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December 3	11,000
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Contents

A Matter of Professional Ethics

An extraordinary general meeting of the shareholders of the Mexico Mines of El Oro, at London, a few days ago, was a rather dramatic occasion as company meetings go. It would perhaps be merely a subject for a news report were it not for a statement made in the course of the meeting by R. T. Bayliss, the chairman of the company, which furnishes an admirable text as to a matter of professional ethics.

The meeting was called upon the requisition of the French and certain other stockholders of the company to act upon a resolution ousting Mr. Bayliss from the chairmanship and Mr. Shaw from the secretaryship. It developed at the meeting that the French interests and S. Pearson & Son, Ltd., of London, who were acting with them, are now in control of this company. Into the charges brought against Mr. Bayliss and his associates, we shall not undertake to go deeply. Briefly they related to the listing of the company's shares in Paris and to alleged withholding of information respecting the mine from the director representing the French interests. As we read the charges in the report of the meeting in the London papers they seem to us to be quite flimsy. Mr. Bayliss' reply to them was dignified and adequate. In reading between the lines, however, it appears that the real grievance of the Frenchmen and their friends is that last fall the shares of the company dropped from over £9 to about £6 and now they lay this to a speech of the chairman at a meeting, Sept. 20. This drew from Mr. Bayliss the following remarks, which we shall repeat in the third person as phrased in the London newspaper reports:

"He was accused of having gone out of his way, in the El Oro company's report, to injure this company by stating that the El Oro company had disposed of its shares in this mine. Why should he try to injure this company? It was the best little mine he had ever had to do with, and it brought him more credit than any other mine in the management of which he had been concerned. . . . . Mr. Smith had said that he (the chairman) had prevented the price of the shares from continually going up. He had nothing to do with the price of the shares; it was the mine which he had to manage. . . . . He gave his word of honor that he had never had more shares in the company than his qualification, and that never, either himself or through anybody else, had he directly or indirectly bought or sold or had any transactions in the shares of the company. He would go further. When he first became associated with mining companies and their management in the city of London—now 25 years ago—he had resolved that he would not have any dealings, directly or indirectly, in the shares of any company with the management of which he was in any way connected. Some might think that resolution was a quixotic one, but he had adhered to it. It had deprived him on many occasions of considerable sums of money. It had necessitated not a little self control; but he had his reward today in being able to get up and make that statement in reply to the charge, or

charges, brought against him. He was accused of having made a pessimistic speech at the last meeting. He absolutely denied that. He had made a plain, honest and truthful statement of the position of the mine and the shareholders were entitled to it."

The position taken by Mr. Bayliss with respect to dealing in the shares of companies under his management is one that must command strong professional approval. Engineer-managers are fain to persuade themselves that they can divest themselves of consideration of their own self-interest and act and report without bias, but it is rarely that they can, and this is said without any reflection upon the honesty of any manager who may be interested in the property under his charge. Often the acquisition of an interest by the manager is encouraged by his superiors, thinking to increase his efficiency by having him as a partner. In many cases that is an excellent plan, but when the case is that of a company in the stock market, the president, directors, manager and everyone else must recognize that being human they cannot escape its influence. As a well known engineer remarked to us not long ago, "I used to put my money into the stock of my company, but I have sold out and shall have nothing more to do with it. I held the stock purely as an investment, but I found that I could not write my regular reports without thinking of what effect they would have on the market." We do not take the position that participation in the ownership of a company under management is immoral, or even unprofessional. We say merely that it is likely to bias judgment, and that factor must be recognized. Anyway it prevents such a straightforward statement as that of Mr. Bayliss, which may at some time be helpful.

To return to the recent case of Mr. Bayliss, he said finally that the discussion had gone far enough and for his part he would not remain on the board of a company controlled by S. Pearson & Sons and the Banque Commerciale et Industrielle and therefore resigned, in which action he was joined by Mr. Shaw and two other directors. His many friends on this side of the ocean, who esteem him as a man and as a distinguished mining engineer, will join us in the opinion that in this matter he was treated shamefully and will indorse the correctness of his position.

Tanganyika Concessions, Ltd.

We have enjoyed reading the report of the recent annual meeting of Tanganyika Concessions, Ltd., which owns a 45 per cent. interest in the Union Minière du Haut Katanga, which owns the marvelous copper deposits of that country. The company, which in London is known as "Tanks" for short, also has extensive railway interests. We have learned that shipment of the reduction plant was commenced last September and the plant will surely be in full swing next April, producing 1000 tons of copper per month, while a second unit is now being started on the road. It would appear that construction can be done more rapidly in the interior of Africa than in the United States. Even so, the erection of this plant has been retarded by the past wet season, which has been the worst on record in Katanga. Of course, it is well known that the extension of the Rhodesian railway is now at the Star of the Congo mine. But *revenons à nos moutons.* The thing that interests us most, just at the moment, is the financial arrangements of this enterprise comprising wheels within wheels, guarantees and reguarantees, debentures and shares of various kinds, agreements with managing directors, contractors, etc., so that a presentation of the subject by the chairman looks, as reported, like a page of quaternions. So when the net returns from the copper production begin to come in, which we hope will be soon, we wonder who will know to whom they belong.

The Smelting Situation in Mexico

The smelting situation in Mexico, especially as relates to the larger custom plants, is rather serious, being in many respects analogous to the position of the works in the United States. Very few of the smelteries in Mexico are being run at present at anywhere near their capacity, and most of them have no immediate outlook for a betterment of their business. While it is customary at this time to ascribe any difficulties in the mining or smelting industries to the low prices of metals, there are several other factors that have combined to alarm the smelters in that country. The most serious of these in most cases is the shortage of silicious ore for the copper plants; minor factors are the lack of iron and sulphur, and the increased competition.

Due to the milling and cyaniding of the ores at Pachuca, Guanajuato, El Oro, Oaxaca and other camps of less importance the smelters have had to purchase a large excess of fluxing ores, which they find difficulty in smelting because of the scarcity of silicious ores. The silicious ore, being generally rich silver and gold, used to be the marginal ore. The present shortage naturally causes a falling off in the earnings of the plants.

The purchasing of barren flux of either lime or iron is of course expensive, but this difficulty has so far been met successfully by most of the smelters. The necessary sulphur for matting has also been found difficult to secure and has caused some of the companies to withdraw their previous sulphur penalties, and in some cases even mines producing heavy copper sulphide ores have been given advantages on account of their sulphur content.

The increased competition is of course the natural evolution in a country so rich in all kinds of smelting ores, and a still greater business will no doubt result as the opening of new railroads, and the subsequent opening of new mines, continues. Certainly it is to be hoped that the present troublesome situation is but temporary.

The Annual Statistical Number

The next issue of the JOURNAL, inaugurating Vol. 91, will be the annual statistical number, reviewing the important events of the mining and metallurgical industry in 1910, and presenting statistics of the production of the metals and the more important mineral substances in the United States in 1910. In some cases these statistical presentations will extend to some of the foreign countries, especially Canada and Mexico. The importance of prompt statistical information is now thoroughly appreciated, and with the hearty coöperation of producers, who communicate to us their production during the first 11 months of the year, together with their individual estimates for December, it is possible to present within a few days after the close of the year reports from which finally revised figures differ but little.

Metallics

Where stamps are followed by tube mills unless suitable trommels are installed to feed undersize direct to the tube mills, the stamp as a rule wastes much unnecessary effort on already pulverized ore.

The product of the specific heat by the specific gravity is a constant for practically all metals, ranging from 5.8 for aluminum to 6.7 for sodium and manganese. This product is known as Dulong and Petit's constant.

It is possible to make a few simple tests on minute quantities of various substances by placing filter papers wet with test solutions on a microscope stage, and then placing small particles of the material to be examined on them.

Aluminum melts at 1215 deg. F., but becomes granular and easily broken at about 1000 deg. F. It is best melted in ordinary plumbago crucibles, and unless greatly overheated, will not absorb either silicon or carbon to any injurious extent.

If oreshoots give off branches which continue upward, tapering out above, the probability is that the lode was formed by ascending solutions. If, on the other hand, successive branch shoots point downward, they have probably been formed by descending solutions.

The rare element xenon dissolves to a greater extent in water (0.1109 per cent.) than does any other gas not forming a compound with the solvent. Autropoff gives the solubility of helium at 0.0138 per cent., the solubilities of these rare gases varying directly with the atomic weight.

According to E. Deiss, many metals and alloys difficultly soluble in acids may be attacked by heating with sodium carbonate, which acts as an oxidizing agent, carbon monoxide being evolved. The addition of magnesium oxide makes it a better attacking agent for alloys containing chromium.

The analysis of zinc retort residues or other such carbonaceous material is greatly facilitated by the use of about 10 c.c. of an oxidizing mixture made by putting potassium chlorate crystals in strong nitric acid until no more chlorate dissolves. This is a convenient reagent to have on hand, and if kept in diffused sunlight decomposes only with extreme slowness.

To test the purity of calcium, barium, or strontium sulphates, Hofmann and Mostowitsch recommend igniting the dried precipitates in a current of carbon monoxide. The temperature for this ignition is 910 to 920 deg. C. for calcium, about 1200 deg. C. for barium. The residue is the sulphide of the metal. The loss on ignition is oxygen, which loss os checked against the theoretical content.

By the Way

The mercury mines in the Zalatna valley, Transylvania, after having lain idle for about 20 years, are again attracting the attention of foreign capitalists and mining men.

At the inquest on Dec. 13 over the bodies of the 31 victims of the Bellevue colliery disaster in British Columbia, it developed that a previous explosion had occurred in the mine on Thanksgiving day, when no one was present. Complaint had been made to the inspector of mines for the province of Alberta that the mine was unsafe, and he had been asked to investigate. The inspector had sent an assistant, Heathcoate, who had made a tour of the mine, and then posted a written notice that it was safe and free from gas. Two days later the explosion occurred.

A new aluminum alloy, consisting of 80 to 90 per cent. aluminum, 5 to 10 per cent. silver, and 5 to 15 per cent. of some metal belonging to the iron group like cobalt, chrome, nickel or manganese, has been invented by R. Esnault-Telterie. This alloy is said to be unusually hard and tenacious. It can with great advantage be used whenever light weight combined with great strength is required. Owing to its low friction coefficient, it is also useful as an antifriction material. We do not vouch for these statements, but we go on record as saying that a good commercial use for silver, such as might elevate its price to, say, 75c. per ounce would be something worth while.

A late decision that a workman cannot be regarded, as a matter of law, to have assumed the risk of injury through getting entangled in an uncovered cogwheel, if his understanding of the English language and previous experience with cogwheels was limited, reminds one, says a contemporary, of the intoxicated delegate to a State convention, who declined to settle the dispute between two other inebriated wayfarers as to whether the body visible overhead was the sun or the moon, on the ground that he was a stranger in that town. Those who have not seen a foreign cogwheel in action may wonder wherein it is more obviously dangerous than the domestic type and how lingual ignorance affects the peril.

The average wildcat prospectus which falls into the hands of mining engineers seems so preposterous and filled with palpable errors that they are at a loss to understand how anyone can be induced to invest in such highly gilded enterprises, usually claiming mountains of ore of sufficiently high grade to make anyone rich, without asking assistance—except in the distribution of this great wealth. However, to schoolteachers, clerks and other hard-working people, the inconsistencies are not apparent. Even among business men in the East, it is often the case that when considering mining investments they prefer the gratuitous assurance of a friend, who knows nothing about mining, to spending a small sum in consulting a mining engineer.

The knowledge that he is considered a relative of the second-story man adds much to the joy of the assayer's life. The following is the copy of a *bona fide* letter received after a smeltery assayer reported that a sample of ore submitted was worth about $1.50 per ton: "Dear Sir: I would advise you to guess again, as your bluff assay has a busted tire. Listen! Children, here are the minimum and maximum values selected from quite a number of them, made by one of the best known firms of assayers in America. The sample, I think, was taken from vein 1, minimum, $881 per ton, maximum, $8278 per ton. I have often roasted it on charcoal, mixed with Carbonate of Soda, by means of my blowpipe, and always obtained an abundance of globules. From the above, it is plain that your assayer has lied, probably bribed to do so by a Bunch of Pirates who will get left. The suicidal absurdity of the report is its own undoing. Ta! Ta! JOHN L.—" And Prejudice congratulates herself that she has again refused to permit Science to dictate to her.

In Wall street, says the *Evening Post,* there is an underworld, a kind of financial demi-monde, recruited from that class of men who waste their lives trying to get something for nothing. Its existence begins on the fringe of respectability, where the men of both worlds may meet on terms of mutual suspicion, and recedes gradually to a state or condition of extreme immorality. On this lower plane larcenous practices are thinly disguised, and the police are feared. "Business" of this baser order would represent total depravity, but for the saving virtue of the absence of any pretence to respectability. It is possible for a member of the respectable world to descend through the several levels to the financial demi-monde, but there are few, if any, instances of a member of the lower world having risen to the other. You may observe a luminary of this demi-monde in the cafés and restaurants, and you place him by his manners with money. He spends it loudly and freely, calls the waiters by name, and is deferred to by little groups of errand men, curb brokers and dependents. He himself is transient. His "business" may collapse to-morrow, whereupon he suffers an eclipse. Or, he may be "raided." The name under which he conducts his operations is seldom his own. It has been worn out. Firm names are invented. They wear out, too, and are continually changing. Everything changes but the world and its members.

CORRESPONDENCE and DISCUSSION

Views, Suggestions and Experiences of Readers

Proposed Amendment for Location of Lode Claims

Secretary Ballinger, in a report just published, recommends "legislation requiring notices of mining locations to be recorded in the office of the register and receiver of the land districts." Whatever may have been Secretary Ballinger's shortcomings in connection with the administration of the mineral-land laws in Alaska, he has certainly officially recognized a weakness in the present law governing the recording of mining locations which should be remedied. Dr. R. W. Raymond long ago called attention to the absurdity of title to land passing from one party to another without notice being given to the party conveying the land, as happens under the present law when a mining claim is located. The notice of location is recorded at the office of the recorder of the mining district, an uncertain and evanescent point, or with the county clerk and recorder. No notice is given to any official of the United States, from which title is obtained by the act of location.

In "A Proposed Amendment of the Mineral Land Laws," (JOURNAL of April 27, 1905, p. 796), I suggested, among other changes, that section 2324 of the revised statutes, which deals with this subject, be amended to read as follows: "All mining claims located after ——— shall be recorded at the United States Land Office of the district in which they lie within 40 days after location, if located within 100 miles of said office, but for every additional 10 miles one additional day shall be allowed. ———And said records shall also contain such a description of the claim, or claims, located by reference to some natural object or permanent monument as will identify the claim, a statement of what claim or claims it adjoins, and a description of the boundaries as stated in the location notice posted on the claim. And where the lands are surveyed by the United States, said description shall include a statement of the section or sections in which said claim lies, and said section or sections shall not thereafter, unless this claim be abandoned, be disposed of as timberland, or agricultural land, or for any other purpose, without investigation of this claim and notice to the locator or locators thereof. Upon each mining claim located upon the public lands and until a patent has been issued therefor, not less than 100 dollars worth of labor shall be performed or improvements made during each year;—— the cost of a survey of a mineral claim, to an amount not exceeding 100 dollars, may be recorded as assessment work if such survey be made by a United States deputy mineral surveyor and filed with the land office of the district. An affidavit stating that such work has been done, and that all monuments are in proper condition, shall be filed with the land office of the district prior to the expiration of the year, and failure to file such affidavit shall be deemed a notice that the claim is abandoned."

The above suggestion, with others, was submitted in 1905 to the commission on public lands, a commission composed of most excellent men, Governor Richards of the Land Office, Mr. Newell, of the Reclamation Service, and Mr. Pinchot of the Forestry Bureau. Unfortunately each member of the commission was overwhelmed with the problems of his own department, and the investigations of the land laws was carried on by proxy. The report, as stated to me by at least one member of the commission, was that so great a variety of opinions had been encountered among mining men that no revision was recommended. At that time there was certainly little interest in the revision of the mineral land laws. No less than a McKinley, "with his ear to the ground," could have caught the opinion of the majority.

Are conditions any better today? Do mining men know what they want? A few more unfortunates have paid money for mining claims, only to find that Tom had covered the same ground with prior locations; or Dick had a timber claim there, properly recorded 10 years before; or Harry had homesteaded the same land. All three may have neglected to comply with the laws; Tom's stakes were down and he had done his assessment by digging out the same hole for 10 years; Dick had little to do at best; Harry never had a real fence on the place and long since deserted it; but all of the old rights are revived when there is money in sight. A few of us have known of these things, have tried to save our clients from them, both by hunting evidence, on the ground, of previous occupation, and by employing the best lawyers to investigate titles, lawyers who will say only: "The title is as good as that of any unpatented mining claim can be." Others have no experience. Have they any objection to the proposed change? I have heard none advanced. If there are any let us hear them. If not, let us urge our congressman to act, for the next generation will have troubles of its own.

GEORGE A. PACKARD.

Boston, Mass., Dec. 10, 1910.

Monumenting Mexican Claims

The following item recently appeared in the Mexican *Herald*: "Many Americans who own mining concessions in Mexico stand a chance of losing their properties by failure to comply with the new law, which require that all these mineral lands must be marked with monuments before the end of the present year, the penalty for failure to do this being forfeiture of the concession to the government." Richard E. Chism, of Mexico City, an authority on Mexican mining law, is reported to have said in reference to this subject: "I can assure you that the item is entirely erroneous. The penalties prescribed for failing to set up monuments upon mining properties do not in any case include forfeiture of the concession. The law states that any person failing to monument his claim shall be subject to an administrative fine of from 100 to 500 pesos, which shall be imposed by *fomento* upon due proof of the offense.

"If the offending party does not put up this monument within thirty days after the imposition of the fine he shall be committed to the ordinary federal courts for infliction of the penalty provided for disobedience to the lawful order of the authorities and the monuments shall be constructed by *fomento* at the expense of the offender.

"It should be noted that this law only applies to those mine owners who failed to set monuments upon their properties before Jan. 1 of 1910. If properties were duly monumented before that date and if the monuments still exist and are in good order there is nothing further to be done than to keep them up by timely repairs, except to add interpolate monuments wherever necessary, so as to comply with the provisions of the new regulations which require that from any one of the monuments it shall be possible to see the preceding and the succeeding monument.

"The regulations also provide that by dimensions, shape or color, or by some other characteristic the monuments of any property shall be differentiated from these of an adjoining or neighboring property.

"This implies, of course, that where there exists a mine already monumented, the new comer who lays out another

claim adjoining the first one or within a short distance thereof, should make his monuments different from those of the older mine, in order to comply with the requisities of the law."

Mr. Chism's statements will be of vital interest and I sugest that you give them publicity.

MEXICAN MINER.

Mexico, D. F., Dec. 15, 1910.

The Mitchell Slicing System at Bisbee, Arizona

I was intensely interested in the paper written by M. J. Elsing that appeared in the JOURNAL of July 23, 1910, p. 174, under the above title, more especially as for many years I was connected with a mine which largely used the square-set method of timbering and so I fully appreciate how desirable it is to introduce modifications of this class of timbering wherever possible. When supporting excavations by square-set timbering the cost per ton mined for timber alone is always a big percentage of the total cost of mining. In the particular mine to which I refer all sets were made of 9x9-in. sawed timbers, the caps being 6 ft. long, struts 5 ft. and legs 7 ft. 9 in. The tenons were all cut in the sawmill and the timbers cut to one templet so that the mine timbermen had little to do but see that the sets were properly erected.

TIMBER COST ABOUT 20 PER CENT. OF THE UNDERGROUND EXPENSE

The quantity of timber required per ton of ore, of course, varies slightly with the area of the stope and its hight but on an average it will be found that stone averaging 11 to 12 cu.ft. to the ton of 2240 lb., requires for the set timbers alone about eight board feet per ton mined. To this must be added the flooring for the sets, the slabbing used in filling up sections and the material required for chutes and for occasionally double-banking and staying sets. Considering, these items, it can be safely taken that 11 board ft. of timber will be required per ton mined, which with timber at 16s. per 100 equals 1s. 9d. per ton of ore mined for timber delivered at the mouth of the shaft. To this first cost for timber must be added the expense of handling the timber to the stopes and the cost of the labor for erecting. Taking everything into consideration it can safely be taken that the cost of timbering equals 2s. 6d. per ton of ore mined or about 20 per cent. of the total underground charges.

