustus Mate. (1,311,711; July 29, 1919.)

Smelting Process and Apparatus. Frank H. Franklin Hampton. (1,315,551; Sept. 9, 1919.)

Steel—Manufacture of Steel. Charles Albert Keller. (1,316,724; Sept. 23, 1919.)

Steel Alloy. William C. Honhorst. (1,313,894; Aug. 26, 1919.)

Sulphide Ores—Process for Treating Ores and Concentrates. Melville F. Coolbaugh. (1,315,761; Sept. 9, 1919.)

Sulphur—Apparatus for Fusing Sulphur from Low-Grade Ores. Paul P. Austin, Jr. (1,315,940; Sept. 16, 1919.)

Sulphur—Process of Extracting Sulphur from Ore. (Jesse Coffeen. (1,314,856; Sept. 2, 1919.)

Sulphur—Process for the Extraction of Sulphur from Metal Sulphids. Max Helbig. (1,315,496; Sept. 9, 1919.)

Tempering Machine (Automatic) for Tools, Such as Rock Drills. Clarence Orrin Stee and Karl Holger Kolhede. (1,311,722; July 29, 1919.)

Titanium—Pigment and Paint. Louis E. Barton, assignor to the Titanium Alloy Manufacturing Co. (1,313,874; Aug. 26, 1919.)

Tools From Wells—Device for Recovering. Augustus B. Scott, Burkburnett, Tex. (1,315,581; Sept. 9, 1919.)

THE MINING NEWS

New York, October 25, 1919

Hayden, Stone & Co. Have Option on Flin Flon Property

Deposit Has Been Diamond Drilled, But Further Investigation Is to Be Made

It is understood that Hayden, Stone & Co., of New York, who have conducted an extensive campaign of diamond drilling on the Flin Flon property near the border of Saskatchewan and Manitoba, Canada, have an option for \$1,500,000 on the property that is good until January. However, they wish to do some sinking, and the owners are prepared to grant an extension for this purpose. No payment has been made, and, as a matter of fact, although the price is \$1,500,000 for the whole property, one of the owners will stay in for part of his interest at least, so that the actual amount of money to change hands will be less than the amount stated.

to construct a railroad for one hundred miles or more, probably from the northern termination of the Canadian Northern R. R. at The Pas, Manitoba. It is understood that either the Canadian Northern R. R. or the Province of Manitoba, or both, are willing to construct the railroad if the building of a smelter at Flin Flon is assured.

Coeur de' Alene Strike Off

Strikers Lose, Returning to Work on Old Terms—Mines Shut Down for Almost Two Months

The strike of miners and millmen in the Coeur d'Alene district, Idaho, which resulted in closing down the Morning, Hunter, Hecla, Hercules, Interstate-Callahan, and Tamarack mines, was officially called off by the district organization of the International Union of Mine, Mill, and Smelter Workers on Oct. 8. The strike began on Aug. 15,

companies would not recognize the union, though willing at all times to meet their employees and adjust working conditions and discuss matters in which they were mutually interested. Subsequently, and before the strike was called, the companies advanced wages 50c. per day, making the rate \$5.25. This did not satisfy the union, however, and the men were called out.

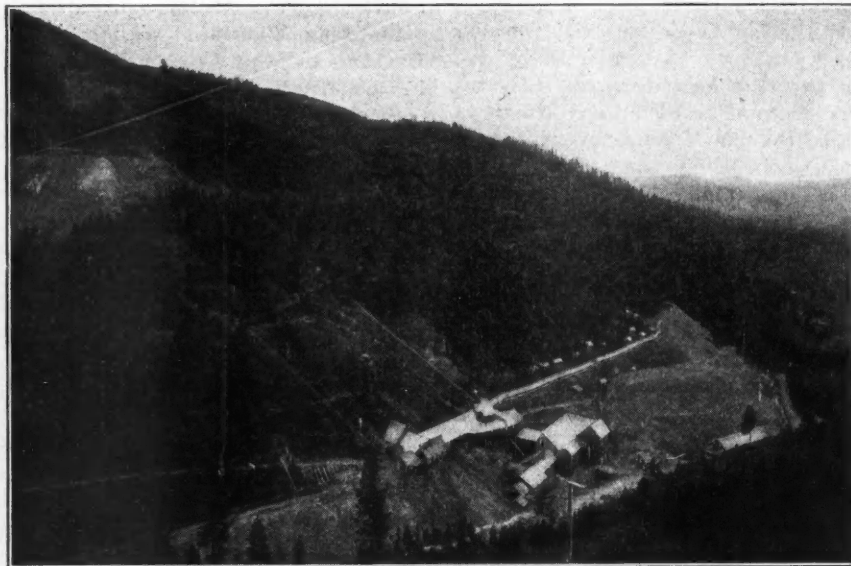
Cleveland-Cliffs Co. Wins Suit Brought by Arctic Iron Co.

Celebrated Iron Country Case Decided After Fifteen Years of Litigation

The United States Circuit Court of Appeals, Cincinnati district, has rendered a decision in favor of the Cleveland-Cliffs Iron Co. and W. G. Mather in the case of the Arctic Iron Co. vs. The Cleveland-Cliffs Iron Co. and Mr. Mather. The decision was handed down on Oct. 7, after the case had been in the Federal courts since 1904. The Arctic Iron Co. holds the fee to the Regent group of mines, Negaunee, Mich., which are now idle, the available ore supply having become exhausted, and never did any mining itself, merely leasing the lands and collecting and distributing the royalty. The Breitung-Kaufman interests hold three-fourths of the stock of the Arctic company, the remainder being in the hands of the Cleveland-Cliffs Iron Co.