The square-set system has, however, much in its favor; it is safe, if properly worked, stopes being filled so the men can generally work under caves; it is very flexible and can easily be expanded or contracted to adapt it to the confines of the profitable ore. But high expense of square-set timbering is undeniable and therefore any modifications which can retain the advantages and at the same time reduce the cost must be of great interest to mining men.

SAVING EFFECTED BY MITCHELL SYSTEM NOT APPARENT

In following Mr. Elsing's description of the modifications adopted at the Calumet & Arizona mine the saving effected is not as large per ton of ore mined as at first appears. In the first place on looking at his plans it will be seen that 32 per cent. of ore has still to be mined by the ordinary square-set method leaving only 68 per cent. to be benefited by any saving introduced by the new method. A big saving in timbers is certainly effected in the new method but I should think that, in those stopes where 75 per cent. of timbers used can be recovered during filling, the side pressure must be so slight that 50 per cent. of the timber could be safely left out in the first place. Also, regarding the recovery of this timber, it must be remembered that unless the rock is quite soft a certain amount of damage is generally done to timber in shooting; also tenons are liable to damage during contraction especially when there is sufficient side pressure to drive home the joints: When the tenons are broken the timbers become too short to use again as stringers and must be cut up into shorter posts and caps with a resulting waste which can only be utilized for blocking and wedges. The cost of recovering the timber and handling it out of the stopes has also to be written off against the value of the recovered timber so that the saving cannot be taken as equal to the cost of the same quantity of new timber delivered at the shaft.

EXTENT OF POWDER AND TIMBER SAVING

It is, in fact, rather hard to see where some of the saving claimed for the Mitchell slicing system comes in. Why should the amount of powder be reduced to one-half? It looks as if, on the other hand, the cost of powder should be if anything more than with the ordinary method. In square-set mining, after the sill floor has been mined and the first set in a new floor taken out, there is never more than four faces exposed, and often only three, and also the breaking of the ground is assisted by gravity. With the new system of mining there will still be the same number of faces but breaking will not be assisted much by gravity so it seems hard to see why there should be a saving of 50 per cent. in powder used.

The claim that the cost of timber and timbering is reduced by half also requires some explanation. From Mr. Elsing's plan it can be seen that the actual timber used is reduced by half but I am inclined to think that there is little saving in the cost of erection. The handling of the 15-ft. stringers in the levels and stopes must be more cumbersome and expensive than the handling of three 5-ft. caps or struts.

MORE DETAILED INFORMATION DESIRABLE

No mention is made of how the filling and timber are brought into the stopes. Apparently this system calls for at least one raise connecting with an upper level for each section or block of ground to be mined. All the square sets are used for ore passes and it is, therefore, impossible to get timber into the stopes through them without interfering with the regular mining. When the timber is being recovered, during the filling of the stope, it will be possible to remove the recovered timber through the square sets as they will then be empty of ore and, for the time being, have served their purpose as chutes.

The saving in labor in mining the upper portions of the pillars can be understood, as with all the square sets being used as passes the method approximates that of an underground "mill" or "glory" hole. I should also think that the rigging of machines between the 15-ft. stringers would be unsatisfactory as these are apparently not blocked in any way and there surely must be a certain amount of spring which would result in the holes getting out of line with the machines, thus causing annoying fitchering.

It is stated that in square-set mining it is often difficult to place the chutes close enough to be within shoveling distance of the working faces. This hardly seems sound as one of the advantages of square-set timbering in the ease with which a series of sets can be boarded up to form a chute. If roads are maintained through the stopes at 20-ft. centers, as in this method, it should be easy enough to place chutes so that they are always within shoveling distance of the faces. The advantage to be gained by the method described by Mr. Elsing lies more in the fact that the slabbing up of the sets to form chutes is unnecessary as the ore will act as sides to the passes when the first block is being mined, and the filling and ore when the remaining block on the other side of the drive is being mined.

The falling ore will knock the timber about a good deal, but as it is not proposed to withdraw and reuse this timber it should easily last out the necessary time. The system described is certainly suggestive, but it would be interesting to know a little more about some of the important details. In any article describing underground methods there can never be too much detail as it is the carrying out of the minor details of a method that always causes the greatest trouble to the man in charge of the work and frequently the entire success or failure of a method depends upon the care with which the details of operation are executed.

J. BOWIE WILSON.

Sydney, N. S. W., Oct. 10, 1910.

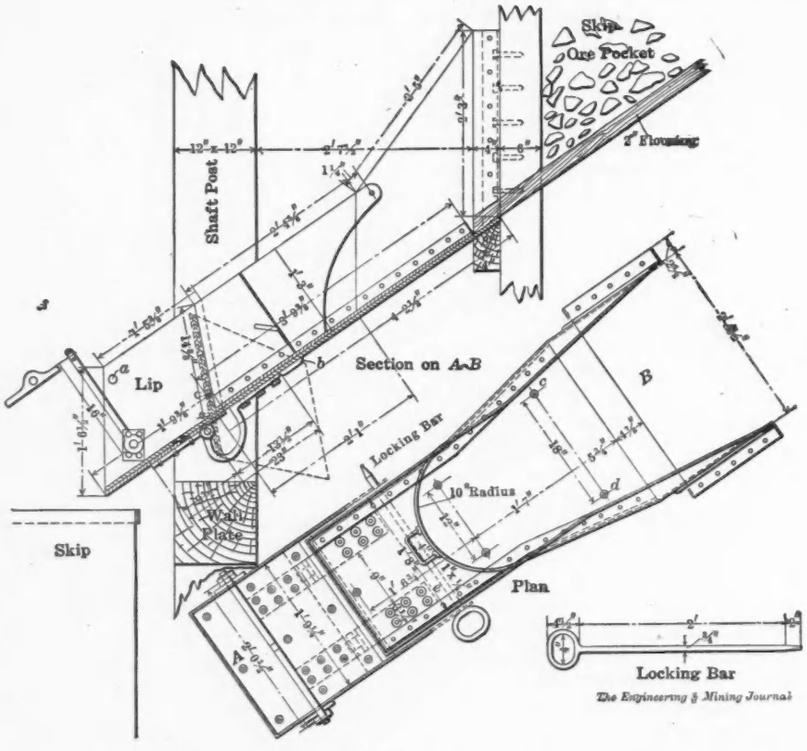
DETAILS of PRACTICAL MINING

Notes of Interest to Prospectors and Operators of Small as Well as Large Mines. Things That Have to Be Done in Everyday Mining

Steel Skip Loading Chute

At Kalgoorlie, West Australia, in the mine of the Ivanhoe Gold Corporation Ltd., steel skip-loading chutes similar to those seen in the mines at Butte, Mont., are in use. The accompanying detailed drawings, taken from the *Report* of the Department of Mines of West Australia, for 1909, illustrates the chute used at the 1669-ft. level in the Ivanhoe mine. The arrangement at the Leonard mine in Butte was described in the JOURNAL of Sept. 3, page 445. As shown in the illustration the chute occupies an additional compartment beside the shaft, and the bottom of the chute forms a continuation from the skip pocket to the shaft. The bottom of the ore pocket is floored with 2-in. planking. This is continued in the chute with a steel bottom of ¾-in. sheet. The sides of the chute are made of ¼-in. plate, 2x2x⅜-in. angle irons being riveted to the sides and bottom with ⅝-in. rivets pitched at 3-in. spacings.

The chute proper extends from the timbering of the ore pocket through the extra compartment to the main timbering of the shaft. A lip is hinged to the bottom of the chute and forms, when lowered, an extension into the shaft and to the skip. This lip, when not in use, is turned up into the position shown by the dotted lines in the drawing and acts as the gate to the chute. It is held in this position so as not to interfere with hoisting by the locking bar *B*, which is slipped through the holes on either side of the lip. The holes *C* and *D* shown in the plan are for fastening liner plates to the bottom of the chute. At *E* holes are punched in the liner plates to allow bolts to be drawn out of the hinges on the lip.



STEEL CHUTE FOR LOADING SKIPS USED IN IVANHOE MINE, KALGOORLIE, W. AUST.

The City of New York is about to begin another extensive mining operation. This will be a tunnel to convey water from the new Hillside reservoir at Yonkers to Brooklyn. The tunnel will be driven through the solid rock underlying Manhattan island and the East river. The first section will be 21,260 ft. in length and 15 ft. in diameter. In subsequent sections the diameter will be gradually reduced to 11 ft. The tunnel will be lined with cement.

Aeration of Cyanide Solutions

It is a recognized fact that the dissolving of gold or silver in cyanide can only be effected in the presence of excess oxygen. It is, therefore, of prime importance to provide this oxygen while the solution is being effected. When a solution becomes spent, i.e., excess oxygen has been used up and excess of hydrogen results, the solution becomes positively charged, whereas it should be negative in order that the metal to be dissolved, which has a positive charge, shall go into solution. It is the function of aëration to correct this condition. It also serves to break up and eliminate objectionable cyanicides, ferrocyanides, arsenious acids, etc.

In the Nova Scotia mill at Cobalt, Ont., especial attention is paid to aëration of the cyanide solution, and this is particularly necessary on account of the use of the Trent agitator, in which the pulp is kept in circulation by pumping solution drawn from the top of the tank through the radiating arms of a distributer set at the bottom of the tank. The arms of the agitator are bent, as in a rotary lawn sprinkler, so that the reaction of the water being forced through them causes rotation. Where Pachuca agitating tanks are used, the air for agitation furnishes the necessary oxygen.

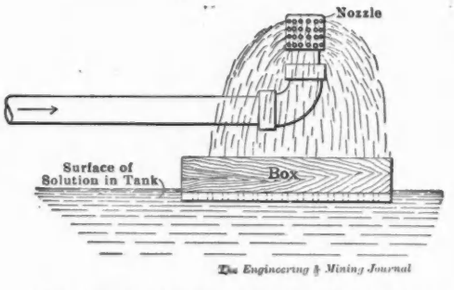


FIG. 1. SPRAY FOR AERATING SOLUTION IN CLARIFYING TANK

DEVICE ON CLARIFYING TANK

In Fig. 1 is shown the arrangement used in the Nova Scotia mill to aërate the solution from the Moore filters as it passes to a clarifying tank. The end of the discharge pipe is turned up and terminated in a nozzle having small perforations. The solution is sprayed through this and falls into a box having holes bored through its bottom, which floats on the surface of the solution in the tank. This arrangement not only serves

to aërate the solution, but aids materially in clearing, no filter press being used to clear solutions further before zinc dust for precipitation is added.

ARRANGEMENT OF SPREADING SURFACES

The silver solution from the clarifying tank is joined by the overflow from three Dorr settlers and aërated by being run over the arrangement shown in Fig. 2, below which in the tank is liberated fresh air delivered from cowls set on the roof of the mill building. The solution is run on a convex-shaped surface covered with strips so as to spread it. From this it drains on a concave surface placed below, but with its edge extending beyond that of the upper one. The solution drains to the center of this surface, where it is discharged to another convex surface, and so on until it has passed over about six. The lower one is perforated so that the solution trickles to the tank below. A sheet of canvas extending from the top of the tank to above the aerating arrangement is stretched about the latter so as to confine the air de-

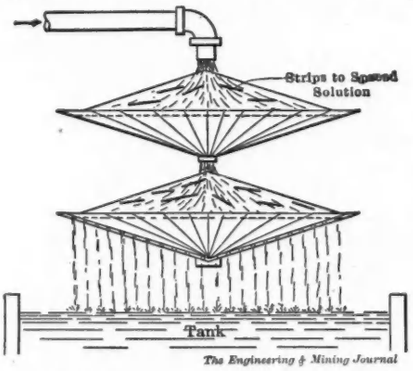


FIG. 2. AERATING ARRANGEMENT USED IN O'BRIEN MILL COBALT

livered from the cowls and force it to pass up between the spreading surfaces, thus affording ample opportunity for the absorption of oxygen.

A final aëration is given the solution at the battery-storage tank. The arrangement here is the same as that above described. A 3-in. pump is, however, used to draw solution from the bottom of the tank and elevate it above the aërating device, where it is discharged. The use of the pump provides a continual circulation of solution. At the Nova Scotia mill it is figured that the consumption of cyanide is greatly lowered by the use of these aërating devices and the extraction is doubtless improved in like measure.

Tests on Old Timber

It is the prevalent impression that the fiber of timber becomes dead after several years' use, and that old pieces should be replaced regardless of their apparent soundness. In the *Engineering News*, C. P. Buchanan, of the Pennsylvania Lines West of Pittsburg, details some experiments on bridge timbers which had been in service for 25 years. The results of his tests showed that the timber was then stronger than specially selected pieces about a year old which he and his master carpenter both passed upon as first-class stock. Consequently it is Mr. Buchanan's view that if sounding, boring, and cutting fail to show any change in the cellular structure of timber that the timber is sound, and that in general, up to the time such evident cellular changes set in, the strength of the wood increases.

Electric Lighting in Mines

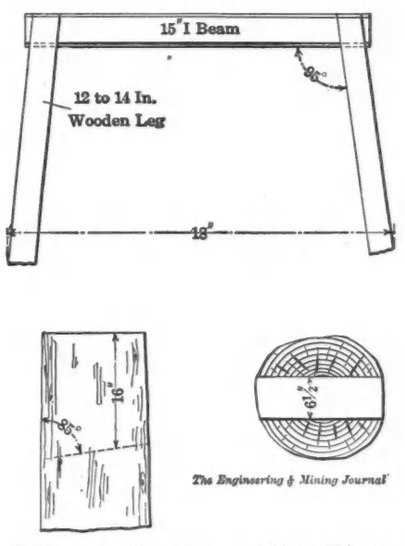
This branch of electrical work does not make the headway it ought in the Rand mines according to R. G. Mackie (*Journ.* Transvaal Inst. Mech. Engrs., Oct., 1910). There is no comparison between an underground station well illuminated by electricity and a station surrounded by candles, or even a few acetylene lamps. Both the latter forms generate noxious gases tending to produce conditions in a mine which officials are constantly on the alert to prevent. A light station greatly facilitates and renders more safe the loading and unloading of cages during the raising and lowering of the shifts. Moving the labor shifts up and down the shafts is, on account of the time required, becoming a serious matter in the deeper mines, and all possible facilities should be offered to enable this work to be carried out as expeditiously as possible. Good light insures greater safety to persons moving about on underground stations, and the tramming boys feel the benefit when they arrive with their loads.

Consider also the benefit derived from having a good light at the loading bins: The skips can be well and quickly filled, but not overfilled, and this means time saved per ton of rock hoisted, while there is less risk of accidents due to lumps of rock falling from overfilled skips. In one particular case where a rock fell from a full skip, it rebounded from the timbers, and finally smashed a pulley at a bend in the shaft. This was unnoticed at the time but when the skip passed again the rope caught between the pulleys with the result that it was positively ruined, meaning a loss of over £200 for rope and five hours stoppage of hoisting. This is but one instance of where a good light at the loading station might have saved all damage, expense and delay.

Surveys for a project involving the draining of 70,000 acres of bottom land in Obion county, Tennessee, have been completed by the Tennessee Geological Survey. The work will cost less than a million dollars and the land will be worth fully five times that amount when reclaimed.

Combination Steel and Wood Mine Timbers

In some States the mine inspectors object to supporting timbers directly on solid coal, and great care should be exercised not to permit any excessive loads to come thereon. This has been prevented in some instances by the use of sprags or short timber props to carry the load to a secure footing. R. B. Woodworth, in the *Trans.* of the Lake Superior Mining Institute, August, 1910, states that an excellent way is to combine the use of steel with wood by using steel for the collar or cap on the gangway and wood for the legs. The steel is relatively better adapted to resist bending stresses under transverse loads, while the compressive strength of wood is much greater than its resistance to bending. This has been done in the



DETAILS OF COMBINATION MINE TIMBER

Adrian mine of the Rochester & Pittsburg Coal and Iron Company at Punxsutawney, Penn., where 4-in. H-sections have been used to replace wooden collars 8 in. square. These H-sections are spaced 4 to 5 ft., center to center, and are supported at their end on round timber posts, making a solid and substantial construction. The additional four inches of head room gained by their use was also a factor in their favor. In the instance above mentioned the steel mine collars rest directly on the top of wooden posts.

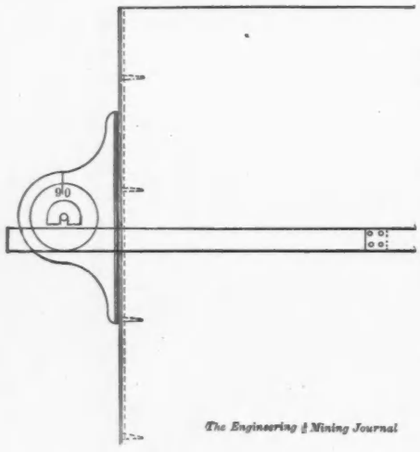
A more satisfactory form of construction is shown in the accompanying illustration which represents combination timber sets used by the Alden Coal Company at Nanticoke, Penn., where a 15-in. I-beam is placed squarely across an 18-ft. gangway and is fitted into a wooden leg at the end. An item of importance in this connection is so to proportion the size of the wooden post to

the steel collar as to prevent crushing of the wood immediately under the steel, the crushing value of the wood being low. The only objection to the use of I-beams is the possibility of splitting the top of the post.

Geologist's Drawing Board and T-Square

BY S. H. HAMILTON*

One of the difficulties confronting the itinerant mining geologist is the transportation of his outfit, and probably the most difficult is the drawing board and T-square. I have used, for some time, pieces of "compo board" 18x32 in., which fit under the tray of my steamer trunk. "Compo board" is a standard trade article (especially in cities), being used in place of lath and plaster for partitions and ceilings. It is made of strips of soft wood about ¼ in. thick, 1 in. wide and 48 in. long, glued together and covered with heavy paper.



GEOLOGIST'S DRAWING BOARD

A piece of compo board 4x5 ft. costs about one dollar. From this piece the desired size is cut square, and the cross-grain edge bound with ⅜-in. brass "angle iron," which is about 3/32 in. thick. The brass, therefore, projects somewhat above the thickness of the board and must be filed down. The board is well soaked in shellac on the edges to keep out moisture, and the brass edge screwed in place after applying thick shellac liberally. This makes a true edge for the T-square. The soft wood takes and holds thumb tacks fairly well, and the paper surface is smooth enough to use tracing vellum directly thereon. After two years' hard usage in the West Indies, mountains of North Carolina, Canada and in the Adirondacks of New York, my boards are as good as ever, save the increasing number of thumb-tack holes.

My T-square is also made up of "standard stock." Starrett's bevel protractor forms the head. The protractor feature is a great advantage. The blade is made up of four standard blades for this head. About an inch is half-cut away from each end and the sections attached with small screws which fit flush. The fitting of these blades is not an easy task and should be confided to some good mechanic. When "knocked down" this protractor-T-square occupies a space of less than 1x3x12 in. in my instrument case. When set up it makes an instrument with a 3½-ft. blade.

*Geologist, 29 Broadway, New York.

Cement Filling of Water Bearing Strata Prior to Shaft Sinking

At a meeting of the Société de l'Industrie Minérale at Nancy, M. Hanra, manager of the Saint-Pierremont mines, recounted his experiences in the use of cement for filling the crevices of water-bearing strata preparatory to sinking a shaft through them. The shaft in question was required to go to a depth of 190 m., and to pass through two watery zones at depths of 115 m. and 163 m. respectively. The prevailing strata were marls, shales and limestones, full of fissures which were, in the main, quite free from clay or other detritus, a condition which greatly favored the injection of cement grouting.

A preliminary pit 5 m. in diameter was first dug to a depth of 9 m. Eight drill holes were then started, spaced 1.90 m. center to center, around the circumference of the proposed shaft. The tops of the holes were lined with pipe embedded in 1.5 meters of well rammed concrete. The drilling then went on in two holes at a time, using the Vogt method of rope suspension with injection of wash water. By observing the rate at which the wash water was absorbed through the walls of the holes, it was possible to ascertain quite accurately the position of the zones of principal fissuring, at which the strongest inflows of water would later be encountered.

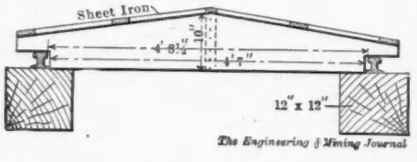
The quantity of wash water averaged 15 cu.m. per hour. The drill holes were begun on Jan. 1, and were sunk to a depth of 200 m. by April 1. The sludge from the drills was brought up by forcing air through pipes to the bottom of the holes; the water issuing from the holes came from the fissures, and brought with it any lumps of clay that might have interfered with the subsequent injection of cement.

The Saclier apparatus, previously tested at another shaft, was employed for making the cement injections. A finely ground portland cement was used, and was injected at the rate of 5000 kg. per hour as a grouting, the thickness of which was gradually increased as the resistance of the fissures became greater. The cementing operation lasted three days and consumed altogether 95 tons of cement.

When the injecting process was finished, the hoisting plant was set up, and shaft sinking began on July 16. In the first 51 m. the flow of water was only 625 liters per hour. The second stage, to the 95-m. level, yielded a maximum of 1500 liters per hour. The third stage, passing through the most fissured limestone, to a depth of 116 m., yielded as much as 5200 liters per hour, but this was easily hoisted by bucket. During the final stage, in the other watery zone, the inflow was only 2900 liters per hour. The largest flows of water were encountered at exactly the levels which the preliminary observations of the wash water had indicated, but they were so small that it was not necessary to install any pump.

Track Cover on Coal Dock

The storage of a large tonnage of steam coal is usually done at the risk of spontaneous combustion. The coal docks of the Cleveland Cliffs Iron Company at Ishpeming, Mich., are completely



COVER FOR TRACK ON COAL DOCK

covered, thus keeping the coal dry. The railroad tracks are built on trestles 20 to 25 ft. high and wide enough for three parallel tracks on top. This gives a storage area about 50 ft. wide by 300 ft. long and 20 ft. high. The posts under each rail are vertical while there are batter posts at the side with a slope of about 65 deg. These side posts form a retaining wall, and are covered so as to form a roof for that portion of the coal pile, while all of the space between the rails is floored with boards and covered with sheet iron.

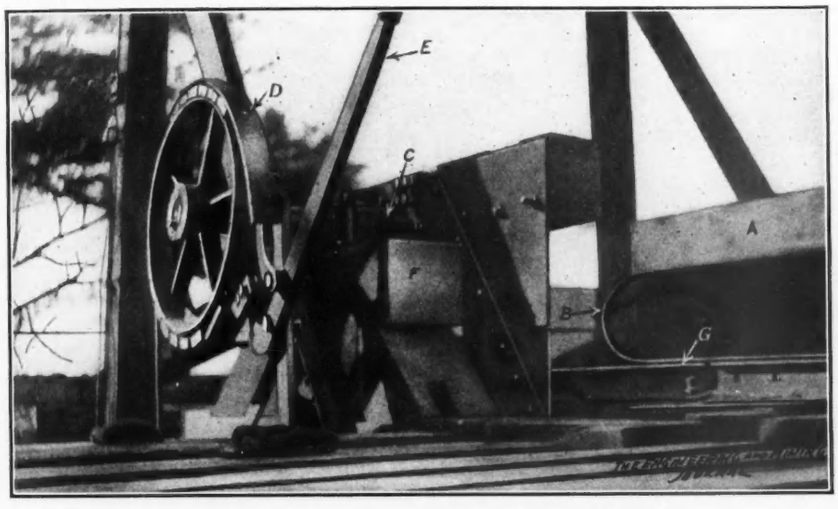
The accompanying sketch shows the arrangement for temporarily covering the section between the rails which is left open to receive coal from the bottom-dump cars. A frame is made with three 2x10-in. planks, spaced 3 ft. apart, on top of which sheet iron is fastened. These sections are about 6 ft. long and are easily removed when it is desired to fill the pocket with coal. There is sufficient grade to the tracks so that water drains off readily. In this way the coal is kept perfectly dry which results in a saving of fuel, and at the same time lessens the danger of fire.

An Automatic Dump

By Guy C. Stoltz*

An unusual type of automatic dump has been installed by Witherbee, Sherman & Co., at the mouth of Barton Hill tunnel at Mineville, N. Y. An electric locomotive brings a trip of loaded 3-ton cars to the mouth of the tunnel, where each one is in turn set out on a trestle at the end of which the cars enter a complete turn-over dump, discharging into a storage bin. The dump is so balanced that the car, after emptying, rights itself by revolving with the tipple.

The combined center of gravity of the loaded car, with that of the tipple, is about one foot above the axles *C*. As the car enters the tipple it encounters the curved rails *B* and revolves on the axles until the car is completely overturned. It is held by band brake *D*, operated by lever arm *E*, until the contents have been discharged. After dumping, the center of gravity of the tipple and empty car is then below the axles, so the whole can be lowered by the band brake until the projecting rails *G* meet a bumper on the trestle which stops the tipple rails level with the trestle track.



Automatic Tipple for Ore Cars, Mineville, N. Y.

The floor of the tipple is made of 3x3-in. angles, to which the rails are bolted. These angles are riveted to angles of the same size, forming the skeleton for the sides. The side angles are riveted to ½-in. steel plates to which the 8x8-in. back-rail timbers are bolted. The turning axles *C* are keyed to a 10x10-in. flat iron piece 2 in. thick, which is in turn riveted to the side plates; the axles extend through a tapping in the side plates to receive a collar. The axles turn in wide journal boxes attached to the timber trusses *F*, which are placed as close as possible to the side plates, to reduce the necessarily large bending stresses in the axle. The dump was built in the company's shops after a design by H. F. Pigg, of the engineering department.

*Mining engineer, Mineville, N. Y.

Creosote as a Timber Preservative

Owing to the increased cost of creosote oil and its comparative scarcity in the United States, a process has been developed in which small quantities of oil are used, which it is claimed will produce the same results as the larger quantities used in the past. Walter Bühler states[1] that this process is commonly known as the empty-cell process. The older process is known as the full-cell process and its advocates claim that, in order to preserve timber successfully, it is necessary to use enough creosote to fill the cell structures. They also claim that the desire to reduce the cost of preserved timber by the use of smaller quantities of oil has produced certain processes the claims for which cannot be fulfilled.

Empty-cell Process

Advocates of the empty-cell process claim that it is only necessary to paint the cell walls to prevent decay, and that, by their special process, it is possible to fill the cell structure with oil, and then withdraw most of it. Thus the cell structure is virtually painted with a small quantity of oil.

All the information today as to the value of creosote as a preservative is based on the resistance to decay of timbers which have been treated by the full-cell process, and whether it will be possible to reduce the cost by the use of smaller quantities of oil is still an open question. It will only be answered when sufficient time has elapsed to demonstrate thoroughly its efficiency by actual experience. It is to be hoped, however, that this endeavor to reduce the cost of preserving timber will not lead to false economies and, consequently, to false impressions of a good preservative.

In the protection of timber against marine insects in Southern waters, present experience would indicate the use of at least from 18 to 20 lb., and, in some timbers, as much as 26 lb. of creosote oil per cubic foot. If the timber is to be used in Northern waters, from 10 to 16 lb. per cu.ft. are advocated, depending on the character of the timber to be treated.

There are certain purposes for which timber is used to-day, such as the modern wood-block pavement, in which that quality which makes creosote a good preservative is of less importance than that which makes it a good waterproofing material.

Specifications Vary for Different Purposes

When creosote was first used in the United States to preserve timber for paving purposes, it was thought that it was only necessary to prevent decay, and specifications were based on experience with creosote in preserving timbers for ties and other purposes. These specifications naturally called for an oil similar to that which had been most effective in such preservation. It was soon found, however, that something more than a preservative was necessary. The wood absorbed large quantities of water, expanded greatly and destroyed the surface of the roadway. The natural development was to increase the quantity of oil used; this eliminated the trouble for a number of years, but it was discovered that in a short time the oil disappeared from the wood, absorption again took place and trouble from expansion and contraction necessarily followed. This led to a study of the creosote itself, not only as a preservative for paving blocks but also for timber, for it was naturally thought that if it disappeared from paving blocks, it would also disappear from timber. This deeper study into the preservative itself has developed it considerably.

It is now customary to differentiate the oils into those suitable for the preservation of timber, for paving blocks, and, possibly, for the protection of timbers against marine insects. It is generally conceded that the higher boiling constituents of the oil are the valuable ones and, whereas formerly high percentages of tar acids and naphthalene were specified, it is now customary to require low percentages of both. In fact, although early specifications called for not less than 10 per cent. tar acids and 40 per cent. naphthalene, those of today demand not more than 5 per cent. of the former and 25 per cent. of the latter.

[1] *Proc.* A. S. C. E., Nov., 1910.

The New Goldfields of Porcupine, Ontario

District Now 25 Miles from Railroad; Branch Proposed. Two Main Orebodies Outlined; Igneous Keewatin and Sedimentary Huronian Rocks

BY REGINALD E. HORE*

During the summer of 1909 a number of discoveries of gold-bearing quartz were made in the vicinity of Porcupine lake, which lies 100 miles northwest of Cobalt, and 50 miles north of Gowganda. Coarse gold could be seen in a number of places, and grab samples and other parts of the quartz were found to contain gold.

Limited Transportation in Summer

The discoveries evidently warranted careful testing, but it was not possible to accomplish much for some months. While only 25 miles from the railroad, the region was comparatively inaccessible on account of the thick forest cover. The prospectors, by taking advantage of the canoe routes and carrying a few weeks' supplies, found no unusual difficulty; but heavy freight could not be handled at all. The arrival of winter relieved the situation, for in the north country the manager in a new camp finds that transportation problems are then much easier. He welcomes the snows and frosts of November, as does the lake shipper an early spring.

When the lakes were frozen over, a winter road was cut through the forest from the railroad to the camp. After the road was ready, several operators attempted to get in supplies before the breakup. A few were successful in their preparations for the summer's work; but an unusually early spring made the snow roads impassable, and most of the exploration to date has been accomplished under remarkable disadvantages.

During the summer wagon roads were built, and gasolene boats and canoes put on the intervening stretches of water. Freight has been hauled on wagons 11 miles over wet clay roads from Kelso to the Frederick House river, then taken by motor boats 15 miles and by canoe 28 miles to Porcupine lake. From the lake to the mines it is taken on "jumpers." An enterprising transportation company has handled a large volume of freight in spite of the many difficulties. It has, however, been found almost impossible to use the summer route for heavy freight.

Development

In spite of the transportation difficulties, considerable progress has been made. Already, 18 months after the first important discovery, it has been demonstrated that there are two large orebodies, three miles apart; that there are a number of large veins which carry visible coarse gold; that average surface samples of many of these veins carry considerable fine gold; that there are veined zones, which are fairly continuous across several claims, and that the area in which gold-bearing quartz occurs covers several townships.

What may be the extent of these deposits, what their contents and the cost of extracting them, remains to be determined. A number of operators of mines in other fields consider that the chances warrant a considerable expenditure. During the present winter several companies will take in supplies for exploration and development work, stamps will be taken into two properties, and mills erected in the summer. The construction of a railroad into the camp is now assured.

The Road to Porcupine through Forest-covered Flat Clay Belt

General Character of the Goldfield

Climatic conditions are much the same as at Cobalt, rigorous, but healthful. Being 100 miles further north, the winters will be a week or two longer. Topographically, Porcupine differs much from Cobalt. The silver camp is situated in a district by no means mountainous, but rocky and rough in detail. The most important finds at Porcupine are at the edge of a flat clay belt, which is being opened up for agricultural purposes. The important discoveries were made on low, rounded outcrops, which stand but little above the clay. A number of discoveries have also been made south and west of these deposits in country that is more rocky, and which forms a part of the Temagami forest reserve.

The thick growth of conifers, poplar, and white birch covers clay and rocky areas alike. The trees will not make good lumber, but will afford an abundant supply of mine timbers and firewood. Lying in depressions in the clay and in the rocks are numerous small lakes of clear water. A few miles from the camp there are waterfalls on the Mattagami river, which will be utilized for power development. From the camp to the main line of the Temiskaming & Northern Ontario railway, it will be possible to build quickly and cheaply a railroad with easy grades.

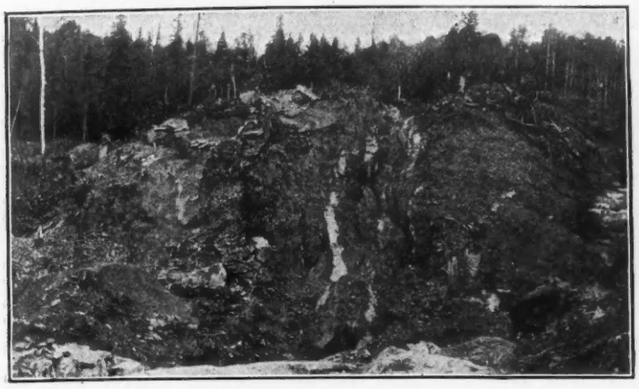
Discovery of the Dome Mine

The gold at Porcupine was found in quartz in place, and by professional prospectors. There are no placer deposits known nor under the circumstances is it likely that such will be found. To John S. Wilson, of Massey, Ont., belongs the honor of the discovery of the "Dome." The presence of numerous quartz veins, some of which carried gold, was remarked by government geologists some years ago and the more immediate cause of the discovery was the extension of a government railroad to within 25 miles of the deposits. The discovery of silver at Cobalt was the direct result of the construction of the Temiskaming & Northern Ontario railway, for it ran directly over a rich vein, which was staked by Fred La Rose, a blacksmith on the construction work. Less directly, but no less certainly, was the railroad responsible for the gold discoveries, since by its proximity it made it possible for the prospector to spend a greater proportion of his time examining the rocks. Before the building of the railroad, the country was only to be reached by long canoe journeys, and consequently much of the short season was spent in traveling. As a rule, the pioneer prospectors in northern Ontario are still using canoes for transportation, but they work most effectively when only a few days' journey from the railroads.

Native Gold Associated with Pyrite

The gold occurs only as the native metal, and is invariably associated with pyrite. Part is readily recovered by am-

*Assistant State geologist, Houghton, Mich.



QUARTZ VEINS IN GRAY SCHISTS AT TIMMONS MINE

DOME MINE, SHOWING SCHISTS ASSOCIATED WITH THE QUARTZ

TWO VIEWS OF THE TIMMONS MINE, PORCUPINE, ONT.

DOME MINE, SHOWING SHAFTS, STOCK PILE AND TEST MILL—QUARTZ OUTCROP IN FOREGROUND

QUARTZ OUTCROPS ON DOME AND TIMMONS MINES, PORCUPINE, ONT.

algamation, and the remainder will probably be cyanided. The highest contents are found in white quartz veins and masses. There are: (*a*) Fairly distinct single-fissure fillings or veins; (*b*) a series of intimately connected filled fissures forming a "vein system;" (*c*) carbonate beds penetrated by quartz veins and forming quartz-ferrodolomite lodes; (*a*) large masses of quartz not in the form of veins or lodes.

The country rocks are of several varieties, igneous and sedimentary, light colored and dark colored. The igneous rocks are mostly dense and fine-grained; some are light-colored silicious porphyries; some are dark-colored altered basalts; others are gray or greenish-gray andesitic types. The sedimentary rocks are gray, fine-grained quartzites; massive and bedded graywackes; coarse, schistose, gray conglomerates; and rusty, weathering, crystalline ferrodolomites. A considerable proportion of both igneous and sedimentary rocks are schistose. The igneous rocks, together with the ferrodolomites and some associated jaspilites, are probably Keewatin. The other sediments are probably Huronian.

The immediate wall rock of auriferous-quartz veins is almost invariably impregnated with carbonates and with small crystals of pyrite. The gold in these rocks, while usually much less than in the quartz, has in some cases proved sufficient to warrant systematic exploration. In the larger auriferous-quartz deposits, there are inclosed some great masses of rock which carry gold.

The Holman Drill in America

Holman Brothers, of New York, is the title of a new American corporation which has been formed for the purpose of introducing the Holman rock drill in America. The manufacturers of this drill, Holman Brothers, of Camborne, Cornwall, England, are one of the oldest companies in this work, having been established in 1839 and claiming a total output of over 30,000 rock drills. It will be recalled that the Holman drill won a $12,000 prize in the Transvaal stope-drill competition, this being one of the drills which was tied for first place in these extensive tests. The Holman machine is known as an "all steel" drill, and among the special features to which the manufacturers are directing attention are the self-tightening chuck for unshanked steels, crucible-steel ball valves, and bushed front head without bolts. Another feature of the drill is the valve motion, which is a combination of the independent air-thrown valve and two trigger or auxiliary valves (steel balls), which perform the function of a tappet.

New Power Developments on the Rand to Offset Labor Scarcity

JOHANNESBURG CORRESPONDENCE

The output for 1910 will again show a progressive increase in value of gold produced in the Transvaal, and will probably be somewhat over £32,000,000 despite there being about 470 stamps idle on the Rand for various causes. There were, in October, 9175 stamps at work on the Rand and 183 tube mills, and outside mines dropped 581 stamps and had 5 tube mills. The stamp duty of the Roodepoort United Main Reef was 19.7 tons for October.

OVER 40,000 LABORERS NEEDED

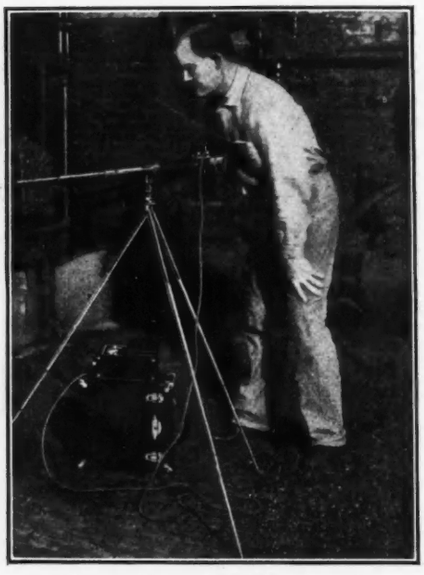
The mines of the Rand are suffering from a shortage of 40,000 to 50,000 laborers. There were 180,103 men employed in the gold mines in October. Two large new producers, the City Reef and the Randfontein Central, will early in 1911 be dropping 800 extra-heavy stamps and requiring 8000 to 12,000 extra laborers. The shortage of labor is being met to a certain degree by the employment of more single-stope drills and when the central air-compressing plant of the Victoria Falls Power Company is working greater relief will be experienced.

NEW COMPRESSED-AIR INSTALLATIONS

Of the power that will be shortly supplied by the Victoria Falls and Transvaal Power Company 40 per cent. will be supplied as compressed air. The first installation will comprise 40,000 h.p., which will be generated by rotary air compressors in the largest units yet manufactured. At the Rocheville station there will be four compressors of 4000 h.p. driven by steam turbines and there will be six of similar power driven by motors at the Robinson Central Reef mine. Each unit is designed to deliver 590 cubic meters of free air per minute from an atmospheric pressure of 610 mm. mercury at a temperature of 20 deg. C. to a terminal pressure of 9 kg. per sq.cm., the temperature at outlet not to exceed 85 deg. C. The isothermal efficiency of the whole is guaranteed not less than 68 per cent. I understand that compression is in several steps with intercooling by sprays, but a ridiculous and wholly unnecessary policy of secrecy pursued by the contractors prevents the publication of certain particulars. One of the best known engineers here, who has recently returned from a visit to Europe, and has seen several similar installations at works there, is inclined to the belief that the real efficiency of these installations is very low. The air will be transmitted to the various mines in mains from 26 in. down to 9 in. in diameter, the velocity of the air being 35 ft. per second. Lap-welded steel pipes with special flange joints will be employed. The initial pressure will be 115 lb. and the average drop of pressure to the mines will be five pounds. Nineteen miles of pipes have been laid already; the air sold is measured by Venturi meters.

A New Radiation Pyrometer

A new type of radiation pyrometer, embracing several new and advantageous features, has recently been devised by Richard P. Brown, of Philadelphia. There has been a long-felt want for an accurate and simple pyrometer for use in measuring temperatures beyond the limit of the well known electric pyrometer with platinum thermo-couple. This latter instrument is useful for temperatures as high as 2500 deg. F., but above this point the life of the thermo-couple is short and its accuracy impaired.