In 1902 the Oliver Iron Mining Co. took a lease on the lands to mine the ore, but prior to the drawing of the agreement, the Cleveland-Cliffs Iron Co. entered into a separate agreement with the Oliver company, the terms specifying that the Cleveland-Cliffs Iron Co. was to have one-quarter of the stock in the Regent Iron Co., which was organized as a subsidiary of the Oliver Iron Mining Co. to operate the mines, and that one-quarter of the ore mined was to be delivered to the Cleveland-Cliffs Iron Co. at the cost of mining. Some time later the Breitung-Kaufman interests learned of the separate agreement and began suit against the Cleveland company and its president, W. G. Mather, who was also trustee for the Arctic Iron Co., for an accounting of profits and interests received because of the agreement entered into outside of the lease granted by the Arctic Iron Co. in its corporate capacity. It really meant that the Cleveland-Cliffs Iron Co. was sued by a company in which it held a one-quarter interest.

The Federal court for the western district of Michigan, which first heard the



VIEW IN THE COEUR D'ALENE DISTRICT, IDAHO, SHOWING SURFACE PLANT OF SUCCESS MINING CO., AT WALLACE

The Flin Flon property is an immense deposit of primary sulphides carrying copper, gold, silver, and zinc. The diamond drilling indicates 20,000,000 tons of ore running 1.7 per cent copper, 1.5 oz. silver, and \$1.40 gold. The deposit was discovered in 1914 by Tom Creighton and Jack Mosher, of Toronto. It takes its name from Flin Flon Lake near by. The Mandy mine of the Tonopah Mining Co. is in the same region, being situated on Schist Lake. The ore of the latter is high-grade copper.

If it should be decided to develop and equip this property, it will be necessary

its duration thus being almost two months. The strikers won no concessions from the mining companies, and returned to work on the same terms that prevailed when they walked out. Their failure has given a serious setback to organized labor in the Coeur d'Alene district. The union demanded 50c. a day increase in wages, eight hours a day "from portal to portal," and recognition of the union. In a public statement following these demands, signed by all mining companies, the increase of wages was refused, claim was made that the eight-hour day law was being strictly observed, and that the

case, gave a decision in favor of the Arctic Iron Co., and the master of chancery set the amount of profits derived from the separate bargain at a figure in excess of \$800,000. The case was then appealed to the Circuit Court of Appeals, being argued in 1916, and that court certified to the United States Supreme Court certain findings of fact which exonerated the Cleveland-Cliffs Iron Co. and Mr. Mather in having participated in any actual fraud. Six questions of law were certified, and the Supreme Court was asked for guidance in rendering a decision. This latter the Supreme Court refused to do, and instructed the Circuit Court of Appeals to render a decision and dispose of the case. The final decision is that there was no cause for action, and the case has been dismissed. It was one of the most important mining suits which ever originated in the Lake Superior district, and probably occupied the courts for a longer time than any other piece of mining litigation.

Butte & Superior Accounting Deferred

The Butte & Superior Mining Co. has secured an extension to Dec. 1 in which to file an accounting made necessary through mandate of the U. S. Supreme Court in the litigation against it by the Minerals Separation-North American Corporation. The time was originally set for Oct. 27. Upon the figures revealed in the accounting, which will be submitted to Judge George M. Bourquin of the U. S. District Court of Montana, as master, will be determined the amounts due the Minerals Separation for infringement of its patents over a series of years.

The Nevada Consolidated Copper Co., which has been sued in the U. S. District Court at Portland, Me., for alleged infringement of patents, has received an extension of time in which to make answer to the charges.

Montana Southern Ry. Completed to Elkhorn Mines

The proposed ore-carrying road of the Boston & Montana Development Co. has been completed from Divide, Mont., on the Oregon Short Line, to Elkhorn, where the company's Beaverhead County properties are situated. The road is narrow-gauge. W. R. Allen, president of the company, in an announcement to stockholders dated Oct. 21, stated that ore shipments will begin to go forward almost immediately. There will be some ballasting and leveling up, which, however, will not interfere with transportation. Mill construction will be pushed with all possible speed. In the meantime the company will ship the higher-grade ores direct to the smeltery. From now on, production will be the sole object, increasing monthly.

According to the general manager's report, in crosscutting the central vein on the 300 level, ore assaying 100 oz. in silver and 16 per cent copper per ton was met. The central vein is from 20 to 30 ft. wide. Crosscutting on this level should reach the Park vein in about forty-five days, where more high-grade ore is expected.

Hancock Consolidated Resumes Operations

Operations of the Hancock Consolidated Mining Co., which were suspended last May, were recently resumed. Production, however, will be deferred for at least ninety days, according to present plans of the company. All miners will be put at work in development of new territory to the south of the shaft. It is expected that by Jan. 1 next enough new ground will be opened so that when production begins it will be maintained on a more substantial basis than was previously possible. Since last May, Hancock has made a sale of land to the Quincy Mining Co., whose property adjoins, receiving therefor \$250,000 in cash.

The reopening of the Hancock mine recalls the fact that it is the only property in the district in which John D. Ryan has an interest. Years ago Mr. Ryan's father and uncle tried to make the mine pay but without success, and for forty years the property was idle. The corporation was then reorganized and refinanced, largely through the instrumentality of Mr. Ryan. It is believed that the property can be put on a paying basis, if the tonnage can be worked up to the capacity of the shaft.

Colorado Engineers at Odds Over Licensing Law

Opposition to the law enacted by the last Colorado Legislature requiring all engineers practicing in the state to secure a license came to a head recently when the Colorado section of the A. I. M. E. passed a resolution condemning the act and asking all members to work for its repeal.

The principal contention is said to have arisen over that section of the bill which stipulates that the engineer who receives a license to work in Colorado must be a citizen of the United States. It is maintained that, according to this, residents of other states cannot come into Colorado to examine a mine without securing a license, and that aliens, among whom are many honored members of the profession in Colorado, cannot obtain such a license at all.

Bureau of Mines May Select Joplin for New Station

If Congress passes an appropriation bill now pending, an experiment station will be established at Joplin, Mo., by the U. S. Bureau of Mines.