BROWN RADIATION PYROMETER

In the case of the radiation pyrometer the sensitive thermo-couple is placed at the rear end of the tube or telescope and a concave mirror focuses the heat rays entering the tube on the thermo-couple, which is connected by wire to the millivoltmeter graduated in degrees of temperature. The radiation pyrometer, therefore, has no part directly subjected to the high heat to be measured, and there is, in consequence, no part to be destroyed by the furnace gases or high temperature. The radiation pyrometer has also the advantage of the readings being instantaneous, the slightest changes in temperature being shown immediately. Radiation pyrometers heretofore manufactured have been of two types, the adjustable and the fixed focus. The imported type of radiation pyrometers using an adjustable focus has been too complicated for general use, and the fixed-

focus instruments have had no means by which the operator could tell whether or not the telescope was too far from the furnace opening or heated body. In the radiation pyrometer with fixed focus, to secure a correct reading of the temperature, the pyrometer tube or telescope should not be more than 30 in. distant when the furnace opening is three inches in diameter, or 60 in. distant when the door of the furnace is six inches in diameter; in other words, the pyrometer telescope or tube should not be distant more than 10 times the diameter of the furnace opening, or object, the temperature of which is to be measured. As long as the pyrometer tube was within these distances, the temperature could be read correctly. There was also no means with a fixed-focus radiation pyrometer of being assured that the tube was pointed correctly at the furnace opening.

A "FINDER" ON THE NEW PYROMETER

In the new Brown radiation pyrometer with fixed focus, a finder somewhat similar to those used on kodaks has been placed on the tube, and by means of this the tube can be readily pointed directly at the furnace opening. It also acts as a measure of distance, and it is only necessary that the bright red of the furnace opening take up the whole view in the finder. If some of the dark outside wall of the furnace is showing around the bright-red opening, the tube is too far distant, and should be moved closer until the bright red only is showing. It is difficult for errors to occur with this new feature, and the instrument is accurate under ordinary working conditions within 1 per cent. or 30 degrees at 3000 degrees Fahrenheit.

The instrument is calibrated for measuring the temperature of a black body, or the temperature of the walls or parts inside of furnaces which are practically black bodies. In using the pyrometer for measuring the temperature of molten metals or highly polished surfaces which reflect, a correction is made.

Another new feature of the Brown radiation pyrometer is the collapsible tube made like a telescope, which permits of the pyrometer tube, indicator, tripod and wiring being fitted in a small leather carrying case weighing only 15 lbs. complete. This feature is particularly desirable to engineers and superintendents who may have to take the pyrometer from one point to another occasionally for tests.

In using a radiation pyrometer on a furnace determination it is frequently inconvenient, if tests of long duration are to be made, to leave the door or opening open. A firebrick tube is therefore inserted in the opening and projects into the kiln or furnace, the inside end of the tube being closed. The pyrometer telescope is focused on the inner end of the firebrick tube, and for permanent installation a bracket is used instead of the tripod to bolt on the wall and hold the pyrometer tube.

The instrument will be adaptable particularly for measuring the temperatures about a blast-furnace plant, in the open-hearth furnaces of steel works where excessive temperatures are carried, in brick kilns for burning firebrick and refractory materials, in rotary cement kilns where the temperature is running about 3000 degrees and must be measured 20 ft. inside the furnace, and by engineers in testing the temperature of boiler furnaces, and in research work. In fact, there are a number of operations where high temperatures are carried and must be measured, where this instrument will prove useful.

This new radiation pyrometer is being placed on the market by the Brown Instrument Company, of Philadelphia, Pittsburg and Chicago, and patents have been applied for covering the special features embraced in the instrument.

Nigerian Tin Mining

LONDON CORRESPONDENCE

Owing to the lack of other recent discoveries of tin, and the limited supply in sight, interest in the tinfields of northern Nigeria has been reawakened. The first discoveries of tin in that neighborhood were made by the Niger Company in 1901, but not until six years later was any tin exported. Development is now being pushed ahead at several points, and the fields are being worked on a small scale by five or six different companies. The export of cassiterite to England for this year will amount to about 500 tons. There are many difficulties to be surmounted before this country becomes a big producer. At present natives, who are capable of carrying a load of about 70 lb., about 20 miles per day, have to be relied on for all transport. The cost of carrying one ton to or from the coast amounts to about £12, and all machinery has to be rigidly sectionalized.

The deposits hitherto discovered are all alluvial, and subject to severe floods in the wet season, and droughts in the dry. They do not, as a rule, lend themselves to hydraulicking, being too flat, nor owing to the permeable nature of the sandy soil, can dams be constructed to hold up water for any length of time. Dredges could be used, but the difficulty of getting the heavy machinery necessary for a successful dredge on the ground is at present great. During the wet season, mosquitoes find the climate admirably suited to them and breed splendidly, to inoculate all white men with malarial germs, making the climate an unhealthful one. It is reported also that cannibal natives in the southern districts are ready and anxious to devour what the mosquitoes leave.

While nothing authoritative on the subject has yet been published, the assays are reported to run well, from three to four lb. of coarse cassiterite per cubic yard, equivalent, with tin at its present price of £165 per long ton, to from 87c. to $1.16. Should the prospecting work now being carried on at many points prove any considerable quantity of ground to carry the above content, there is no doubt but that a light railway or motor road will be constructed, after which northern Nigeria will become an important producer of tin.

The Law as to Promoters

Vice-chancellor Howell filed an opinion on Dec. 16 holding that Frederick F. Searing, Albert C. Fairchild and Henry F. Bell are liable as promoters for the secret and undisclosed profits made by them in the organization of the Passaic Steel Company. The opinion points out that to effectuate a certain result the promoters decided by an agreement among themselves upon all the details of the plan, calculated the amount of profit which they would make out of the transaction, and ascertained and set down in writing each man's share long before they made any part of the scheme public. They organized a syndicate which was to furnish all the funds necessary to carry out the scheme, the members of which were to be stockholders and bondholders of the new company, in which they became directors, although they paid nothing for the stock which gave them control of its management. Discussing the responsibilities as promoters in the circumstances presented, the vice-chancellor said:

"A promoter when he shall have been found to be such as a matter of fact is a sort of self-constituted agency for bringing a company into existence—and this fact alone would go far toward charging him as a fiduciary—has in his hands the creation and molding of the companies; he has the power of defining how and when and in what shape and under what supervision it shall start into existence and begin to act as a trading corporation. This control of the promoter over the company, so plenary and absolute, involves a corelative responsibility, and out of this responsibility arises the doctrine now well settled of the fiduciary relation of the promoter toward the company he creates.

"In virtue of this fiduciary relationship the promoter is accountable to the company for all moneys secretly obtained by him from it. Secrecy is the gist of the wrong. The law does not say a promoter may not make a profit out of a company

he promotes, providing he makes a full and fair disclosure to the company of what he is getting and the company assents to it.

"As promoters it was their duty to provide an independent and impartial board of directors and to disclose to the persons who were about to become shareholders what profits, if any, they were to make out of the transaction. It is universally held that promoters of a corporation have no right to make secret profits. By secret profits is meant such profits as are made by the promoter without disclosing the same to the real parties in interest and obtaining their consent, either expressed or implied."

The suit was instituted by stockholders of the corporation, who for several years have been trying to secure an accounting for the profits which they alleged have been illegally made out of the enterprise.

The Small Mines in Rhodesia and the Rand

LONDON CORRESPONDENCE

While there is no boom in Rhodesian mines, both the agricultural and mining industries of the country are recording steady and continuous progress. The absence of a boom is perhaps to the ultimate advantage of the country, as with attendant wildcat flotations and ultimately disgruntled shareholders, it is more than apt to bring a district into disrepute. To a large extent their loss is the fault of the shareholders themselves, who attempt to "get rich quick" by investing good money in an industry about which they know but little.

Mining men seeking fresh fields should take note that the Rand offers no opening whatever to the man who is anxious to invest his money and muscle in a prospect, either located by himself or taken on lease and option. On the Rand he can only invest his savings in colossal undertakings wherein his stake is but the merest driblet, and over which he consequently can have no control whatever, but is at the mercy of the vagaries of the market. True, the value of most Rand mining shares has remained remarkably steady for the last year or two, for mining stock, but that does not alter the fact that the enterprising miner who, having saved up some money, is anxious to put it into a prospect of his own, or with a syndicate, and sink or swim with it, has no chance on the Rand. Was it not Carnegie who remarked that the way to get rich was to put all one's eggs into one basket, and nurse that basket with extreme care? It is obvious that no ordinary individual can effectively nurse a big developed mine.

In Rhodesia the case is very different. A number of small shallow mines are being worked at a profit. Rich ore is encountered at depth also, witness the Globe & Phoenix, now down 2,300 ft. in paying ore. Rhodesia more nearly resembles Colorado in the opportunities for miners and leasers working on a small scale. The Consolidated Gold Fields Company, and indeed the majority of the Rand mining houses, have representatives in the Rhodesian field, ready and anxious to take over any mine showing a broad continuous reef too low grade to handle on a small scale, but suitable for the installation of large reduction plants.

Natural Gas in Texas

There are four known gasfields in Texas which appear to have sufficient gas for all ordinary purposes, in the counties of Clay, Cass, Navarro and Webb. The Clay county gas comes from the same general field as the oil from that country (Henrietta, Petrolia and Electra). From 1904 to 1908 the production of oil from these fields was 421,342 bbl. The Navarro county gasfield is closely associated with the Corsicana and Powell oilfields from which the production of oil, 1896-1908, was 7,446,836 bbl. There is, according to the State Bureau of Economic Geology, another large gasfield in Texas which has not been developed at all. It is from 15 to 25 miles south and southwest from San Antonio and lies, in a general way, between the San Antonio and the Medina rivers and along this latter-stream from its confluence with the San Antonio. Good pressures have been observed in this field and it is likely that a large quantity of commercial gas could be secured.

The cities of Dallas and Fort Worth, with a population of about 170,000, are supplied with natural gas from the Clay county fields, south of Red river. The gas is piped for 110 miles and the base price is 50c. per thousand cu.ft., with a substantial reduction to large and regular consumers. Wichita Falls, Wichita county, pipes its gas from the Clay county fields also and the price is 9 cents. In addition to these cities Laredo, Webb county, on the Rio Grande, also has natural gas, piped for 20 miles, while Atlanta, Cass county, and Corsicana, Navarro county, have local supplies that could be much more extensively used than is the case at present.

A Foreign "Bucket Shop" Crusade

Berlin despatches declare that a movement against bucket-shops has been instituted by the Association of German Bankers, which is undertaking a campaign of instructing the public on the subject. It is seeking the coöperation of the newspapers, especially those of the German provinces, in showing the dangers of trading with firms which have nothing to recommend them but their loud advertising methods. It is proposed to drive out foreign bucket-shops from Germany, so far as possible. An information bureau is to be established at London, to assist in this undertaking, and Austrian and Swiss bankers have also promised their coöperation.

Coal Discovered in Nevada

A body of coal has been discovered in Nevada in that district lying between Wellington and Bodie, and situated near the California line. Returns on some of the coal that has been sampled show the product to be of a high quality. The fact that the seams are true coal and not lignite is most encouraging. A core drill is now being moved to the location, and the ground will be thoroughly prospected to a considerable depth. Several parties are already on the ground, and a number of locations have been staked.

Under the laws of Nevada, one person may take up 160 acres and pay the Government for the same within one year at the rate of $10 per acre. A company may take up 320 acres at the same rate and terms. At the present time the coal property is located 50 miles from the nearest railroad.

Mine Explosion in Virginia

A serious explosion occurred, Dec. 14, in the Greene coal mine, situated two miles from Tacoma, Va., on the Norfolk & Western railway. It is reported that about 20 miners were killed. The afflicted mine is a small operation employing 35 men. In an attempt to rescue some of the entombed miners, Superintendent Barrowman and three of his assistants descended the shaft and perished in the poisonous gases that filled the workings. Several hours after the explosion occurred, Superintendent P. E. Roan, of the Clinchfield Coal Corporation, arrived on the scene bringing with him a number of rescue apparatus. With the aid of the rescue helmets, 10 bodies were recovered before midnight, on the day of the explosion.

French Aluminum Syndicate

It is said that all the French aluminum producers have entered into an agreement to apportion the entire sales territory open to them, both domestic and foreign, and have placed the entire disposal of their output with the Metal Gesellschaft of Frankfort-am-Main. As the capacity of the French works is about 15,000 tons per year, *La Revue des Produits Chimiques* remarks that their agreement will make them an interesting factor in the new negotiations for an international syndicate.

San Antonio Copper District, Sonora, Mexico

LOS ANGELES CORRESPONDENCE

The San Antonio mining district lies immediately west of the town of San Antonio de la Huerta, at the terminus of the Yaqui branch of the Cananea, Rio Yaqui & Pacific Railroad, about 150 miles northeast of Guaymas. The town is on the left bank of the Rio Yaqui, in the southeast corner of the district of Ures, State of Sonora. Evidence is to be found indicating that mining was carried on in the vicinity of the San Antonio district 200 years ago. At present, activities are confined to two relatively large and several minor operators. The properties are held by the following individuals and companies, the figure following the name indicating the percentage of the total area held by each: San Antonio Copper Company, 41.6; H. L. Miller and associates, 27.4; Herman Wendler and associates, 10.2; F. C. Aguilar and associates, 5; A. G. Arnold and associates, 3.7; Yaqui Smelting and Refining Company, 3.2; Ochoa and associates, 3; First National Bank group, 1.9; Mina Grande Mining Company, 1.6; miscellaneous, 2.4. The total area in the above holdings is 7703 acres.

The mineral-bearing veins are in the sedimentaries and an extensive intrusive body of quartz porphyry, the latter constituting the greater part of the district. The line of contact is quite irregular but may be said to have a general east-west course across the southern portion of the district. The sedimentaries, which are chiefly slate, dip about 15 deg. toward the south. The main vein system in the porphyry strikes a little east of north and dips steeply toward the east. The main vein of this system is included within the property of the San Antonio Copper Company, the largest operator in the district. This vein varies in width, in places showing over 100 ft. Toward the north the ore is copper; as the contact is approached, high-grade copper-silver ore is encountered. South of the contact another vein system is encountered striking northeasterly and dipping about 75 deg. southeasterly. These veins vary from 8 to 20 ft. in width, show good slate walls, and produce chiefly gray copper.

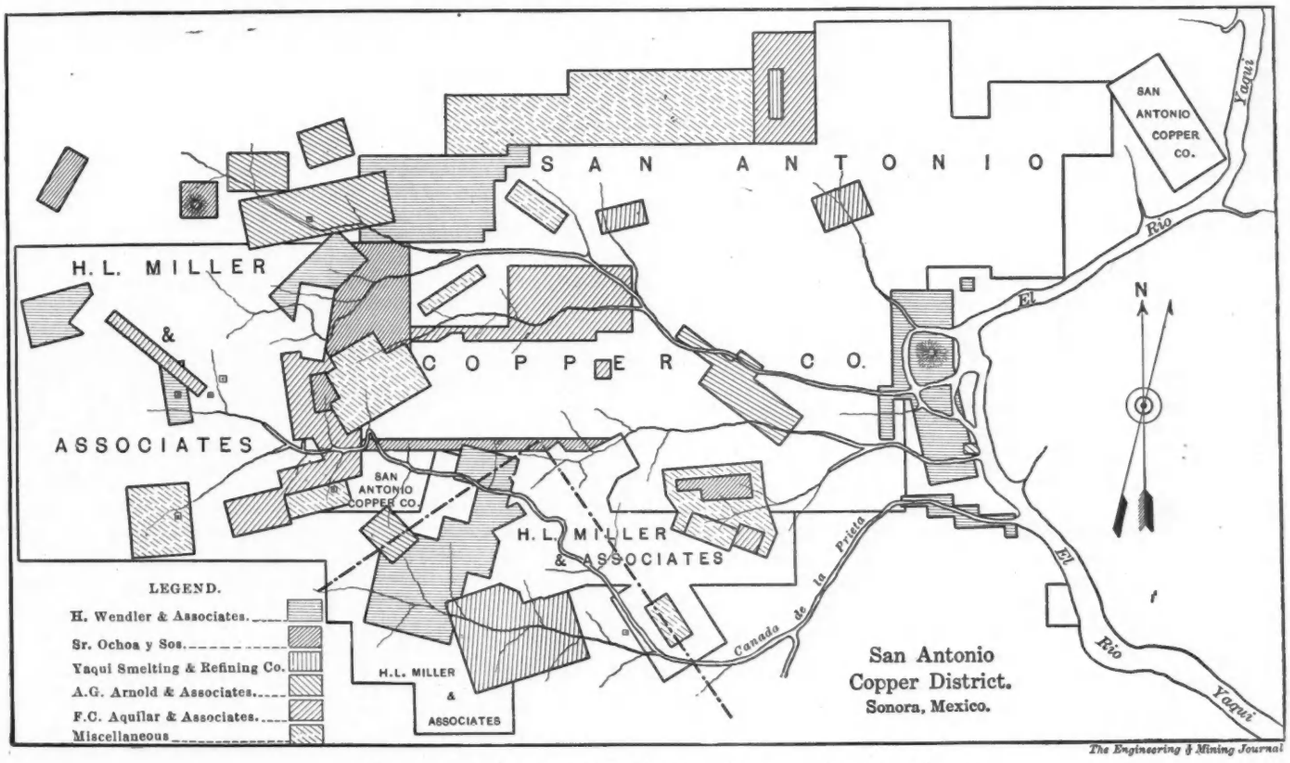
The San Antonio Operations

The property of the San Antonio Copper Company is developed by 19 tunnels of varying lengths up to 1200 ft. The greatest depth attained is about 600 ft. Above 400 ft. the ore consists of practically all of the oxidized copper minerals; below this depth chalcopyrite with some bornite appears. The orebodies are usually of good width and contain from 4 to 8 per cent. copper, the average probably being about 5 per cent. All of the ore carries small amounts of gold and silver. The San Antonio company has located a smeltery site and has completed the survey for a 4400-ft. tunnel to cut its orebodies at a depth of 1200 ft. The plans call for a double-tracked tunnel, the portal of which will be about two and a half miles from the smeltery site. About 135 men are employed.

Developments on the Miller Group

Twenty men are employed in the development of the property held by H. L. Miller (of Los Angeles, Cal.) and associates. This property lies to the south of the contact in the slate, and development is proceeding on the northeast-southwest vein system. Most of the work done here is about 300 ft. from the contact. Development consists of nine tunnels, varying from 100 to 400 ft. in length, and a shaft on the vein 275 ft. in depth. It is claimed that about 20,000 tons of ore carrying an average of more than 5 per cent. copper and 20 oz. silver per ton has been opened.

The country hereabouts is mountainous. The elevation of the Rio Yaqui is 725 ft.; the apex of the San Antonio vein is at 2200 ft., while the mountains back of the



MAP OF THE SAN ANTONIO COPPER DISTRICT, SONORA, MEXICO

town reach an elevation of 5000 ft. With the exception of three or four months in summer, when excessive heat is experienced, the climate is ideal. There is a fairly good supply of hard wood to be had. Firewood costs $2.50 per cord. The semi-anthracite coalfields lie about four miles to the south. The product can be had for $5 per ton. However, no coal is used in the present mining work, wood fuel serving to generate all necessary power, as little or no hoisting or pumping is required in the mines.

Burning Reverberatory Ash at the Steptoe Plant

By Lindsay Duncan*

In the spring of 1908 when the Steptoe plant of the Nevada Consolidated Copper Company was first put in service, I made an attempt to utilize the ash from the reverberatory furnaces for steam making under the power-house boilers. That the ash possessed a thermal value was indicated by the analysis, an average one being as follows: Fixed carbon, 68.9 per cent.; volatile carbon, 5.9 per cent.; ash, 19.2 per cent.; moisture, 6 per cent. This represents 11,400 B.t.u. per lb., a value as high as many of the western lignite coals regularly used for steam making, and it theoretically should give an evaporation of about nine pounds of water from and at 212 deg. F. per pound of fuel. While not able to attain so high an evaporation yet the trial was a commercial success and reduced the coal consumption by 350 tons per month. In the power house there are eight 400-h.p. Babcock & Wilcox water-tube boilers equipped with American stokers, Dutch ovens, superheaters, economizers and induced, and forced draft, a thoroughly modern steam plant, in which an actual evaporation (including 100 degrees of superheat) of 8¼ lb. of water per lb. of coal was regularly obtained.