Trail Smeltery's Schedule C Revised

In response to numerous complaints from shippers, the Consolidated Mining & Smelting Co. of Canada, has announced in a recent circular that a definite settlement for the lead and silver contained in shipments of lead ores to the Trail smeltery will be made at the end of the second calendar month succeeding the date of sampling. The circular referred to amends certain clauses of Schedule C, according to which settlements have been for shipments received since July 1, 1919. Schedule C was published in the Journal of Aug. 9, 1919.

The circular is as follows:

"In addition to the Mexican competition for Canadian domestic business, considerable quantities (of lead) had to be exported at the open market price to reduce stocks and take care of current production. This was due to the light Canadian demand. In spite of these adverse features we have been able to average in each month's sales considerably more than the New York price for lead. We are, therefore, changing our method of lead settlement commencing with shipments received here on Oct. 1, and are amending Schedule C as follows (The clauses which follow include):

"The price for lead to be used in settlement will be our average sales price delivered at destination in Canada, for the second calendar month succeeding the date of sampling, or the American Smelting & Refining Co.'s New York average quotation for the said second calendar month, whichever is the greater, less a deduction in either case of 1½¢ per lb. for refining and marketing.

"There will be deducted also from the settlement price \$2.30 per ton on sales at Toronto and common points, and \$4.50 per ton on sales at Montreal and common points, and similar differentials to other points. This freight adjustment is to cover actual increases in freights.

"Settlement—(a) Shortly after sampling, an advance payment of 90 per cent of the apparent value will be made. The prices used in estimating the apparent value will be the New York price of silver of the date of sampling, and the previous month's sales price for lead.

"(b) Shortly after the close of the second calendar month after sampling, when the data is available, the final value will be computed and any adjustment necessary will be made between the smelter and the mine.

"Settlements for monthly receipts prior to October will proceed under the pooling scheme until fully liquidated."

PROGRESS OF MINING OPERATIONS

Important Events of Interest
Condensed and Classified
for Easy Reference

ALASKA

Alaska shipments of domestic copper ore to United States in September totaled 7,366 tons, containing 6,208,840 lb. copper, valued at \$1,376,257.

ARIZONA

Cochise County

Phelps-Dodge (Bisbee)—September production of copper was as follows: Copper Queen branch, 5,056,000; Burro Mountain, 203,000; custom ore, 506,000; Moctezuma Copper, 2,827,000; total for Douglas smeltery, 8,592,000; Detroit Copper (Morenci branch), 637,017; total all branches, 9,229,017.

Commonwealth Development (Pearce)—Milling ore in Commonwealth mill from Commonwealth mine, as well as old tailings. Lessees getting out siliceous ore for shipment to smeltery.

Republic (Johnson)—Resumed shipping copper ore at rate of 2,000 tons a month. New three-compartment shaft to be sunk to 800 ft.; seventy men employed.

Middlemarch (Pearce)—Mill repairing damage caused by carborundum thrown into bearings of Diesel engine.

Gila County

Gibson (Bellevue)—Mill running three shifts on dump ores; producing car of concentrates every three days.

Arizona-Globe (Globe)—On 480 level struck low-grade chalcopryrite. P. J. Hickey, Jr., superintendent.

Inspiration Cons. (Inspiration)—September production of copper was 5,800,000 lb.; August, 6,500,000.

Golden Eagle (Kirkland)—To install hoist and compressor. Small force working on development.

Zonia (Kirkland)—Being worked by three groups of leasers, who are taking out copper carbonates of shipping grade.

Miami (Miami)—Installing headframe and machinery at new No. 5 shaft.

Van Dyke (Miami)—Shaft below 400 level. Contract is for 1300 ft., taking it through ore proven on contact of Pinal schist by drilling.

Mohave County

Diana (Chloride)—Native and ruby silver cut at 200 ft. when sinking shaft.

Fountain Head (Kingman)—Property at Stockton Hill shipping high-grade lead ore to smeltery. A. C. Goodwill,

lessee, has tunneled to vein, 125 ft. below outcrop.

Oatman Amalgamated (Oatman)—Will develop to 500 ft. at point where management believes Tom Reed and Gold Road vein systems converge.

Pinal County

Arizona Hercules (Kelvin)—Four modified Callow flotation cells completed and put in use, replacing original rougher cells in one unit of mill. Jigs in Marcy mill circuit also in operation, recovering most of the native copper.

Gila Development (Kelvin)—Equipment for 25-ton milling plant has begun to arrive. Mill consists of crushers, rolls, Lane mill and amalgam plates. Considerable tonnage of ore already broken, and development work will be resumed when mill starts.

Gross Group (Kelvin)—Engineers have been examining Gross group, two miles east of Kelvin. Principal metals found thus far are silver, lead, and molybdenum. Other rare metals said to occur in quantity sufficient to warrant exploitation.

Ray-Boston (Kelvin)—Power plant being overhauled, and building new wagon road to county road. Expects to have two diamond drills in operation Nov. 1. C. E. Hart, in charge.

White Metals (Kelvin)—About twenty men working in old Pioneer group in Dripping Springs Mountains recently taken over by this company. Old workings in order, and development proceeding rapidly with modern equipment. About 40,000 tons of ore developed. J. C. Devins in charge.

Ray Broken Hills (Ray)—Operations suspended on original holdings after unfavorable report by C. P. Berkey and L. D. Huntoon. Other properties of company will be developed.

Magma (Superior)—Has acquired noted Reymert silver mine, 15 miles southwest of Superior. Consists of ten patented claims, with 28 more claims located by Magma. To be developed by drilling.

Magmatic (Superior)—Extending tunnel. Has cut 4-ft. iron-manganese body.

Potts Canyon (Superior)—Power house and new headframe equipment being installed. Sinking has cut silver-lead stringers.

Silver King of Arizona (Superior)—Crosscut from old shaft in chimney cut

new shaft Oct. 18 at 415½ ft. point. Station being cut. Company has 19½ tons concentrates on hand. In cleaning 4½ x 4½-ft. Marcy mill recently 1,400 lb. of sand was recovered running 4,700 oz. silver per ton.

United Superior (Superior)—Reported to have been financed in Michigan for development of group of 32 claims.

Magma Chief (Winkleman)—Recently opened up high grade ore in new shaft, has begun to ship to Hayden. Property, formerly known as Sombrero Butte group, is managed by Charles Kumke.

Santa Cruz County

Tres de Mayo (Nogales)—Sinking shaft; now down about 150 ft. Drifting on 100 level disclosed ore sampling high in silver, lead, and vanadium. Property leased by A. L. Peck and associates, of Nogales, to Dr. O. B. Bachman and others, of Los Angeles.

Hardshell (Patagonia)—Three-compartment shaft down 400 ft.

Duquesne (Patagonia)—Under lease to Panick & Curry, who are shipping 400 tons a month.

World's Fair (Patagonia)—Again in operation after shutdown due to litigation. Lower levels being pumped out.

Yavapai County

Consolidated Arizona (Humboldt)—Experimenting in leaching low-grade carbonate copper ores. One car load received from surface capping of Dundee property, Jerome.

Jerome-Grande (Jerome)—Reported financed in Troy, N. Y. Company is reorganization of Verde Grande. Development comprises 800-ft. shaft, and 500-ft. crosscut, latter to continue to contact. J. C. Cain, of Jerome, president.

Shea (Jerome)—Electric transmission line completed and mine pumped out. Ore shipment awaits completion of new road and construction of ore bins.

American Eagle (Prescott)—Group lying partly in Maricopa County and partly in Yavapai County, southeast of Hot Springs, sold to Montana people. Active development will be started at once under direction of Howard Winthrop, of Butte.

Arizona Victory (Prescott)—Arizona Victory Mining Co. has been organized in Prescott by Mark Bradley and associates to operate Swiggert property in Walker district.

Calcium Fluoride Development Co. filed a petition in Prescott asking dissolution. Organized in 1908 as Illinois Fluorspar Co. Claims all debts paid.

Poland (Prescott)—Mill and camp buildings being torn down and taken to Prescott for re-use.

Thumb Butte (Prescott)—Operations to be resumed on Thumb Butte Consolidated, better known as Anderson group.

Tiptop-Heath (Prescott)—Meeting called in Prescott Nov. 1 for dissolution of corporation. Mine in Tiptop section operated for silver and tungsten. Assets include hoist, small mill and electric plant.

Blue John-Wedge (Walker)—Bonded by Joe Cavanaugh and Harold Colwell, who will ship silver ores.

Yuma County

Quartzsite badly damaged by cloudburst. Rich gold ledge near camp reported revealed by flood.

Bullard (Salome)—Noted property reported bonded from Bullard brothers by number of Los Angeles and Denver mining men, represented by Frank H. Sawyer, of Phoenix.

CALIFORNIA

Amador County

Keystone Mining (Amador)—Timbers of main shaft being replaced by reinforced concrete throughout. System proved very satisfactory in neighboring Bunker Hill Consol.

Calaveras County

Utica Mining (Angels Camp)—Sinking shaft at Gold Cliff mine, present depth 1,900 ft. Fifty-stamp mill crushing 240 tons good quartz ore daily. Good grade of ore exposed in bottom levels. Faulted main orebody recovered after crosscutting 800 ft.

Morgan Mine (Carson Hill)—New mill crushing approximately 300 tons a day. High-grade ore maintained on 685 level, the lowest. W. J. Loring, manager.

Sheep Ranch (Sheepranch)—Down to 1,700 ft. and employing 55 men, but has not resumed milling.

San Benito County

Klau Quicksilver (Paso Robles)—Being reopened; planned to erect camp buildings, engine house, and to sink shaft. E. W. Carson, manager.

Sierra County

Tightner Mine (Alleghany)—Sold to interests represented by Fred Searles, Jr., and controlled by Senator Clarke of Montana. Work starts within thirty days. Cash consideration small, payments to extend over four years. Equipment includes twenty-stamp mill and hoisting machinery.

COLORADO

Clear Creek County

Capital M. & T. (Georgetown)—Rich strike made on Aetna vein after

over 2,000 ft. of fruitless development. Vein three feet wide and carries gold, silver, lead and copper.

Lake County

Paul Morel Placer Ground in McNulty Gulch in Birdseye section taken over by Milwaukee interests. Several test pits sunk and 130-ft. drift driven in gravel. Dredging planned.

Western Mining (Leadville)—Wolf-tone mine has resumed operations after being idle for several months. About fifteen men employed mining zinc carbonate above water level.

Ouray County

Kansas City (Ouray)—Mine in Red Mountain district leased and bonded to Everett J. Sloane by Paul J. Walker, owner. Company organized to operate property.

Pitkin County

Midnight (Aspen)—Pushing tunnel since strike of high-grade ore in adjoining Oakland mine.

IDAHO

Adams County

Red Ledge (Landore)—Hydro-electric plant being installed on Deep Creek to furnish plant for mining operations. Property owned in Duluth, Minn., and situated on Idaho side of Snake River, seventeen miles from Homestead, Ore., nearest railroad point.

Shoshone County

Columbus (Murray)—Eight men to be employed during winter. Will drift on lead-silver ore in main tunnel and continue crosscut to parallel vein. Vein outcropping in creek will be developed. Thirteen claims at junction of Eagle and Tributary creeks owned by company. E. P. Gallagher, of Philadelphia, chief owner.