Characteristics of the Reverberatory Ash

Externally the ash has the appearance of imperfectly burned coke and in firing developed many of the characteristics of a high-ash pea anthracite. Reverberatory ash is not by any means an ideal fuel and has several disadvantages among them the following: (1) It reduces the steaming capacity of a boiler fully 40 per cent. and thus excludes its use from places in which the boiler plant is run close to its rating; (2) it clinkers badly, fires have to be cleaned from four to eight times per shift; (3) it does not respond readily to forcing, so that a drop in steam pressure necessitates using coal instead of ash; (4) about 50 per cent. more labor is required in the firing than if coal is burned.

I might mention in passing that our attempts to use ash on locomotives and steam shovels were unsuccessful due principally to the clinkering and to the reduction of steaming capacity. The ash burns with a short blue flame, gives off no smoke, and we soon discovered that forced draft was absolutely essential to rapid combustion. In practice the best results were obtained by light and frequent firing, spreading but not slicing the fire.

Work in Boiler Room

The boiler-room employees are divided into three shifts consisting of a foreman, who also acts as water tender, three firemen and two ash and coal passers. Each fireman has a battery of two boilers to look after and the usual procedure is for him to put three scoops of ash in each of the four side doors, six scoops of ash in each of the two center doors, wipe the perspiration from his brow and start to fire at the side doors again. In cleaning fires the two coal passers assist successively the three firemen to remove and wet down the clinker. The firemen and coal passers are Greeks receiving $2 per day and the water tender is an American rated at $3. In addition to the labor mentioned there were two Greeks employed cleaning boilers, filters, economizers, blowing flues, etc. There is also a boiler-room foreman over all three shifts who is responsible for the upkeep of the boiler plant, and for its efficient operation.

Test Run Gave 5.03 Pounds Actual Evaporation

After the crew became proficient in handling this material I isolated a battery and ran a test to determine the evaporation actually obtained, the data concerning which are shown in the accompanying table.

STEPTOE PLANT BOILER TEST.

Boilers, 2-400-h.p. Babcock & Wilcox.	
Boiler grate surface, per boiler.....	24 sq.ft.
Average steam pressure, lb.....	155.5
Average steam temperature, degrees F.	466
Average superheat, deg. F.....	99.5
Average temperature feed water, deg. F.....	209.2
Draft at base of stack, in. water.....	0.90
Draft at bridge wall, in. water.....	0.39
Forced draft pressure, in. water.....	2.10

The fuel was weighed over platform scales before firing and suction of the feed pump connected to an open steel tank which was alternately filled and partially emptied, the depth being taken with a hook gage. The tank was cylindrical and calibrated for this test.

The test ran for four hours during which 57,241 lb. of water were evaporated with 11,385 lb. of fuel, which gives an actual evaporation of 5.03 lb. water per lb. fuel, or 5.84 lb. water from and at 212 degrees. This is not as high a ratio as might be anticipated from the fuel analysis and it is probable that the reduction is due to the frequent opening of the doors for firing and cleaning. The American stokers which had proven satisfactory in burning slack coal did not give good results with ash so that after experimenting for some time hand firing was adopted.

Cost Distribution

The practice at this plant is to give the reverberatories credit for ash burned based on the value of equivalent coal i.e., 60 per cent. of the dry weight of the ash. A similar credit is also given for the steam received from the waste-heat boilers at the reverberatory. In deriving the latter credit the feed water is measured, a deduction made for blow off, then 10 per cent. is deducted to allow for condensation, line loss, irregularity of service, etc. The value of the amount of coal required to evaporate the quantity of feed water remaining after these deductions have been made is credited to the reverberatories. These two credits aggregate in the neighborhood of $15,000 per month and comprise about one-half of the total operating costs of the power house.

*Mechanical engineer, Steptoe Valley Smelting and Mining Company, McGill, Nev.

A Disease of Tin

This is the name given by Ernest Cohen, of Paris, to a peculiar allotropic transformation of tin. The following account is abridged from *La Technique Moderne*. The first clear case of the disease occurred in a lot of Straits tin stored in a Russian custom house during the winter of 1868. When it was time to remove it, it had fallen into powder. This was attributed to the intense cold of that winter, the phenomenon afterward being reproduced by artificial refrigeration.

According to Cohen's researches, at the temperature of 64 deg. F., there is a change from "white" to "gray" tin, which goes on with increasing velocity until a maximum is reached at — 40 deg. F. after which the velocity decreases, the change ceasing at — 172 deg. F. The first symptoms are small swellings like warts or grains, the trouble beginning at isolated places, but quickly spreading from point to point, the tin changes from white to gray, it crumbles to powder, and undergoes partial oxidation, the volume increasing somewhat.

In the early stages the reaction is reversible, in the later stages it is not, and the powdered gray tin has the property of infecting good white tin. Consequently, if any objects are attacked they should be removed from the neighborhood of uninfected pieces, and it is recommended that the temperature of cases in museums which contain tin objects should not fall below 68 deg. F. at any time.

Shafter Silver District, Presidio County, Texas

Mines Operated 25 Years. No Deep Levels Opened. Silver Occurs Chiefly as Chloride, Confined to Limestone of Carboniferous Age

BY WILLIAM B. PHILLIPS*

In the southern part of Presidio county, Texas, about 150 miles southeast of El Paso, there is a silver mine which has been in successful operation for more than 25 years. It has produced over $7,000,000 in silver and has paid $800,000 in dividends. The average value of the ore has been about $15 per ton in silver, chiefly as chloride (hornsilver), a little sulphide of silver, and rarely, thin sheets of native silver. Associated with the hornsilver and occurring in more or less isolated patches and bunches is a galena which carries silver, picked samples having shown as much as 2300 oz. per ton. A little gold is found, but as the total production of this metal in Texas during the last 25 years is less than $40,000, the gold is not a source of much profit.

The Shafter Silver District

The Shafter silver district is 45 miles from Marfa on the Southern Pacific railway, and about 20 miles from the Rio Grande, at Presidio del Norte. It is reached by daily automobile line from Marfa.

The business of the camp centers around the little town of Shafter, where plenty of shade, good water, electric light, etc., render life in that comparatively arid region unusually pleasant. The elevation of the district is about 4000 feet.

The geology of the immediate section was worked out by Dr. J. A. Udden, for the University of Texas mineral survey, and the results of his investigations were published in *Bull.* No. 8 of that survey, June, 1904.

In that publication Dr. Udden gave the accompanying table of the general arrangement of the rocks in the district.

ARRANGEMENT OF ROCKS IN SHAFTER MINING DISTRICT. (J. A. Udden.)

Group.	System.	Series.	Formation.
Cenozoic	Pleistocene		Land and stream drift.
	Tertiary	Late tertiary	Lavas and dikes.
		Early tertiary.	Deep intrusives.
Mesozoic	Cretaceous	Lower cretaceous.	Buda limestone (?) Del Rio clay (?). Edwards limestone: Shafter beds. Presidio beds.
Paleozoic	Permian (?) and carboniferous.	Chinati	Cibolo beds (1438 ft.) Alta beds (3500 ft.) Cieneguita beds (1000 ft.)

Geological Features

The Cieneguita beds, which are the lowest of the Carboniferous sediments, are dark shales, heavy lenticular masses of mortar rocks, conglomerates, dark limestones and mixtures of these materials. They attain a thickness of 1000 feet.

The greater part of the division is occupied by the shafts in which granite boulders are sometimes found imbedded. Above these beds are the Alta beds of dark shales and yellow sandstones, the latter of fine texture. The Alta shale beds have a thickness of 2000 ft. and the yellow sandstone 1500 ft., making a total of 3500 ft. for the division.

Above the Alta beds are five divisions of the Cibolo beds, in ascending order: The transition beds, 100 ft.; lower brecciated zone, 133; zone of sponge spicules, 85; thin-bedded zone, 470; and yellow limestone, 650; total thickness of the Cibolo beds 1438 feet.

With regard to the yellow limestone, Doctor Udden remarks that it may prove to be Permian. The orebodies are, for the most part, confined to the Carboniferous limestone, the age of which appears to be the same as the limestone of the Santa Eulalia and the Sierra Mojada districts, in Chihuahua, Mexico, both silver-lead producers.

In the 700-ft. shaft of the Presidio mining company the base of the Cretaceous was reached at a depth of 442 ft. Below this point the Cibolo limestone was penetrated more than 200 ft. The ore-bearing limestones extend to the surface south of this shaft and ore is mined at the grass roots. It was not necessary to sink a 700-ft. shaft in order to reach the ore. The greater part of the 400,000 tons of ore removed has come from above the 250-ft. level and there still remains a quantity of second-grade ore above the 60-ft. level, on the adjoining property. Not much ore has been removed below the 500-ft. level, although it is known that the "chambers" extend considerably below this level. The ore may be said to be confined to the Cibolo limestones, whether upper Carboniferous or Permian, and the same formation carries silver-lead ore near Altuda, Brewster county, Texas, 100 miles northeast of Shafter.

Mineral Deposits at Shafter

Doctor Udden is of the opinion that the mineral deposits of the district are limited to the older sediments and to the deep intrusives, and that the Cretacious rocks and the later intrusives have not shared, to much extent, in the mineralizing processes. A considerable acquaintance with the district and especially the information gained during a recent examination of ore of the principal properties enables me to confirm this opinion. To what extent the deeper intrusives have affected the mineralization of the older sediments, especially those that lie above the Alta beds, is not yet known. It is a fact that the upper 1400 ft. of the Chinati series and particularly the last 650 ft. show a more extensive and intensive mineralization than any other portion. There is no sudden change with respect to the content of the orebodies that pass from the uppermost yellow limestone (650 ft. thick) into the underlying beds, but there does seem to be a tendency toward a restriction of size in the chambers which carry the ore. This may be due, in part, to the reduced capacity of water, already charged with carbonate of lime, to act upon fresh material.

Dikes and intrusive sheets in the district are of frequent occurrence, the strike of which is subject to considerable variation, from nearly east and west to north 26 deg. west. Some of these dikes are thoroughly disintegrated at depths of 400 to 500 ft. They are mostly porphyritic and carry both silver chloride and native silver, the latter as thin sheets and of rare occurrence. On the porphyry, which has not been entirely altered to clay, are sometimes seen spots of silver sulphide with dendritic forms of manganese oxide.

Carbonate of lead (cerussite) is seen as small groups of radiating crystals associated with the galena that has begun to change. A little carbonate of zinc

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may also be observed but not often. The ore is almost entirely free from zinc, but two miles to the west there are large deposits of zinc ore ("dry bone"). Zinc has in no case interfered with the treatment of the Shafter ore by pan amalgamation and is not likely to be a factor in cyaniding the low-grade ores unsuitable for amalgamation.

Ore Occurs in Pockets

The silver-lead ores of the Shafter district occur in pockets in the limestone. Some of these have afforded large quantities of ore and mining has been carried on in them for months at a time. The walls stand well and little or no timbering is required, except in the vicinity of a clay seam. It is not unusual in taking out all of the ore to leave chambers that are from 50 to 75 ft. high and 500 to 1000 ft. long. One such pocket has been followed 2500 ft., 10 to 40 ft. in width between walls, from near the surface to the 250-ft. level.

These pockets are frequently connected with each other, so that the underground workings are irregular. The leads from one chamber to another are not always orebearing. At times they are indistinct yet easily recognized by the experienced miner.

The regularity with which certain types of ore veins and especially coal veins can be laid off and worked is not to be observed here. Instead, we have great caverns in the limestone varying in shape and size. A good deal of the ore has been removed from excavations practically at the surface.

The Mina Grande Orebody

The accompanying photograph will show, in an excellent manner, the nature of such work. This opencut is known as the Mina Grande and is partly on section 5 and partly on section 8, block 8. It is about 175 ft. long and varies from 16 to 50 ft. wide, and 35 ft. deep. All of the material in sight, with the exception of the top layer of limestone, is ore-bearing, the average silver content being about 20 oz. There is still a considerable amount of material carrying nearly 30 oz. in silver, with about 2 per cent. of lead. At this place the ore could be taken out to a depth of 60 ft. in opencut and quarry work, the maximum overburden not exceeding 20 feet.

The Mina Grande orebody dips to the south and west at an angle of about 35 deg. and on the one side there is a fault marked by a clay filling from 4 to 6 ft. in width. In places this filling carries a little hornsilver, but as a rule it is barren. This orebody is developed on the 140-ft. level, but it has not been worked to much extent below this point. Associated with the silicious limestone, which is really the ore proper, there is much dark quartz carrying hornsilver and sulphide of silver. Where the ore is richer it is a red-brown and is more or less friable, the associated quartz being distinctly cellular with thin walls.

The line of demarcation between the ore and the limestone is distinct, even in the largest chambers, so that it is possible to mine the ore clean. It has been the custom to sack the highest class of ore and send it direct to the El Paso smeltery, but the revenue from this source probably has not exceeded $40,000 in all. Unless such material is exceptionally rich in silver it would pay better to send it to the mill.

Milling Methods

The method of treating the ore is by stamp mill and pan amalgamation with sulphate of copper, salt and quicksilver—the modernized patio process. Until within the last few years no attempt was made to save the lead, although it was known to carry silver. A private enterprise established two Wilfley tables below the mill and the results have been satisfactory. As has been already remarked, some of the galena is rich in silver and is worth saving. The bright, clean and crystallized galena appears to carry less silver than the dull gray and finely crystallized variety. Where the galena has suffered partial alteration into the carbonate it is apt to be much richer in silver than elsewhere. But this change is likely to cause more slimes and a greater loss in ordinary concentration.

In any event, due attention should be given to saving the galena for it usually shows a higher silver content than the material which carries merely the hornsilver. Any new mill built in the district should be designed and equipped so as to remove the galena as closely as possible.

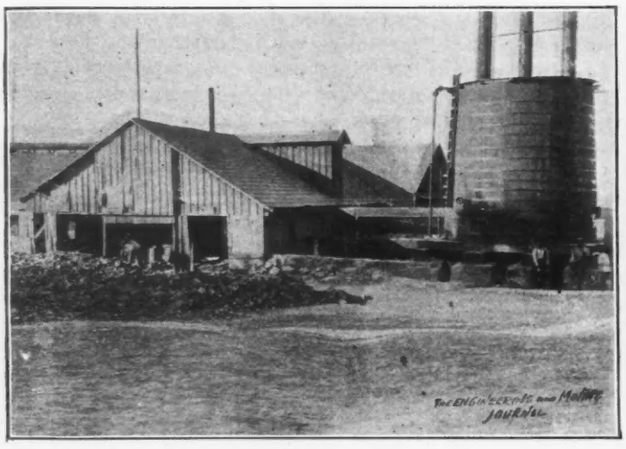
Thirty Miles of Underground Workings

During the last 28 years it is likely that the total amount of underground work in the Shafter district has exceeded 30 miles. Nearly all of this is above the 250-ft. level, so that the deeper ore has scarcely been touched, i. e., the ore that follows the southeast dip of the inclosing limestone. What this will prove to be is not known, but it is probable that it will be somewhat better than the ore nearer the surface although possibly not so easily treated.

The deepest shaft, 700 ft., is entirely dry although it is 300 ft. below the level of Cibolo creek. No water has been encountered in any of the workings, but in places, the clay seams are moist. The dryness of the ground is attributed to the sound condition of the walls, and were it not for this the mining costs would be much higher than they are. There are not many places where $15 silver ore has yielded steady profits for 25 years and where the outlook for the future is so encouraging.

Supply of Wood, Water and Labor

With hauling distance, nearly all of the original wood has been cut and used, so that for several years the fuel has



Mill of the Presidio Mining Company, Shafter, Tex.

Mina Grande Open Pit of the Presidio Company at Shafter, Tex.

been crude oil hauled 45 miles, in tank wagons, from the railroad. In the Chinati mountains there is still good timber but almost inaccessible. A little wood is still brought in from places along the Rio Grande and one persistent Mexican is freighting it 50 miles at $6 per cord. He is not getting rich.

Cibolo creek affords abundant water from Shafter toward the upper springs, but ceases to flow above ground below the town. The water is good enough for all ordinary purposes and is also used for drinking, although most of the white people use distilled water from the condensers at the boilers. The Mexicans are not so particular. Now and then there is a little typhoid fever in the settlement, but, on the whole, health conditions are good.

Wages vary from $1.25 per day for Mexicans to $3 per day for white miners, but the Mexican at $1.25, does as much and as good work as his American rival.

Pan Amalgamation vs. Cyaniding

Whatever may be the reserves of ore suitable for pan amalgamation (and I by no means disparage them), it seems to me that the future of the district will depend on the successful cyaniding of ore that carries from $10 to $12 in silver. There is a large amount of such material remaining in the old workings and more may be found by systematic prospecting in new ground. Ore that carries $12 leaves a narrow margin for profits by amalgamation, but should be well adapted to cyaniding. It is understood, although I have not seen the report, that cyanide experiments on a considerable scale showed an extraction of over 90 per cent. of the fire assay, using pulp that passed a 30-mesh screen. If this be true, and I have reason to believe that it is, the Shafter district presents an unusual opportunity for profitable silver mining for many years.

Some Advantages of Mine Telephones

Not only because of the protection it affords to lives and property but as the means of placing the mining business on a more systematic basis, the telephone system, reaching every important part of the mine and placing the most remote shaft or gallery in instant touch with every other important point, is becoming an indispensable feature of mine equipment.

Before the days of mine telephones a group of miners working in one room knew that the foreman would be around and visit them during the course of the day. Now each miner knows that his boss is likely to call on any man at any time during working hours. Whenever a telephone call comes the miner must be ready to go and speak to his superior. This means of direct personal communication brings the foreman and his men closer together.

A few weeks after a telephone system had been installed in one mine in the Pittsburg district the telephone was instrumental in checking a serious underground fire. An employee detected the smell of smoke and, running to the nearest telephone, informed the private branch-exchange operator at work in a building near the mouth of the mine. The operator called each telephone in the shafts and men were sent out from all points to search for the blaze. At the same time the superintendent, who was at his home, was notified by telephone. In this way the fire was reached and extinguished through the timely warning given over the telephone. In another mine a worker fell beneath an electric locomotive and was badly hurt. Word was at once sent to a surgeon, who was waiting at the entrance to the shaft when the car arrived bearing the injured man. In this case the telephone probably saved a life.

Social Conditions among Iron and Steel Employees

Washington Correspondence

Among the activities of the United States Immigration Bureau has been an investigation into the conditions of the workers in the iron and steel trades. The report giving the results of this labor has just been published, from which the following information is taken.

About 58 Per Cent. of Steel Employees of Foreign Birth

Iron and steel manufacturing in all its aspects was studied in the territory east of the Mississippi river. Detailed information was received for 86,089 employees of the industry, and an exhaustive study was made of 2456 families, the heads of which were employed in iron- and steel-manufacturing establishments. Of the total number of employees in the industry 57.7 per cent. were found to be of foreign birth, the principal races composing this proportion being the Slovak, Polish and Croatian from southern and eastern Europe, and the German, Irish and English from western and northern Europe. Of the native-born iron and steel workers 28.8 per cent. were native Americans and 13.4 per cent were of native birth but foreign father. Of the total number of employees of foreign birth only 8.6 per cent. had been employed in the same industry abroad, while 64.4 per cent. had been farmers or farm laborers in their native countries. The average weekly wage of employees in the industry was $14.35; the average annual earnings of male heads of families was $409; and the average annual family income $568. The average annual earnings of all employees in the industry who were 18 years of age or over was only $346.

Family Incomes

As regards the sources of family income, it was found that 40.5 per cent. of all the families derived their income entirely from the husband, while 33.1 per cent, composed principally of southern and eastern Europeans, secured their income from earnings of husbands and contributions of boarders or lodgers. The families whose heads were native-born depended more largely upon contributions of children than those the heads of which were born abroad. Of the total number of families, 7.8 per cent. were supported by the earnings of husbands and contribution of children.

Of foreign born families, 41.5 per cent. supplemented the earnings of the heads by keeping boarders or lodgers as contrasted with only 8.3 per cent. of the families the heads of which were native-born. This practice led to a high degree of congestion within the households the heads of which were foreign-born. The average number of persons per room in such households was 1.76 as compared with 0.93 persons among the families the heads of which were of native birth; and the average number of persons per sleeping room in foreign-born households was 2.89 as contrasted with 1.96 in the native-born households. The average rent per capita in foreign-born households was only $1.14, while that in native-born households was $1.71. Of the total number of foreign-born households, 14.7 per cent. used all rooms to sleep in, as against only 3.8 per cent. of the households the heads of which were native-born. Of the native-born employees 20 years of age or over, 64.6 per cent. were married, and of the total foreign-born 67.2 per cent. Of the foreign born employees, 84.2 per cent. were able to read and 82.3 per cent. could both read and write. Of the employees of foreign birth who were of non-English-speaking races only 51.8 per cent. were able to speak English.