Interstate-Callahan (Wallace) — A Crosscut north on 600 level encountered 9-ft. of high-grade zinc ore with some lead. Raise has been driven in ore to 400 level, where drifting eastward is in progress. Strike is east of fault, cutting vein, and ore is identical with famous orebody west of fault. This is most important development in recent years, adding greatly to known resources. Development of Niosic property will continue.

North Bunker Hill (Wardner)—Electric hoist, compressor, and pump recently installed. Unwatering 300 ft. shaft and will deepen 200 ft. Will also explore vein on 300 level, where lead-silver ore of good grade has been reported.

KANSAS

Joplin-Miami District

Crescent L. & Z. (Waco)—New mill near Waco in operation. Only mill in field using classifier ahead of rougher jig. Overstrom tables used in sludge department.

MICHIGAN

Copper District

Calumet & Hecla (Calumet) September production of copper was as follows: Ahmeek, 1,378,987 lb.; Allouez, 362,562; C. & H., 4,504,464; Centennial, 95,050; Isle Royale, 1,287,228; La Salle, 14,600; Osceola, 849,100; Superior, 14,000; total, 8,505,991.

Franklin (Houghton) — Crosscut should cut vein on 39th level within 30 days, having 40 ft. yet to go. Shaft will sink to 41st level, and another crosscut will be run to vein. Still has unsold copper.

Winona (Winona)—Two shafts working one shift, and underground force increasing steadily. Small shipments of mineral made to Quincy smeltery from mill.

Gogebic Range

The State Tax in Gogebic County Mich., is about \$270,000, an increase of more than 90 per cent over 1918, and the greater part of this has to be paid by the iron mines. The city tax in Ironwood has increased about 25 per cent and the rate is considerably over 3 per cent.

Ashland (Ironwood)—Purchased Corliss hoist from Norrie-Aurora, which will be installed soon. Drift on 20th level in ore for several hundred feet; width and depth of orebody not yet proved. Raising from 24th level through dike where bottom of orebody is expected.

Oliver Iron (Ironwood) — Electric hoists completed and in operation in Norrie-Aurora mine.

MINNESOTA

Mesabi Range

Billings (Chisholm) — New underground property of Tod-Stambaugh Co. rapidly becoming large producer. Now loading about ten cars per day for direct shipment, besides placing some ore on stockpile.

St. James (Aurora)—Mine closed down during slack period early in season, resumes operations. McKinney Steel Co., operators.

Williams (Biwabik)—Thomas Furnace Co. shipping stock-pile of old-abandoned property to their furnaces at Milwaukee. Mine abandoned in 1912 on expiration of lease.

Hobart (Gilbert)—Filling in stock-pile grounds. Timber shaft will be extended from 133 to 200 level.

St. Paul (Keewatin)—Shipped 25 cars siliceous ores for test run at Trout Lake concentrator.

Vermilion Range

McComber (Armstrong Lake)—Cutting station and pump room at 400 level. Will drift and develop northward; expect orebody at 180 ft.

Pioneer (Ely)—This mine, also Sibley, Chandler, Pattison, and Zenith closed down indefinitely because of miners' strike. These mines represent entire production of Ely district, and all shipments suspended. Eight hundred miners out of work, and all business at standstill.

Phoenix (Mud Creek)—Pumping out old workings well under way. Plan to pump out down to old 300 level and redevelop.

MONTANA

Beaverhead County

Boston & Montana Dev. (Wise River)—Montana Southern Railway completed from Oregon Short Line at Divide to Elkhorn properties. Crosscut on 300 level in central vein showed ore running 100 oz. silver and 10 per cent copper. Vein 20 to 30 ft. wide. Crosscut should reach Park vein within 45 days.

Jefferson County

Legal Tender (Clancy)—Three hundred sacks of ore, estimated to run from \$300 to \$400 in silver, ready for shipment, with half carload of second-class, running about \$40 per ton.

Liverpool Mining (Clancy)—Good grade ore in shoot being mined on 200 level. Water in shaft lowered near 700.

Jefferson (Whitehall)—Raising for shaft started from 35-ft. level. Engine will be installed at this level and sinking to 200 level begun.

Silver Bow County

Butte Copper and Zinc (Butte)—Emma mine kept clear of water, but no decision on date for resuming mining operations.

Davis-Daly (Butte)—Installation of skips begun. Steel for enlarging bins is on ground, and construction has started. September tonnage about 9,300, against 7,900 for August and 4,900 for July. Average copper content in September was 6.6 per cent.

North Butte (Butte)—Large body of native copper ore opened on 900 level at Sarsfield property.

NEW MEXICO

Grant County

Republic M. and M. (Hanover)—Plan installing 100-ton concentration and flotation mill for zinc sulphide ores.

Lucky Bill Group (Silver City)—At Bayard station being developed by Black Hawk M. & M. Co. Lead carbonate ores on both 200 and 300 levels. E. D. Lidstone, manager.

Sierra County

Silver Monument Metals (Chloride)—Plan installing small concentrating-flotation mill for silver ores.

Lady Franklin (Lake Valley)—Test to determine best treatment of these ores by Texas State School of Mines. W. H. Paul, engineer for company.

UTAH

Beaver County

Golden Reef (Frisco)—Shaft now down 540 ft. Will continue to 700 level where drifting will be started. Equipment will be electrified.

Salt Lake County

South Hecla (Alta)—September shipments were 1,000 tons. Development work in progress. Rapid advance being made in tunnel to cut Albion workings.

Wasatch Drain Tunnel (Alta)—Tunnel in 5,000 ft. and within 700 to 800 ft. more will be under old Columbus Consolidated workings abandoned years ago owing to water. Columbus Consolidated shaft now unwatered 200 ft.

Cardiff (Salt Lake City)—Orebody recently opened on 800 level about 280

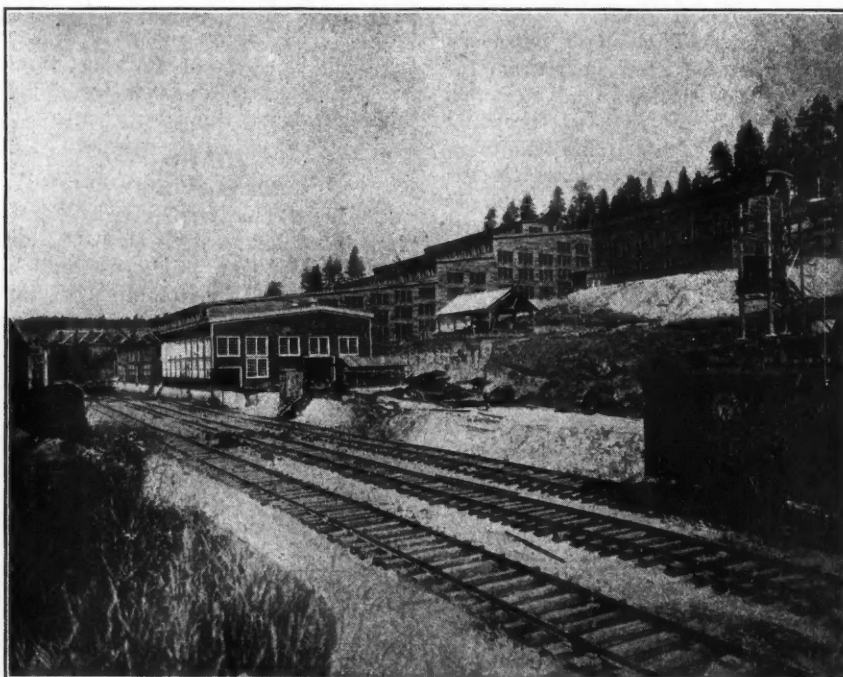
CANADA

British Columbia

Florence Silver (Ainsworth)—F. R. Wolfe states average of 100 tons has been daily delivered to mill during last five or six months. Intends to increase rate of output. Large ore reserves opened up by recent work.

Highland (Ainsworth)—Concentrator is being operated after standing idle seven months. Ore developments have been made and group increased to seven claims. Consolidated M. & S. Co. of Canada, owners.

Dolly Varden (Alice Arm)—Has shipped over 1,000 tons averaging \$50 since taken over by Taylor Engineering Co. using entire capacity of its railroad to tidewater.



CANADA COPPER CORPORATION'S NEW 2,000-TON MILL AT ALLENBY, B. C.

ft. from shaft. About 50 men at work. Shipping 50 to 60 tons silver-lead ore daily. Mine work recently held up by snow drift.

Tar Baby (Salt Lake City)—Tunnel being driven in hard limestone and believed to be approaching contact. Situated in Big Cottonwood Canyon.

Summit County

Park City Shipments week ended Oct. 4 amounted to 3,949,240 lb. of ore and concentrates. Shippers were as follows: Silver King Coalition, 1,221,520 lb.; Ontario, 1,303,400 lb.; Judge M. & S., 1,001,680 lb.; Daly West, 208,640 lb.; Silver King Consolidated, 110,000 lb.; Daly, 104,000 lb.

Glen Allen (Park City)—Excellent progress being made on mill.

Utah County

Treasure Hill (American Fork)—Shipping silver-lead ore. Will work through winter.

Royal Group (Alice Arm)—These five claims sold to J. Miller, of Prince Rupert. Adjoins Dolly Varden.

United Metals (Alice Arm)—Has two 12-horse pack trains transporting to tidewater.

MEXICO

Baja California

Boleo (Santa Rosalia)—September production of copper was 1,477,280 lb.

Chihuahua

Cusi (Cusihuiriac)—Building flotation mill, 200 tons' capacity daily.

San Patricio (Parral)—Building 300-ton cyanide mill.

Sonora

Greene Cananea (La Cananea)—September output was 4,200,000 lb. copper, 177,500 oz. gold, and 940 oz. gold.

CHOSEN

Oriental Cons. (Unsan)—September clean-up was \$89,500; August, \$62,500.

THE MARKET REPORT

Daily and Weekly Metal and Mineral Prices,
Metal Market Conditions, Average
Monthly Prices, Stock Quotations

Silver and Sterling Exchange

Oct.	Sterling Exchange	Silver		Oct.	Sterling Exchange	Silver	
		New York, Cents	London, Pence			New York, Cents	London, Pence
16	416 ¹ / ₄	118 ¹ / ₈	63 ³ / ₄	20	415 ¹ / ₄	118 ³ / ₄	64 ¹ / ₄
17	415 ¹ / ₄	117 ⁷ / ₈	63 ³ / ₄	21	417 ¹ / ₂	120 ¹ / ₈	61 ⁵ / ₈
18	414 ¹ / ₄	117 ⁵ / ₈	63 ³ / ₄	22	416 ⁵ / ₈	118 ³ / ₄	63 ³ / ₄

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

Daily Prices of Metals in New York

Oct.	Copper		Tin		Lead		Zinc
	Electrolytic	Spot	Spot	N. Y.	St. L.	St. L.	St. L.
16	21 ³ / ₄	54 ¹ / ₂ @54 ³ / ₄	54 ¹ / ₂ @54 ³ / ₄	6.47 ¹ / ₂ @6.50	6.25@6.35	7.50 @7.60	
17	21 ³ / ₄	54 ¹ / ₂ @54 ³ / ₄	54 ¹ / ₂ @54 ³ / ₄	6.47 ¹ / ₂ @6.50	6.30@6.40	7.57 ¹ / ₂ @7.62 ¹ / ₂	
18	21 ³ / ₄	54 ¹ / ₂	54 ¹ / ₂	6.47 ¹ / ₂ @6.52 ¹ / ₂	6.30@6.40	7.60 @7.65	
20	21 ³ / ₄	54 ³ / ₄ @55	54 ³ / ₄ @55	6.47 ¹ / ₂ @6.52 ¹ / ₂	6.35@6.40	7.70 @7.75	
21	21 ³ / ₄	54 ¹ / ₂	54 ¹ / ₂	6.50 @6.60	6.35@6.40	7.75	
22	21 ³ / ₄	54 @54 ¹ / ₄	54 @54 ¹ / ₄	6.50 @6.60	6.35@6.40	7.75	

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other special shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis. Tin is quoted on the basis of American tin, 99 per cent grade.