Few Belong to Labor Organizations

The tendency toward acquiring citizenship among the wage-earners of foreign birth was small, only 32 per cent. being naturalized and 11.4 per cent. having taken out first papers. Of the families the heads of which were foreign-born 20.5 per cent. owned their own homes, as compared with 15.1 per cent. of those the heads of which were native-born. Only 1.5 per cent. of foreign-born and 3.6 per cent. of native-born employees were members of labor organizations.

Opening of the Chitina Copper Belt in Alaska

A Richly Mineralized Region Now Touched by the Copper River Railroad; Copper, Free Gold and Auriferous Stibnite So Far Discovered

BY DENIS DONOHOE*

The successful piercing by the Copper River railway of the Chugach range, a chain of lofty, glaciated, serrated mountains that fringe the southern coast of Alaska, has served to direct attention to the newest, save one (Katanga), of the prospective copperfields.

On Sept. 24, 1910, the first train was run over the railroad to the new town of Chitina, which lies in the southern extremity of the Copper River valley, at the confluence of that stream with the Chitina river; well within the mountain wall and at the very threshold of the Kotsina-Chitina copper belt. Travel from Cordova over this section of the railroad has been continued uninterruptedly ever since. In December, the Kuskalana was spanned by a steel bridge 250 ft. high and the railroad was extended to a point about 15 miles east of Copper river. As grading is completed to the Bonanza mine, the objective point, the railroad should be finished by February.

Freight Formerly 10 to 40 Cents per Pound

Precisely how important the completion of the railroad is to the future development of this new copperfield may be deduced from the fact that all supplies, including powder and horse feed, hauled on horse sleds in winter from Valdez into the copper country, have cost operators and prospectors in past years from 10 to 40c. per lb. for a 200-mile haul. By reference to my account books for the last five years I find that freight, thus transported, has cost 9.3c. per lb. for transportation from the coast to the interior under the most favorable circumstances and 37c. per lb. in 1908, when the trail and climatic conditions were at their worst and the mortality among the horses was great. In view of the manifold difficulties and great expense under which operations have been carried on in the past, it will probably not be a subject for surprise to mining men when it is stated that the total of all the covered work in the copper belt, i.e., tunnels and shafts, does not exceed 9000 feet.

The Kotsina Belt

The Kotsina-Chitina copper belt, as it is termed in the reports of the U. S. Geological Survey, is a tract of mountainous country, embracing the watersheds of the Kotsina, Kuskalana, Gilhena, Strelna, Lakina, Nizina, Kennicott, Chitistone and Chitina rivers, with their tributary streams, notably, Nugget, Rock, Roaring, Kluvesna, Elliott, Dan, Chititu, Young, Glacier and Cañon creeks, etc., situated in the central portion of southern Alaska, about 125 miles north of the Pacific ocean. Roughly speaking, this tract of territory containing the known copper deposits is 115 miles long, with a mean width of about five miles, and the copper is to a greater or less extent connected with a contact of Chitistone limestone and Nikolai greenstone, which has its beginning in the vicinity of the foot of the Chitina glacier and extends in a general northwesterly direction to Copper river. In the western extremity of this copper belt the limestone capping, for it is generally superimposed upon the greenstone, has been eroded and has disappeared, and throughout its entire extent the contact has been cut here and there by glaciers; thereby exposing in section certain metamorphic contact veins and deposits to a considerable vertical depth below their apices near the summits of the mountain range containing them.

Copper Indications Present along Entire Contact

It is a fact that there is not a space of two miles anywhere along this contact, where the same is exposed and not obscured by vegetation or the detritus from the limestone crags above, that does not exhibit surface indications of the presence of copper. Many of these outcrops, doubtless, are of little present or future economic importance; but there are others of a far different character and these last are more numerous than a mere summer visitor, passing rapidly through the country, for the most part on horseback over valley trails, would be led to imagine. They may be divided broadly into two classes, viz., veins and replacement bodies in the limestone, and contact-metamorphic veins and deposits in the greenstone. The latter, where the glaciers have done their work of denudation thoroughly, are, in not a few instances, readily traceable for a considerable distance, occasionally for several thousand feet. Since the average width of many of them, as far as can be determined from a few superficial opencuts, would appear to exceed 10 ft., the characterization of the orebodies along this contact as remarkable would appear to fall well within the

Limestone-Greenstone Contact at Back of Icy Lake and on Kennicott Glacier

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confines of strict conservatism. The commonest surface ore of the limestone deposits is a chalcocite of exceptional purity; while bornite and chalcopyrite, in the order named, are the common ores of the greenstone. The copper carbonates are not of frequent occurrence, save as a superficial crust upon the sulphide ores.

Prospecting Limited to the Greenstone Contact

All the copper deposits within the belt, now being worked, are situated at altitudes ranging from 3000 to 6500 ft., and until this year little, if any, prospecting had been done away from the limestone-greenstone contact. This is to be regretted, as the presence of contacts of porphyry and shale, granite and shale, ets., suggests the strong possibility of the existence of workable deposits in other horizons.

Within the territorial boundaries of the Kotsina-Chitina copper belt about 200 groups of copper claims, embracing probably about 4000 claims had been located prior to January, 1910, and the labors of prospectors during the current year have added probably 200 claims to this total.

Guggenheims Only Own One Group of Claims in District

In view of the misleading statements contained in sensational magazines and newspapers, it seems but simple justice to point out that the Guggenheims own today only a single group of copper claims in this vast district, viz.: the group generally known as the Bonanza mine, which comprises, including tributary placers, less than 4000 acres of land. The idea that there is any effort on the part of the Morgan-Guggenheim syndicate to control this extensive copper belt, save inasmuch as their railway is the first to penetrate it, is the subject of mirth in every prospector's cabin and in every operator's camp throughout this vast district. Unlike Butte and many of the older camps the area of the Kotsina-Chitina copper belt is too vast for such a consolidation to be readily effected and the financial interests already represented in the belt are too important to be assimilated save on their own terms. Capital affiliated with the Calumet & Hecla entered the district one year before the Messrs. Guggenheim secured the control of the Bonanza mine, and James Phillips, Jr., prominently identified with the Nevada Consolidated and other well known copper properties, had acquired comprehensive interests in the field before the Guggenheims entered it, and indeed before the preliminary surveys for the present railroad were begun. Among other capitalists of the first magnitude that are firmly entrenched in the new copper district may be mentioned interests affiliated with the Cape Copper Company, and during the last year the Cole-Ryan syndicate was represented in the Chitina copper belt. In fine, the idea that this copper belt is to be a one-company proposition would seem to those who dwell therein wholly erroneous and, in point of fact, more than 65 per cent. of the existing copper claims are still owned by their original locators, by prospectors, or are controlled by small local capitalists, i.e., the trades-people of Valdez, Cordova, and other outfitting points on the coast.

During the last summer the number of mining engineers who visited the copper belt was greater than ever before and their reports to their principals, New York, Boston, Chicago, and European capitalists are said to have been uniformly favorable.

Bonanza the Only Proved Copper Mine

At the beginning of the current year the only proved mine within the confines of the copper belt was the Bonanza which has recently been described in the columns of the JOURNAL. During the last season the continuity of the rich surface deposits of the Bonanza mine has been proved to a depth of approximately 400 feet, while the Great Northern Development Company has uncovered a large deposit of 8 per cent. ore at a depth of about 800 ft. by a tunnel 550 ft. long. The Motherlode Mining Company in its main working tunnel has penetrated for a distance of more than 30 ft. into a replacement body of rich chalcocite, and the Blackburn Mines Company on one of its groups adjacent to Kennicott mountain has also encountered a similar replacement body and has shown up rich ores in several large metamorphic contact deposits on its other groups. Exploration by prospectors during the past summer has served to extend the confines of the known copper belt to Cañon creek, which is distant about 45 miles in a southeasterly direction from Kennicott, the proposed terminal of the railway.

Auriferous Gravels Being Worked on Chititu and Dan Creeks

Within the confines of the copper belt there are two creeks containing extensive deposits of auriferous gravel now being worked, viz., Chititu creek and Dan creek, and their product this year, including that of their tributaries, has exceeded by about $20,000 the gross product of any recent year. For several years past the presence of nuggets of stibnite containing free gold, occasionally an ounce of gold to the nugget, has been noticed in the clean-ups of the two hydraulic plants working on Chititu creek, and placer miners shoveling into the boxes on Dan creek have also occasionally found stibnite associated with their gold. Accordingly, a determined effort was made this year by prospectors to discover the ledges whence this auriferous stibnite came, with the result that two promising prospects of gold bearing antimony ore were located; one on the eastern exposure of Dan Creek mountain and the other at the head of Rheta gulch, a tributary of Copper creek in the same neighborhood. These discoveries were made in August and not sufficient work was done this season to determine their economic importance, but the Dan Creek mountain veins show an abundance of free gold on the surface. Gold-bearing molybdenite, containing stibnite and a little associated chalcopyrite was discovered in September by a prospector within four miles of the Bonanza mine. The ore is contained in small stringers, the largest of which does not exceed 4 in. in width, but they are numerous. The Blackburn Mines Company also found this year a little free gold, associated with chalcopyrite, on one of its claims.

New Gold-bearing Quartz Veins Discovered

Second only to the copper, probably the most promising factor making toward the future development of the territory tributary to the new railway has been the discovery in 24 localities, extending from Moose pass, which lies east of the town of Seward, to the McKinley Lake region, about 23 miles east of Cordova, of quartz veins containing free gold, in some instances in association with tellurides. These discoveries, save one (the Cliff mine near Valdez) have all been made during the last six months and the search for gold-bearing quartz was stimulated by the payment in the early summer of dividends of 30 per cent. on the $100,000 of capital stock of the Cliff Mining Company, which is a close corporation, controlled by business men in Valdez. In the McKinley Lake region near Cordova I visited, late in September, two of these prospects.

In one prospect, controlled by the W. G. Nicholls syndicate of Salt Lake City, a vein 14 ft. wide with clearly marked walls, slate and greenstone schist, had been opened and, although no ore had been blocked out, free gold was plainly discernible across the entire 14-ft. exposure; while a second vein which had just been cut by a short tunnel showed also an abundance of free gold and a quantity of tellurides. Ore from the vicinity of Valdez, from the Moose Pass country, from Beaver dam, and other camps in this district was of the same general character as the McKinley Lake ore, save for the absence of tellurides. Orders have already been placed for four small stamp mills to operate in this new goldfield, and it seems reasonable to conjecture that next spring will witness an increase in both prospecting and development in this district.

The Yellowpine Mining District of Nevada

A Zinc-Lead-Silver District, First Worked by Mormons. Zinc Only Utilized Recently. Carbonate Ore. Depth of Oxidized Zone Unknown

BY NEWMAN B. GREGORY*

The Yellowpine mining district is situated in Clark county, in the southernmost part of the state of Nevada, and includes approximately that territory lying between latitudes 35 deg. 40 min. and 36 deg. 5 min. north and longitude 115 deg. and 5 min. and 115 deg. and 40 min. west. The San Pedro, Los Angeles & Salt Lake railroad runs nearly north and south through this district. The towns of Jean, Arden and Roach are railroad stations, and are shipping points for ore. Goodsprings, in the Spring mountain range, is eight miles west of Jean, is reached by stage and is the principal camp in the Yellowpine district. At Jean the elevation is 2876 ft.; in the Spring mountains, where the zinc-lead-silver properties are situated, the elevation is between 4500 and 6000 feet. The population of the entire district is not over 300. Jean has 23 inhabitants; Good Springs, 60; Arden, 60 people.

The mountains have been subjected to intense erosion, and the detritus washed and blown into the lower desert country. The yearly precipitation is from three to five inches; this falls generally in July and August. In the mountains only small trees are available for fuel. A number of varieties of cactus are the only desert plants. All the mines are perfectly dry, and water for all purposes is hauled to them from the nearest camp. The only water near the mines is at Goodsprings, where there is an excellent well, the other towns receiving their supply from the Salt Lake railroad.

First Mine Worked by Mormons

The Potosi mine on the old trail between Salt Lake and San Bernadino was discovered about 1860 by the Mormons, and has been worked continuously since that time. Until 1906 it was worked exclusively for lead and silver. It is stated that zinc had not been recognized up to this time. It was not until a mining man from Socorro, N. M., went over the district that zinc was discovered. By chance this man picked up a piece of ore, and from his knowledge of the oxidized zinc ores of New Mexico identified the specimen as high-grade zinc carbonate. By 1908 a considerable quantity of hand-sorted mixed zinc-lead-silver ore had been shipped, but zinc was not recovered in smelting, and consequently the operator was not paid for the zinc content; these cars were shipped as lead-silver ores to Salt Lake City.

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The Monte Cristo mine, several miles southeast of Goodsprings, was discovered in 1906, and was the first producer of a pure, high-grade zinc carbonate. The ore was exceptionally high grade, some of the purest zinc-carbonate shipments which any district has produced coming from this mine. The average of all shipments has been nearly 45 per cent. metallic zinc with individual cars assaying well above 45 per cent. Owing to the fact that zinc ores were not discovered until 1906, and the general demoralization due to the panic the following year, development throughout the district was limited. In July, 1908, the mines again resumed production, and have continued operations to date.

No Detailed Geological Studies Yet Made

No detailed geological report of the Yellowpine mining district is available. The geology of the entire area presents a complex problem. In the short time available for the study of the geology, the succession appears to be about as follows: Upper Carboniferous limestone, from a few hundred to a thousand feet in thickness, is the country rock. Devonian, Ordovician, Silurian and Cambrian rocks, principally limestone, underlie the Upper Carboniferous in the order named. Mesozoic limestone and sandstone overlie the Carboniferous in places, and elsewhere have been entirely eroded. This whole limestone stratum has been broken and faulted and recrystallized, and during this period of disturbance the Spring Mountain range was formed. Trachyte and acid porphyry intrusions in the limestone were either contemporaneous or followed shortly this period of disturbance. The porphyry intrusions occurred as large dikes, probably along fault planes, and in general it is near the contact of the limestone and porphyry that mineralization has occurred. These dikes have a general north and south strike, and dip from 40 to 60 deg. from the horizontal.

Ore not in Defined Veins

Lead-silver ores, and zinc ores, and mixed lead-silver-zinc ores, the lead carrying silver values, occur as replacements in limestone, not in a well defined vein but in an easily determined zone, in lenses, chimneys, and chutes. In cutting out the various levels of a mine limestone bars are encountered occasionally, and it is necessary to cut through this barren rock from 10 to 75 ft. before the orebody is again disclosed. Although one mine has attained a depth of 600 ft. the ground-water level has never been determined for any mine of the district. It is certain that oxidation of the entire mining area extends to a considerably lower level than the present depth of any of the mines. Zinc is found always in the oxidized state, the ores occurring as the carbonate and silicate and as hydrozincite, a whitish earthy basic zinc carbonate $Zn\,CO_3.\,2Zn(OH)_2$. Lead occurs as sulphide and carbonate, the occurrence of sulphide being due to the fact that when lead sulphide begins to oxidize, a protective coating of lead sulphate is formed, and this coating tends to prevent further oxidation. The most important mines in the district are the Yellowpine Mining Company, the Potosi, and the Prairie Flower.

Several Small Shipping Mines in District

There are a large number of prospects which have shipped ore at various times, and are now making a small production. This production represents ore taken out from the surface, or near the surface, in the course of development work. Among the claims which have already shipped ore which has largely paid the expense of development work are the Addison & Milford, the Sultan, Ingomar, Fredrick Ward, Alice, Pilgrim, Anchor, Valentine, Robins & Chaffin, Taussach, Riley & Donohue, Kansas-Nevada, Hoosier, Whale, Green Monster, Gila Monster, Mobile, May Kirby, Mountain Top and the Blue Jay.

Operations at all of these are conducted in a very similar and crude manner, and for this reason a discussion of the Yellowpine mine will serve to illustrate the prevailing practice. All the miners are confining themselves to development work, shipping only such ore as is taken out in extending the mine by levels and incline shafts. The Potosi with approximately 100,000 tons of 35 per cent. zinc ore has the largest developed tonnage. The Prairie Flower, operated by the Knight and Hyde interests, found ore at the 70-ft. level in June, 1910, and shipped its first car about the middle of June. Its product is a mixed lead-silver-zinc ore averaging about 20 per cent. lead, 10 to 15 per cent. zinc, and 12 oz. silver to the ton. This ore is sold for lead-silver contents, and zinc is not paid for.

The Yellowpine Mine

The Yellowpine company's property is situated four and one-half miles west of Goodsprings. A Nevada stock company owns the property by patent rights. The geology of the ore deposit has been described in a discussion of the general geology of the district. A 5x6-ft. incline shaft was started about five years ago, and up to the present time about 60,000 tons of ore has been proved. To develop this tonnage 1750 ft. of levels in ore and 500 ft. of dead work have been completed. The mineral zone, or vein as it may be called, has been cut in places for a width of 40 ft. before cutting into the barren limestone. The levels have been cut with an average width of 5 or 6 ft., but in a number of places large pockets of almost pure lead carbonate, and pockets of nearly pure hydrozincite have been found. The shaft is situated on a mountain slope, and is 400 ft. in length on a 40-deg. incline; the mountain slope gives the shaft a vertical depth of about 600 ft. The ore as mined averages 27 per cent. metallic zinc, 15 per cent. lead, and 12 oz. silver. After hand sorting, and as the ore is shipped, it averages from 32 to 35 per cent. zinc, 15 to 18 per cent. lead, and 12 to 14 oz. silver to the ton. There is every reason to believe that the orebody will continue downward until the ground-water level, the sulphide zone, is reached, and it is probable that mineralization will contine to a much greater depth.

Three Classes of Shipping Ore

Three classes of ore are mined: (1) a clean zinc carbonate and silicate; (2) lead-silver ore carrying some zinc, but zinc not paid for; (3) mixed zinc-lead-silver ores. These ores are merely hand sorted before shipment. Until 1909 no ore was sold under the classification of mixed ores; the operator had to sell his ore for the lead-silver content and receive pay only for those values, or he sold it as zinc ore and received pay for zinc content only. The desirability of this ore for use in the manufacture of zinc-lead paint, brought about a market for this mixed product. This ore is sold on a basis of 30 per cent. zinc, 15 per cent. lead, and 12 oz. silver. With spelter at 5c., St. Louis delivery, one ton of this ore sells for $18, f.o.b. Kansas points. For every increase or decrease of 1c. in the market price of spelter, $4 per ton is added or deducted from this base price. The unit variation on zinc up or down from 30 per cent. is $1; the unit variation on lead is 35c., and the unit variation on silver is 35 cents.

Mine Owner Receives One-Fifth Assay Value

Zinc ores are sold on the formula, $P(T-8)-R$, where P represents metallic zinc in pounds, T represents the units of zinc contained in the ore, and R the smelter returning charge. The returning charge on this ore is practically $10. With spelter at 5c., St. Louis, a 45 per cent. zinc carbonate or silicate would sell, f.o.b. Kansas, for $(45-8)-10$, or $27 per ton. With spelter at 6c. this same ore would sell for $4 to $6 more per ton.

Lead-silver ore in which the zinc content is not paid for sells on the regular schedule of 90 per cent. of the New York quotation for lead, and 95 per cent. of the New York quotation for silver. The freight rate to Salt Lake is $4.25, and to Kansas points $8. Figuring an ore averaging 30 per cent. zinc, 15 per cent. lead and 12 oz. silver for assay value: 30 per cent. zinc equals 600 lb. zinc @ 5c., equals $30; 15 per cent. lead equals 300 lb. lead @ 4½c., equals $13.50; 12 oz. silver @ 50c. equals $6; total assay value, $49.50. The ore-buying companies pay $18 at the smeltery, or $10 to the producer, f.o.b. Jean, for nearly $50 in assay values. It thus appears that on account of metallurgical losses, freight, etc., the producer receives about 1/5 of the assay value of his ore.

Costs about $10 per Ton of Ore Mined

Wages are uniform over the district: Drill men, $4 per day; muckers, $3.50; engineers, $5; blacksmiths, $4; sorters, $3.50; general laborers, $3.50; foremen, $5, plus board, $1; cooks, $2.50; board costs from $1 to $1.25 per day.