London

Oct.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic	Spot	3 M.	Spot	3 M.	Spot	3 M.
	Spot	3 M.							
16	105 ¹ / ₄	105 ¹ / ₂	116	279 ³ / ₄	280 ⁷ / ₈	28 ³ / ₄	29 ¹ / ₄	44 ¹ / ₄	44 ⁷ / ₈
17	106 ¹ / ₄	106 ¹ / ₄	117	281	282 ¹ / ₄	28 ⁷ / ₈	29 ¹ / ₄	44 ¹ / ₂	45
18	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	107 ¹ / ₄	106 ¹ / ₄	117	281 ¹ / ₂	282 ¹ / ₂	29	29 ¹ / ₂	45	45 ¹ / ₂
21	106 ¹ / ₄	105 ³ / ₄	117	281	282	29 ¹ / ₄	29 ³ / ₄	45 ¹ / ₂	46
22	104 ¹ / ₂	104	116	279 ¹ / ₄	280	29 ⁵ / ₈	30 ¹ / ₄	45 ¹ / ₂	45 ³ / ₄

The above table gives the closing quotations on the London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb.

Metal Markets

New York, Oct. 22

Copper was dull, and there was a good deal of uncertainty as to the true position of the market. In lead and zinc, there were spectacular advances, with the probability that in both cases the rise will continue. Tin was irregular, especially as to the spot market, under the varying influences of the longshoremen's strike.

Transatlantic freight rates were about the same as in the previous week, with an easier tendency, however, especially owing to the large number of steamships now in the harbor. The rates from San Francisco to Hongkong and Kobe advanced to \$20.

Copper

There was the same irregularity in the market that we reported for the previous week, but the range of prices was not so great. The major part of the business was done at prices ranging from a little above 22c. to a little below 21¹/₂c., with 21³/₄c. as an average, taking into account not only the extremes, but also the volume of business. In the previous week some considerable sales to domestic manufacturers were made. This week the aggregate of the domestic business was much less. Such as was done was largely with consumers, i. e., those concerns that manufacture the last marketable products into which copper enters. Such concerns buy wire-bars and have wire drawn on toll.

A few good sales at good prices were effected in that way.

Though the domestic demand on the whole was sluggish and inconsequential, a fair business for export was done, mainly with countries on the Continent of Europe. However, both Great Britain and Japan bought some copper. This business was done chiefly through the Export Association, but some was done outside of it. The Continental countries bid prices higher than what could be realized in this country, and their orders were promptly accepted. Great Britain, on the other hand, would not pay anything above the lowest of our market.

Germany was a buyer of copper here, and also has been trying to buy in Great Britain. The stocks of copper in Great Britain and Australia are being used to control the British market, and, American producers being under-sold, their failure to export anything more than small quantities of copper to Great Britain is explained. However, the British stocks are running down more rapidly than has been commonly supposed.

Copper Sheets—32¹/₂c. per lb. Wire, 25@25¹/₂c. Domestic buying dull.

Tin

The steel strike being practically over, manufacturers of tin plate evinced more interest in buying tin, and on the whole there was a pretty good demand. The vagaries of the longshoremen's strike in New York created a good deal of unsettlement in the spot position and explain the erratic fluctuations up and down.

Singapore quoted, c.i.f. London, £283¹/₂ on Oct. 16, 17 and 20; £287¹/₂ on Oct. 21; and £286¹/₂ on Oct. 22.

In our issue of Oct. 4, the price of tin at New York on Sept. 20 was incorrectly printed at "55¹/₂c." The correct figure is 54¹/₂c.

Lead

As was anticipated, the A. S. & R. Co. advanced its price to 6¹/₂c., which was done the afternoon of Oct. 16. The St. Louis market steadily showed increased strength, and during the last two days independent producers realized prices in the New York market above that named by the A. S. & R. Co. Speculators and dealers bid even higher prices, but all possible efforts to prevent lead from falling into their hands will be made. The position in the lead market is acute, and any injudicious behavior might easily lead to excitement. It

is expected that the price will go higher, but much will depend on buyers keeping their heads, as well as producers.

Bonded lead for export is quoted at 5% c. France inquired for a large quantity, and Belgium for a little. Great Britain made some inquiries but was unwilling to pay the price asked. Germany also would like to buy lead.

The strike at Alton, Ill., continues.

Zinc

Up to the last fortnight, American producers apparently did not understand the situation of the zinc industry in Europe, and by making relatively low and erratic offers over there confidence abroad was rather upset. With a better appreciation of the European situation, however, American producers became firm in their attitude and buying for speculative account, which had temporarily halted, was resumed here. Great Britain bought a further large quantity in this market this week and the inquiries from France and Belgium took more definite forms. France in particular, seems to want a large tonnage. Our advices from Europe are to the effect that zinc will surely be scarce there by the end of the year. There is no chance of Europe producing much at current prices. There was not much domestic business done in this country this week, but toward the close, galvanizers became buyers in a small way and the steel strike being practically over, further buying by them is to be expected. With this combination of bullish influences it was only natural that a sharp advance in the spelter market should have been experienced. There is much reason to expect that it will go further.

In our Market Report published Oct. 11, the price of zinc at St. Louis on Oct. 7 was incorrectly given as 7¼@7½c. This should have read 7¼ to 7½c.

Zinc Sheets—\$10.50 per 100 lbs.

Aluminum—33c. per lb.

Antimony—There was a distinctly better tone, and more business was done. We quote spot at 8¼c. Futures were quoted at 9c., duty paid.

Bismuth—Unchanged at \$2.96.

Cadmium—Unchanged at \$1.40.

Nickel—Ingot, 42c.; shot 43c.; electrolytic, 45c.

Quicksilver—Following the sharp decline to \$75 last week, no considerable quantities were offered, and the market rallied to \$80@\$85 for quicksilver to arrive. There seems to be an actual scarcity of spot metal, and from \$95 to \$102 was reported realized. San Francisco telegraphed \$82.50, strong.

Silver—Market has advanced, owing to an insistent demand from China. It is understood that much of the bullion shipped to Hongkong and Shanghai is

for mintage purposes, and the coin is attracted to the interior, where the demand has been large. No shipments were made to Europe in the last week, owing to the longshoremen's strike.

Mexican dollars at New York: Oct. 16, 92½; Oct. 17, 92; Oct. 18, 92; Oct. 20, 93; Oct. 21, 94½; Oct. 22, 93.

Platinum—Continued in good demand, but nevertheless the market was distinctly easier. We quote refined ingot at \$130.

Palladium—Unchanged at \$120.

Tungsten Ore—More interest in this market seems to be developing. European buyers are reported to have been making inquiries. Some Chinese scheelite is reported sold at \$7 per unit.

Molybdenum Ore—Unchanged at 75c. per lb. of molybdenum sulphide.

Pyrites—Spanish pyrites is quoted at 17½c. per unit for furnace size ore, free from fines, c.i.f. New York or other Atlantic ports.

Zinc and Lead Ore Markets

Joplin, Mo., Oct. 18.—Zinc blende, per ton, high, \$47.40; basis 60 per cent zinc, premium \$46; Prime Western, \$45; fines and slimes, \$42.50@\$40; calamine, basis 40 per cent zinc, \$30. Average settling prices: Blende, \$44.84; calamine, \$34.15; all zinc ores, \$44.56.

Lead, high, \$79.35; basis 80 per cent lead, \$80@\$77.50; average settling price, all grades of lead, \$77.74 per ton.

Shipments the week: Blende, 8,896; calamine, 245; lead, 1,342 tons. Value, all ores the week, \$511,570.

Sellers continue to sell lightly, holding the bulk of ore for advance prices, which they believe will come with the nearer approach of winter. Buyers continue firm in refusing to advance prices further this week, and purchases are reported light. The works of the Illinois Zinc Co., at Peru, Ill., are closed by a strike and no buying is done by the local company. Ore on hand has been turned to other buyers.

Lead is selling for next week's delivery on \$80 basis.

Platteville, Wis., Oct. 18.—Blende, basis 60 per cent zinc, \$48@\$48.50 for both premium and Prime Western grades. Lead ore, basis 80 per cent lead, \$75 per ton. Shipments reported for the week, 1,690 tons blende, 206 tons galena, and 397 tons sulphur ore. For the year to date totals are 79,756 tons blende, 5,223 tons galena, and 13,629 tons sulphur ore. Shipped during the week to separate plants, 2,645 tons blende.

The zinc and lead ore markets for Sept. 27 were inadvertently omitted from the market report which we issued on Oct. 4. They are given below in order that the record may be complete.

Joplin, Mo., Sept. 27.—Zinc blende, per ton, high, \$46.90; basis 60 per cent zinc, premium, \$43.50; Prime Western, \$42.50; fines and slimes, \$40@\$37.50; calamine, basis 40 per cent zinc, \$28@\$26. Average settling prices blende, \$45.60; calamine, \$25.96; all zinc ores, \$44.64.

Lead, high, \$71.40; basis 80 per cent lead, \$70@\$67.50; average settling price, all grades of lead, \$68.47 per ton.

Shipments the week: Blende, 6,749; calamine, 353; lead, 1,104 tons. Value, all ores the week, \$392,540.

Shipments nine months: Blende, 358,293; calamine, 10,110; lead, 53,922 tons. Value all ores nine months, \$18,474,730.

An effort to reduce the price level to \$40 basis failed because one buyer desired a heavy tonnage and was willing to pay \$42.50 basis. All buyers "on the market," and expecting settlements on \$40 basis, changed their basis to conform to the same price level current the previous week. About 8,000 tons reported sold for next week's delivery.

Platteville, Wis., Sept. 27.—Blende basis 60 per cent zinc, \$43.50 base for premium grade and \$42.50 base for Prime Western grade. Lead ore, basis 80 per cent lead, \$70 per ton. Shipments for the week are 1,719 tons blende, 167 tons galena, and 296 tons sulphur ore. For the year to date, the totals are 73,632 tons blende, 4,696 tons galena, and 12,582 tons sulphur ore. Blende shipment to date decreased 23 per cent from that of 1918 to corresponding date. During the week, 2,506 tons blende was shipped to separate plants.

Iron Trade Review

Pittsburgh—Oct. 21

Ferromanganese—The market remains stagnant. English 80 per cent could probably be had at \$95, c.i.f.; the asking price of domestic producers remains at \$110, delivered.

Steel—There is an acute scarcity of sheet bars, as sheet and tin mill operations have been in greater ratio than operation of steel mills producing sheet bars. Sales of sheet bars are reported at \$44.50 and at \$45, Pittsburgh, against the Mar. 21 price of \$42. Billets remain nominally at the old price of \$38.50, with slabs at \$41 and rods at \$52.

Coke—The Connellsville coke market has stiffened further. The curtailment in output in the first fortnight was sufficient to balance the reduced consumption due to the strike, and as furnaces resume, the consumption increases, and operators increase output only as they can obtain a fair price. Foundry coke is easy. We quote furnace at \$4.25 and foundry at \$5.50@\$6.25, per net ton at ovens.