Practically all of the operators are pushing development work, and for this reason the cost of mining per ton is as yet an unknown quantity. Labor will amount to $3 or $4 per ton. The 12-mile wagon haul to Jean costs $2.75 per ton, and loading charge is 25c., making a total of $3 for hauling and loading. Supplies, depreciation, management, insurance and development work will probably equal $3 per ton, making the total cost of mining and loading for shipment about $10 per ton. The Monte Cristo mine placed in freight cars at Jean a large tonnage of ore during a period of 17 months ending April 10, 1910, at a cost of a few cents less than $9 per ton. Adding to this a freight rate of $8, the Monte Cristo realized a profit of nearly $10 per ton on all ore handled during this period of 17 months. Under present market conditions the Yellowpine and other companies can show a fair profit.

The mine labor is almost entirely American, and intelligent. The Potosi employs foreign labor, mainly Italians and Mexicans, and pays a 25c. lower wage scale. All mines are worked single shift, seven days in the week. Little machinery is used; in the Yellowpine and Potosi, gasolene engines are used in hoisting. Hand drilling is generally adopted. A narrow-gage railroad from the mines to the Salt Lake railroad at Jean is a possibility for the district. Such a road would materially lower the hauling cost.

No Concentrating Method Available

The character of the zinc-lead ores will make any attempt at concentration a difficult problem. The zinc ores are of practically the same specific gravity as the gangue, and tests to which the ore has been subjected have failed to show a satisfactory recovery of the contents.

This district is laboring under a heavy handicap with no railroad nearer than 10 miles, a heavy freight rate to the smelteries, and no adequate method of concentration. There is undoubtedly a vast amount of lead-silver-zinc ore in the Yellowpine area. To develop these deposits properly, outside capital will have to find its way into the district. A railroad spur must be built to Goodsprings. These things will almost assuredly be brought about in good time. The present production is that of a camp in its infancy, and it is only a question of time, I believe, until the Yellowpine district will be recognized as a field of great possibilities.

Plate and Sheet Production

The American Iron and Steel Association has received direct from the manufacturers the production of iron and steel plates and sheets in 1909. The production, excluding nail plate, amounted to 4,234,346 long tons, of which 76,202 tons were of iron and 4,158,144 tons of steel. The increase over 1908 was 1,584,653 tons, or 59.8 per cent.; but there was a decrease of 14,486 tons, or 0.3 per cent., from 1907. In 1909 there were 141 works in 17 States which made plates or sheets. Pennsylvania made 2,384,185 tons of the total, Ohio, 938,185, and West Virginia 211,012 tons.

The production of plates and sheets in the United States for five years past has been as follows, in long tons:

	Plates	Sheets.	Total.
1905.....	2,041,206	1,491,024	3,532,230
1906.....	2,531,552	1,650,604	4,182,156
1907.....	2,660,060	1,588,772	4,248,832
1908.....	1,271,021	1,378,672	2,649,693
1909.....	2,379,098	1,855,248	4,234,346

Plates include all material of No. 12 gage or thicker; sheets all of No. 13 gage or thinner. Black sheets for tinning are included above, but nail plates are excluded. Of the plates made in 1909 only 1.4 per cent. were of iron; of the sheets, 2.4 per cent.

Deep Mining in the Guanajuato District, Mexico

Nueva Luz Shaft 2031 ft. Deep. Mexican Government Pays Subsidy of 150 Pesos per Meter. Cost 250 Pesos per Meter at 2000-ft. Level

BY FRANK H. PROBERT*

Deep mining in South Africa and Australia has attracted much attention during the last few years, because of the successful solution of difficult engineering problems and the proved continuance of workable ore to great depths. The Guanajuato district of Mexico is now being watched by the financial and engineering world because of the sinking of the Nueva Luz shaft by the Proprietary Mines Company of America to explore the Mother Lode over 3000 ft. on its dip. It has added interest because of the substantial recognition it receives from the Mexican government.

Guanajuato has aptly been titled "Mexico's Treasure House," for since the discovery of the Veta Madre in 1554 its reputed output of $400,000,000 is probably well within the realm of truth. The wonderful Valenciana shaft was started toward the end of the eighteenth century and sunk to a depth of 1807 ft. at a cost of 1,000,000 pesos. It produced over $150,000,000. The King's tax alone for a period of five years ended 1804, which amounted to one-fifth of the yield, was $1,325,000. The shaft is octagonal and 32 ft. across. Eight separate horse whims were used at the same time in shaft sinking. It is lined with solid rock masonry. Inability to handle the water was the cause of its abandonment. The accompanying illustration, furnished by Catlin & Powell, shows the relative position of the main shafts and the dip of the orebody.

Geological Features

Brief mention of the geological structure of Guanajuato is of interest. The broad physiographic features have been determined by fault blocks of extraordinary length; by the huge masses of volcanic ejecta and by a long period of erosion smoothing off the cragged peaks and covering the southern slopes with accumulated débris, extending to the fertile basin of Celaya. As a geologic unit the rock system is simple, consisting of Mesozoic sediments (Cretaceous), Teritary eruptives, and recent detrital rocks.

The crustal movements manifested themselves as a great network of faults and were accompanied by the intrusion of igneous rocks, later followed by the outpourings of vast lava flows. The mineral wealth bears a close relationship to the intensity of these Tertiary volcanic outbreaks. Stream courses intersect the region, exposing the rocky structure ribbed by many veins and scarred by mine openings and dumps of over 300 years' mining activity.

The district shows a basement of Cretaceous shale capped by a series of volcanic rocks; bedded andesitic breccias and tuffs covered in turn by rhyolitic breccias with a second series of andesite above. Older members of the series were intruded by granite, altering and breaking the Cretaceous shales and andesitic breccias, and initiating the mineralization which, enriched in a later period, has formed the great bonanzas of the district. Dikes of rhyolite cut through the granite, and andesitic dikes cut the clastic rocks of this type. None of the rocks is truly waterlaid except locally in small pools and lakes about the flanks of the old volcanic pile, but much of the material is the result of mud flows.

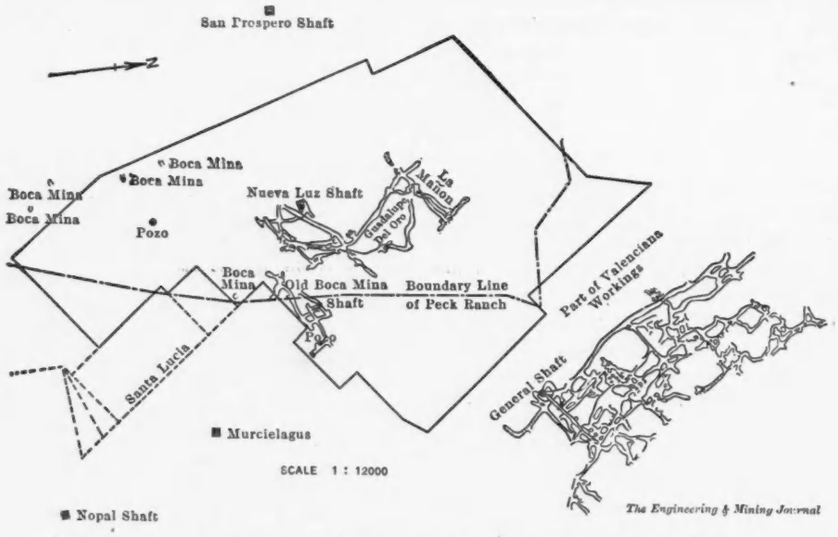
Ore in Fissure Veins

The ore of the district occurs in fissure veins formed in fault fractures. The vein structure varies from massive to a tangled mesh of veinlets or stringers. The vein filling consists of quartz and calcite often surrounding and inclosing fragments of rock much altered by circulating waters. The minerals are argentite, stephanite, rarely polybasite, proustite and native silver. Pyrite is common but unimportant and chalcopyrite is rare. There is evidence of the reopening of many veins with later deposition of ore about fragments of the older vein filling. The bonanza orebodies are sharply defined from the barren parts of the vein. These shoots pitch to the south and have an average depth far exceeding their greatest horizontal extent.

The Veta Madre is a strong lode formed along a zone of distributed faulting, which is in places 150 ft. wide and shows three veins, foot-wall, central and hanging. At the north end, the lode lies between black shale and red Guanajuato conglomerate; farther south it lies between andesitic rocks and rhyolite porphyry.

The Nueva Luz Property

The Nueva Luz property, aggregating 72 acres, is about three-quarters of a mile northwest of Guanajuato. It covers



PLAN OF NUEVA LUZ AND VALENCIANA MINES, GUANAJUATO, MEXICO

the dip of the Valenciana bonanza about 2000 ft. west of the outcrop. Its value is in the ownership of the underlay of this bonanza. The vein on Valenciana ground extends northwest and southeast, dipping 45 deg. to the west. It has a width of from 30 to 160 ft. The orebody of the Valenciana was worked to the 1640-ft. level by the shaft, and then by winzes to a greater depth, the bottom still being in bonanza ore.

The Valenciana oreshoot had an unusual horizontal extent, official maps showing it to be over 2000 ft. long on the 1150-ft. level of the big shaft. On the lowest level, 1607 ft., the oreshoot is 1476 ft. long, and assuming a continuance downward to a depth equal to half its horizontal extent, would bring it to the 2300-ft. level of Nueva Luz. This is a reason-

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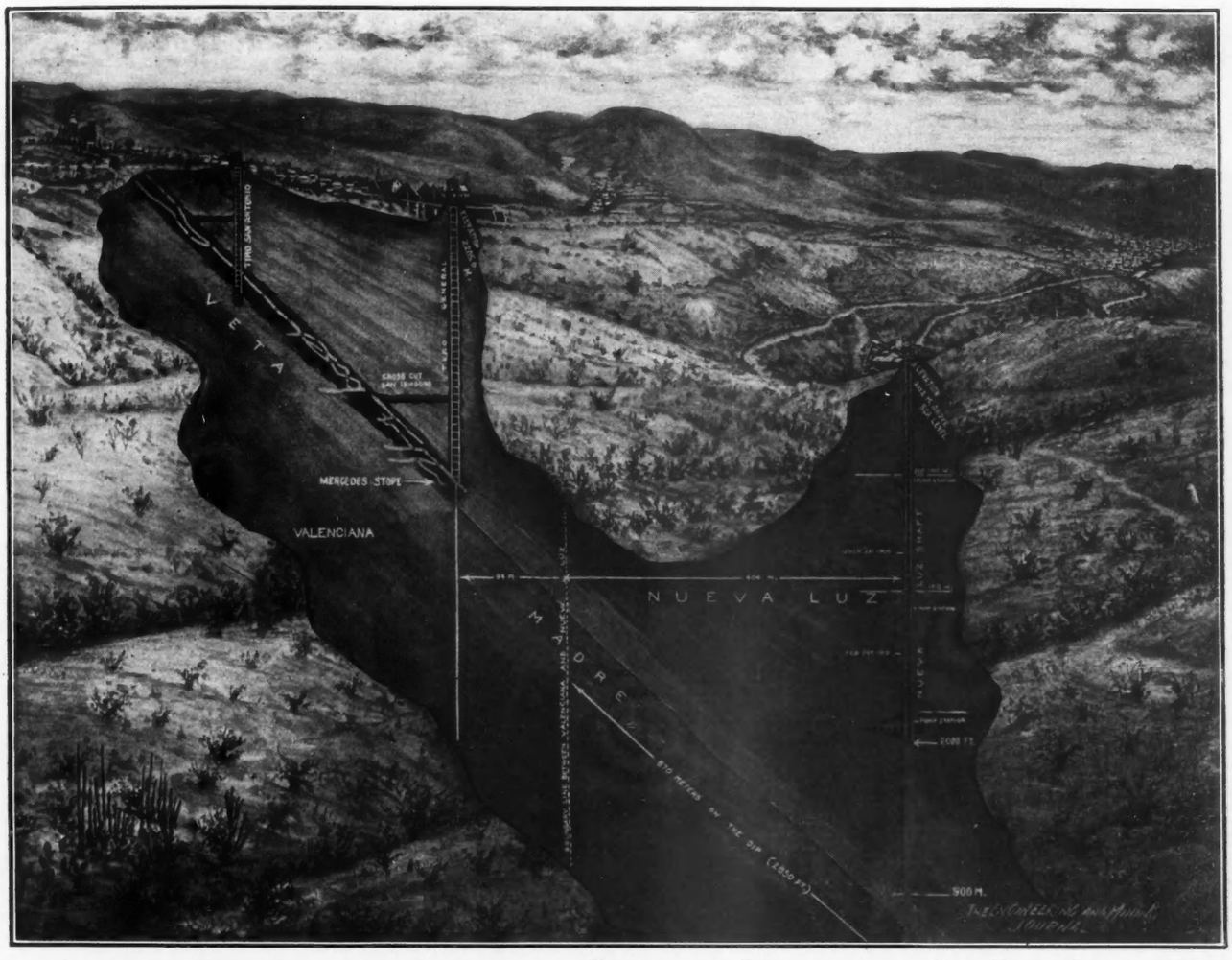
able deduction and if proved correct makes the territory being developed of great value. The facts all indicate the downward extension of a body of relatively high-grade ore into Nueva Luz ground, which should be mined at a profit.

The Nueva Luz Shaft

The Nueva Luz shaft is a great project. Weighing all geological evidence and the authentic history of the Valenciana, success must attend the work. The collar is about 320 ft. lower than that of the Valenciana, and centers of shafts are bucket roads, using crossheads with wire-rope guides, are used for sinking, but the shaft is sufficiently large for a pump compartment when this becomes necessary. It is planned to divide the shaft into three 700-ft. lifts using electrically driven pumps for handling the water. At present, one small pump is only called into use three or four hours a day. Water stands in the Valenciana shaft within 600 ft. of the collar, but the Tepeyac, which adjoins the Valenciana on the same lode, is taking out ore 400 ft. below the water level of the Valenciana. I do not anticipate any sudden rush of water when the motion, geared, electrically driven hoist, good for 2500 ft.; a 600-cu.ft. two-stage Ingersoll-Rand air compressor; suitable headframe and the necessary offices. Ingersoll-Sergeant 2¼-in. drills are used in the shaft.

The shaft is costing about $125 per meter and progresses at the rate of about 15 ft. per week below the 2000-ft. level.

Starting in the altered andesitic rocks the shaft passes through a projecting tongue of granitic rock, and encountering a big fault (the Mañon) at 934 ft. passes into the black Cretaceous shales and continues in them to the bottom. These



San Antonio, General and Nueva Luz Shafts and Hypothetical Extension of the Veta Madre, Guanajuato

1592 ft. apart. If the Veta Madre maintains a steady dip of 45 deg., as it has done for 2500 ft., it will enter Nueva Luz ground at 1580 ft. vertical depth; the shaft will penetrate the hanging wall at 2950 ft., and the lode should pass out of the ground on the southwest side at about 4000 ft. This will give approximately 2850 ft. on the dip of the vein.

The shaft is in good condition to carry on the projected work. As started by the old-time Mexicans, it was circular, but Mr. Henrick has continued it as a rectangular shaft, 6x16 ft. Only a little timbering has been necessary. Two Nueva Luz crosscut reaches the lode, but a gradual drainage through the vein and slow lowering of water level. There will be at least 350 ft. of solid vein material on the dip of the vein between the Nueva Luz crosscut and the bottom of the big Valenciana shaft, sufficient to retain the water.

Surface Equipment

There has been no foolish expenditure of money in unnecessary surface equipment, and every economy has been exercised under Mr. Henrick's administration. There is a double-drum, second-

black shales are abundantly pyritized in places and are occasionally veined with calcite and quartz, forming the characteristic *ramaleo* of the Guanajuato district. At 1950 ft. some argentite and ruby silver were found, proving the existence of high-grade ore at this depth. Advices from the mine, on Nov. 1, are to the effect that the shaft is 2031½ ft. deep, the deepest mine in Mexico.

At a depth of 1935 ft. the first station was cut for crosscutting to the Veta Madre. The crosscut will be approximately 900 ft. long and, on Nov. 1, was in 50 ft. It should reach the vein early

in 1911. There is every geological reason to anticipate the opening of large orebodies of commercial grade at this level on the Veta Madre.

Subsidy Paid by the Government

Nueva Luz is the only mine in Mexico which receives a government subsidy. A contract under date of Feb. 4, 1907, for a period of 10 years, between the Federal Executive and the Mineral Development Company—now part of the Proprietary Mines Company reads, in abstract: "During the life of this contract, the company shall be exempt from the payment of all Federal taxes, excepting stamp and mining taxes. . . . The company shall have the rights to collect indemnity from those mining properties which may be benefited by the projected shaft, the same to be proportional to the benefits received, for unwatering, ventilation, or extraction of material. . . . In view of the fact that the projected shaft will be of great benefit to the mining district of Guanajuato, the Federal Government grants to the Mineral Development Company, a subsidy of 150 pesos ($75) for each meter of vertical depth attained by the shaft, which indemnity shall be paid for each 50 meters of shaft sunk below a depth of 500 meters and up to a depth of 1000 meters."

Early in July, the first subsidy of $3750 was paid by the Federal authorities, and another of the same amount is now due. The government geologists are watching the project with great interest and the eyes of Guanajuato are all centered on the work. The interest is becoming keener as the goal is approached, for the proving of commercial ore at this depth in Nueva Luz on the Veta Madre will rejuvenate the camp and lead to greater activity in the Guanajuato district. The courage of those directly responsible for this mammoth work of sinking 2000 ft. to cut a silver vein is deserving of the success which all mining geologists who have examined the property assure them.

Compared with the probabilities of opening up large ore reserves below 2000 ft., the other attractive mineral showings on Nueva Luz ground are small, although in themselves they are of importance and value. The Nopal vein system being explored in the upper workings may add materially to the daily tonnage to be mined.

Quartette Mining Company

The report of the Quartette Mining Company, Searchlight, Nev., for the year ended Sept. 30, 1910, shows a total profit of $995. A total of 5124 ft. of development work was done during the year, but no large deposits of rich ore were discovered, the largest being only 75 ft. long. Work is still being pushed, and a new low level is being driven and a still deeper one planned. The company has about $85,000 available for further work of this sort.

There were milled during the fiscal year 27,468 tons; the heads carried $6.50 per ton, the bullion produced amounted to $4346, or 66.87 per cent., and the milling costs were $1.006 per ton. About 369 tons of first-class ore averaging $45.10 per ton were sent to a custom smeltery for treatment, freight and treatment charges amounting to $10.95 per ton.

The cyanide plant operated most of the year, running on old tailings, but as the sands are now practically exhausted, the plant has been shut down. The heads averaged $3.3015 and the bullion produced $2.3601, or an extraction of 71.48 per cent., and the working costs were $1.6309 per ton. It is purposed in the future to treat the accumulated slimes.

The mining cost per ton, including development, was $3.28, of which $0.65 was for supplies and $2.63 for labor. It should be noted that none of the foregoing costs includes any proportion of the Boston office or other administration expense which amounts to a total of $18,300 against which there is a credit of $3627 for interest and discount.

Concentration of Ontario Magnetites*

The province of Ontario is comparatively poor in deposits of merchantable iron ore but has many of low-grade material, the greater number of which consist of impure magnetites. This suggests magnetic concentration, but the concentrated ore must be produced at a sufficiently low cost to compete with natural ores that are marketed at $3 to $5 per ton. The low-grade material therefore must be mined cheaply and crushed and concentrated without excessive cost. Cheap mining is not possible unless operations are conducted on a large scale, which requires deposits of some magnitude. The concentrated product may be in a state of fine subdivision and therefore unfit for direct use in the blast furnace, necessitating either briquetting or nodulizing, an additional item of cost.

Advantages of Magnetic Concentrates

On the other hand there are important features connected with properly concentrated ores which give them a distinctly superior value to natural ores. The most important are the high iron content; the absolute standardization of the concentrated ore, eliminating the variable conditions present when using natural ores; and a greatly reduced loss from flue dust. Tests carried on at the Kingston School of Mines prove that under proper conditions it is possible to briquet and desulphurize these concentrates without any added binder.

Conclusions

The experiments demonstrated that first-class bessemer concentrates can be produced from the crude ores from the Temagami, Moose Mountain, Coe Hill and Radnor districts, and that all of these concentrates will form hard porous briquets, more or less peroxidized and free from sulphur, when submitted to a process similar to the Gröndal system of briquetting. The extent of crushing required varies from relatively coarse disintegration to fine pulverization, being governed entirely by the physical structure of the ores treated. Sulphur, when present in the form of iron pyrites can, in the majority of cases, be reduced to a very low figure in the concentrate. If present as pyrrhotite its removal is difficult, and the best that can be expected is to produce a concentrate of sulphur content little lower than the original percentage contained in the crude ore. If subsequent briquetting or nodulizing of the fines is required almost complete oxidation of the sulphur will result. No trouble was experienced in the removal of phosphorus below the bessemer limit.

Dry Concentration Not Satisfactory

Dry concentration of fine-grained compact ores yields indifferent results, the chief obstacle being the effective removal of mechanically entangled dust particles that render the production of high-grade concentrates difficult, if not impossible. Jaspilite ores will yield a fairly coarse-grained silicious concentrate, but require fine grinding and the application of wet concentration for a high-grade bessemer product. Fine-grained compact magnetites will not yield even a fair silicious concentrate unless pulverized to 60-mesh, and like jaspilite ores require additional grinding, with wet separation before yielding bessemer concentrates. Ores containing much magnetic pyrites, but with low phosphorus content, are amenable to either dry or wet methods of separation, but sulphur will not be reduced materially and the resulting concentrates must be desulphurized. Magnetites of a schistose structure containing no excessive amounts of sulphur and phosphorus are amenable to dry separation for the production of non-bessemer concentrates, but will yield a bessemer product with grinding to 40-mesh and subsequent application of a wet process. Coarsely crystalline ores containing no excessive percentages of sulphur and phosphorus will readily yield a high-grade bessemer concentrate with either dry or wet process and will not require excessive grinding.

*Abstract of a report by George C. Mackenzie for the Ontario Bureau of Mines.

Fatal Accidents in the Coal Mines of North America

Great Need of Statistical Work. Enlightened Public Opinion Required to Cut Down Death Rate. Bad Showing Compared with Europe

BY FREDERICK L. HOFFMAN*

In the coal-mining experience of North America during 1909 there occurred 2434 fatal accidents among an average number of 717,317 mine employees, or at the rate of 3.39 per 1000. During the previous year the corrected rate was 3.84 per 1000, so that there has been a gratifying diminution in the fatality rate, equivalent to 0.45 per 1000. Compared with the year 1907, the reduction in the rate was even more marked, but that year was rather exceptional, the rate having reached 4.15 per 1000, or the highest recorded rate in the history of North American coal mining. At the present time the tendency is, therefore, apparently toward a gradual reduction in the fatality rate, and it is evident that the disastrous experience of recent years has not been without effect. The statistics are complete for all of the principal coal-mining States, but for some of the less important coalfields it is still impossible to obtain accurate official comparable returns. This explains why Alaska, Arkansas, California, Georgia, North Dakota, Oregon, Texas, Virginia and Wyoming are not included in the tables which follow, since every effort to obtain an official statement of the facts has been unsuccessful. Semi-official returns for these coalfields indicate, however, that the actual loss of life in coal mining in these States and the Territory of Alaska was comparatively small.

The tabulation and analysis of returns has been delayed on account of the usual difficulty in obtaining the returns for a few of the States. There appears to be no excuse for withholding from the public information of so important a character as the number of fatal accidents in coal mining, but apparently there is not a sufficiently active public interest in the facts to demand their early publicity and official comments upon their occurrence. Until there is a more general public interest in the facts in the aggregate, as well as in the accidents in detail, there is little hope for a material reduction in the fatality rate, which, in its final analysis, must result from an enlightened public opinion demanding that those responsible for the safety of mining operations shall be held more strictly accountable than is at present the case. In marked contrast to the increasing demand upon large corporations for a greater publicity of the facts of their business operations, there has been no substantial progress in the direction of uniform statistics of accidents in mining with a due regard to the elementary facts, which require to be better understood if real progress is to be made in future years. The returns of one State are often not at all comparable with those of another, while as a rule the descriptive accounts are brief and more or less indefinite, making an accurate classification by causes and related circumstances difficult, if not impossible.

TABLE I. NUMBER OF PERSONS KILLED BY ACCIDENTS IN COAL MINES OF NORTH AMERICA, 1900–1909.

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1900–1909.
Alabama	37	41	50	57	84	185	96	154	108	129	941
Colorado	29	55	73	40	89	60	88	99	61	99	693
Illinois	94	99	99	156	157	199	155	165	183	213	1,520
Indiana	18	24	24	55	34	47	31	53	45	50	381
Iowa	29	27	55	21	31	24	37	35	38	28	325
Kansas	20	10	30	36	(a) 16	36	30	52	31	35	296
Kentucky	17	21	19	25	19	31	40	32	40	33	277
Maryland	7	12	11	16	12	16	13	5	12	19	123
Michigan	10	6	6	8	7	8	6	7	6	9	73
Missouri	10	15	10	17	11	11	16	8	10	21	129
Montana	6	7	12	5	9	8	13	14	21	12	107
New Mexico	15	9	17	17	15	5	9	31	34	18	170
Ohio	68	72	81	124	118	114	126	153	112	115	1,083
Oklahoma	40	44	60	33	30	44	39	32	44	40	406
Penn., anthracite	411	513	300	518	595	644	557	708	678	567	5,491
Penn., bituminous	265	301	456	402	536	479	477	806	572	506	4,800
Tennessee	10	44	226	26	28	29	33	31	34	31	492
Utah	209	9	8	7	9	7	7	8	8	16	288
Washington	33	27	34	25	31	13	21	37	25	39	285
West Virginia	141	134	120	159	140	194	269	356	625	364	2,502
British Columbia	17	102	139	42	37	12	15	31	18	57	470
Nova Scotia	21	14	19	31	19	20	28	35	39	33	259
Total	1507	1586	1849	1820	2027	2186	2106	2852	2744	2434	21,111

(a) Six months only.

TABLE II. FATAL ACCIDENTS IN COAL MINES OF NORTH AMERICA, 1900–1909.
RATE OF PERSONS KILLED PER 1000 EMPLOYED.

	1900.	1901.	1902	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1900–1909.
Alabama	2.59	2.90	2.79	2.94	4.77	10.75	5.23	7.61	5.75	6.40	5.28
Colorado	3.99	6.88	8.11	3.89	8.26	5.05	7.32	7.67	4.25	7.53	6.32
Illinois	2.39	2.24	2.15	3.13	2.87	3.36	2.49	2.47	2.58	2.93	2.69
Indiana	2.03	1.98	1.83	3.64	1.91	2.63	1.58	2.79	2.36	2.64	2.36
Iowa	2.22	2.05	4.23	1.59	1.90	1.36	2.20	2.05	2.20	1.56	2.09
Kansas	1.87	1.05	3.22	3.61	3.09	2.97	2.95	4.35	2.74	3.04	2.91
Kentucky	1.88	2.15	1.58	1.85	1.37	2.06	2.39	1.82	2.15	1.76	1.91
Maryland	1.32	2.23	1.89	2.82	2.11	2.57	2.10	0.85	2.00	3.34	2.13
Michigan	6.11	3.26	4.24	2.54	2.58	2.16	2.83	2.43	1.94	3.04	2.86
Missouri	1.31	1.63	1.09	1.85	1.09	1.06	1.65	1.70	1.06	2.31	1.46
Montana	2.53	3.24	6.19	2.32	3.59	3.67	5.43	5.12	6.68	3.11	4.20
New Mexico	7.44	4.81	10.11	7.26	7.61	2.35	3.82	10.13	9.26	5.57	6.99
Ohio	2.14	2.15	2.16	3.00	2.57	2.58	2.71	3.20	2.23	2.45	2.54
Oklahoma	7.59	8.35	9.62	5.42	3.63	5.76	4.81	4.15	3.02	2.76	4.85
Penn., anthracite	2.86	3.47	2.03	3.41	3.69	3.83	3.35	4.19	3.89	3.31	3.43
Penn., bituminous	2.44	2.56	3.36	2.65	3.44	2.90	2.76	4.40	3.15	2.72	3.08
Tennessee	1.15	5.23	25.80	2.69	2.81	2.76	3.07	2.79	3.06	2.77	4.91
Utah	138.96	5.06	3.24	3.21	4.06	3.57	3.69	3.07	2.99	5.36	12.93
Washington	7.79	5.59	7.83	5.13	6.69	2.61	4.08	6.05	4.68	6.81	5.68
West Virginia	5.03	4.14	3.41	4.03	3.08	3.88	5.20	6.33	10.35	5.85	5.43
British Columbia	4.22	25.67	34.65	9.85	8.31	2.72	3.12	5.12	2.95	8.88	9.69
Nova Scotia	3.17	1.83	2.36	2.79	1.63	1.86	2.31	2.89	3.02	2.73	2.46
Average	3.25	3.21	3.48	3.16	3.33	3.40	3.20	4.15	3.84	3.39	3.46

NECESSARY REQUIREMENTS OUTLINED

It would seem to require no argument that the following facts should be known beyond a doubt concerning every accident in mining, certainly as regards fatal accidents: The race, nativity, exact occupation, the place where the accident occurred (that is, above ground or underground), the period or length of mine experience, the age at death, the conjugal condition (that is, whether married, single, widowed or divorced), the number of dependent children or those under 15 years of age, the nature and amount of insurance carried (if any), whether life, accident, or both, and finally, the cause of the accident and all the surrounding and contributory circumstances, accompanied, if possible, by a plan illustrating the facts which require to be known. It should be stated whether an inquest was held and whether the responsibility was placed, and if so upon whom, and finally,

*Statistician, Prudential Insurance Company, Newark, N. J.

whether the guilty parties, if any, were brought to justice, and the nature and extent of the penalty imposed. In the case of non-fatal accidents the nature and degree of bodily injury should be precisely stated, and where more than one part of the body is injured the more serious injuries should be emphasized. In such cases it should be ascertained whether the injury caused incapacity for work, and if so, the resulting time of unemployment. The term "fatal accident" requires to be defined, for apparently in some States accidents ultimately terminated by death are reported as fatal, while in others only a short period is allowed during which the results are ascertained. It would seem advisable to arrive at a uniform agreement to report all accidents terminated by death previous to some stated day, say the fifth or seventh, and should death result subsequent to such a date the case should be reported as non-fatal. In one mining

TABLE III. FATAL ACCIDENTS IN COAL MINES OF NORTH AMERICA.
COMPARISON OF 1909 WITH THE FIVE PREVIOUS YEARS.

	Number of Persons Killed, Yearly Average		Rate per 1000 Employed.		Increase or Decrease of Rate.
	1904-1908.	1909.	1904-1908.	1909.	
Alabama	125	129	6.80	6.40	—0.40
Colorado	79	99	6.41	7.53	+1.12
Illinois	172	213	2.74	2.93	+0.19
Indiana	42	50	2.25	2.64	+0.39
Iowa	33	28	1.94	1.56	—0.38
Kansas	33	35	3.25	3.04	—0.21
Kentucky	32	33	1.98	1.76	—0.22
Maryland	18	19	1.93	3.34	+1.41
Michigan	7	9	2.35	3.04	+0.69
Missouri	11	21	1.26	2.31	+1.05
Montana	13	12	5.02	3.11	—1.91
New Mexico	19	18	7.13	5.57	—1.56
Ohio	125	115	2.65	2.45	—0.20
Oklahoma	38	40	4.08	2.76	—1.32
Pennsylvania, anthracite	636	567	3.79	3.31	—0.48
Pennsylvania, bituminous	574	506	3.34	2.72	—0.62
Tennessee	31	31	2.85	2.77	—0.08
Utah	8	16	3.43	5.36	+1.93
Washington	25	39	4.84	6.81	+1.97
West Virginia	317	364	6.00	5.85	—0.15
British Columbia	23	57	4.38	8.88	+4.50
Nova Scotia	28	33	2.37	2.73	+0.36
Average	2383	2434	3.60	3.39	—0.21

State, for illustration, deaths occurring even as late as eight months after the accident are reported as fatal, which, of course, tends to increase the fatality rate above the corresponding rate of States in which only a short period is allowed during which the result of the accident is ascertained.

BETTER CLASSIFICATION OF WORKERS NEEDED

There is urgent need of a uniform classification of the causes of mining accidents, and there is equally urgent need of a more definite nomenclature of the various occupations. There are in use in different mining fields local terms which have practically no meaning to those in other fields, but all of which can be reduced to some simple general term equally understood by all.

Aside from these considerations it would seem of importance that the mine inspectors in their reports should annually state the number of inspectors authorized by law, the number of mines subject to supervision, the number of inspections actually made, the number of violations of law reported, the number of prosecutions, and the number of convictions. At the present time no definite information of this kind is obtainable from many of the mine reports, and there is much diversity in the reports otherwise, which makes the results of mine inspections in one State difficult, if not impossible, of comparison with the results in another State. The new Mining Bureau no doubt will direct its efforts toward an improvement in the reporting, classification and uniformity of accident statistics, much as the division of vital statistics in the census and the interstate commerce commission have brought about uniformity in vital and railroad statistics, in marked contrast to earlier complexity, inaccuracy, confusion and incompleteness. In every field of corporate enterprise there is an increasing demand for publicity and for a better knowledge of the conditions and circumstances which govern corporate experience, and the same requirement will no doubt be insisted upon in the case of mining companies in years to come.

OVER 2400 FATAL ACCIDENTS IN 1909

Table I exhibits in detail, for States, Territories and Provinces, the number of persons killed by accidents in the coal mines of North America during the period ending with 1909. The table has been corrected for previous years and is, therefore, not strictly comparable with the table published in the JOURNAL for December 25, 1909. Such corrections are inevitable in the present state of mine inspection and the occasional disregard of official duty to give due consideration to the necessity of early publication of the facts which have so important a bearing upon the welfare of the mining population.

During 1909 there occurred 2434 fatal accidents, against 2744 during the previous year, and 2852 during 1907. In the aggregate there have been 21,111 fatal accidents during the decade, or an average of 2111 a year. The actual number of deaths during recent years has, therefore, been considerably above the average, and relatively so in proportion to the number employed. It requires to be taken into consideration that for some of the States the returns are for fiscal years, and it may be suggested that in any future revision or change of methods all of the States should agree to report the facts by calendar years. At the present time it would not seem advisable to make the required corrections, since many of the States do not report the number employed and the fatal accidents by calendar months.

Table II shows the fatal accident rate in coal mining in the United States and Canada, calculated upon the usual basis of the average number employed. There is, unfortunately, no agreement among mine inspectors as to the method by which the average should be calculated or determined, and there are grave doubts as to whether the methods in some States are not widely at variance with those in use in other States. It would seem best to calculate the average on the basis of monthly returns of the number employed according to the payrolls as of the first day of every month, or the first Monday of every month, divided by 12, which would yield a uniform average sufficiently accurate for the end in view. To require a further refinement of this method, by daily reports of the number of employees, or weekly reports, would impose an undue amount of clerical labor upon

TABLE IV. TWENTY-FIVE YEAR RECORD OF FATAL ACCIDENTS IN COAL MINES OF NORTH AMERICA. 1885–1909.

	Number of Employees.	Number Killed.	Rate per 1,000 Employed.
1885	214,184	576	2.69
1886	222,029	514	2.32
1887	230 834	514	2.23
1888	278,175	659	2.37
1889	278,361	681	2.45
1890	301,295	853	2.83
1891	326,684	959	2.94
1892	343,564	883	2.57
1893	384,249	970	2.52
1894	394,146	962	2.44
1895	404,553	1,061	2.62
1896	409,320	1,123	2.74
1897	409,830	956	2.33
1898	407,536	1,056	2.59
1899	421,489	1,250	2.97
1900	464,235	1,507	3.25
1901	494,287	1,586	3.21
1902	530,624	1,849	3.48
1903	576,365	1,820	3.16
1904	609,001	2,027	3.33
1905	643,225	2,186	3.40
1906	658,880	2,106	3.20
1907	686,460	2,852	4.15
1908	715,355	2,744	3.84
1909	717,317	2,434	3.39
1885–1889	1,223,583	2,944	2.41
1890–1894	1,749,938	4,627	2.64
1895–1899	2,052,728	5,446	2.65
1900–1904	2,674,512	8,789	3.29
1905–1909	3,421,237	12,322	3.60
1885–1909	11,121,998	34,128	3.07

the mining companies and would not yield satisfactory or accurate results in the end. While the rate per 1000 as determined by this method is open to criticism on account of the variable factor of employment or unemployment, as the case may be, it requires to be considered that any other basis would not be comparable with the fatality rates of men employed in other trades and industries, and unless the facts were carefully secured the results would be even less accurate than by the method employed here. The same conclusion applies to the relation of coal production to the number of fatal accidents, which has, no doubt, intrinsic merits of itself, but which is inapplicable to purposes of comparison with the fatality rates for men employed in other occupations. Subject to these limitations the table affords an interesting comparison of the fatality rates for each of the last ten years.

TABLE V. FATAL ACCIDENTS IN THE PRINCIPAL COAL-MINING COUNTRIES OF THE WORLD, 1899–1908.

NUMBER OF PERSONS KILLED.

	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1899-1908.
Australia	16	34	22	107	15	15	27	21	19	26	302
Austria	156	224	181	196	103	110	183	155	161	145	1,614
Belgium	121	140	157	144	159	129	123	132	148	155	1,408
France	208	230	198	180	170	184	182	1,280	202	186	3,320
India	98	64	70	77	97	67	60	100	89	178	900
New Zealand	3	4	3	2	4	4	6	6	12	5	49
Prussia	869	948	1,078	914	909	894	919	1,005	1,318	1,593	10,447
United Kingdom	916	1,012	1,101	1,024	1,072	1,055	1,159	1,142	1,245	1,308	11,034
Total	2,387	2,656	2,810	2,644	2,529	2,458	2,659	3,841	3,194	3,596	28,774

TABLE VI. FATAL ACCIDENTS IN THE PRINCIPAL COAL MINING COUNTRIES OF THE WORLD, 1899–1908.

RATE OF PERSONS KILLED PER 1000 EMPLOYED.

	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1899-1908.
Australia	1.26	2.44	1.48	6.64	0.94	0.92	1.64	1.22	0.98	1.29	1.85
Austria	1.37	1.84	1.39	1.60	0.85	0.92	1.53	1.28	1.27	1.10	1.31
Belgium	0.97	1.05	1.17	1.07	1.14	0.93	0.91	0.95	1.04	1.07	1.03
France	1.35	1.42	1.21	1.09	1.02	1.07	1.04	7.17	1.10	0.95	1.76
India	1.32	0.71	0.73	0.78	1.13	0.72	0.67	1.01	0.79	1.38	0.93
New Zealand	1.39	1.63	1.09	0.69	1.40	1.22	1.84	1.63	3.07	1.28	1.57
Prussia	2.28	2.26	2.36	2.01	1.92	1.82	1.85	1.94	2.32	2.62	2.15
United Kingdom	1 26	1.30	1.36	1.24	1.27	1.24	1.35	1.29	1.32	1.32	1.30
Average	1.50	1.54	1.00	1.45	1.37	1.31	1.40	1.96	1.52	1.62	1.53

TABLE VII. FATAL ACCIDENTS IN AMERICAN AND FOREIGN COAL MINES, 1899–1908.

	North America.			Foreign Countries.		
	Number of Employees.	Number Killed.	Rate per 1000 Employed.	Number of Employees.	Number Killed.	Rate per 1000 Employed.
1899	421,489	1,250	2.97	1,592,485	2,387	1.50
1900	464,235	1,507	3.25	1,723,362	2,656	1.54
1901	494,287	1,586	3.21	1,804,688	2,810	1.00
1902	530,624	1,849	3.48	1,820,914	2,644	1.45
1903	576,365	1,820	3.16	1,848,662	2,529	1.37
1904	609,001	2,027	3.33	1,882,206	2,458	1.31
1905	643,225	2,186	3.40	1,893,945	2,659	1.40
1906	658,880	2,106	3.20	1,958,516	3,841	1.96
1907	686,460	2,852	4.15	2,096,562	3,194	1.52
1908	715,355	2,744	3.84	2,222,312	3,596	1.62
1899–1903	2,487,000	8,012	3.22	8,790,111	13,026	1.48
1904–1908	3,312,921	11,915	3.60	10,053,541	15,748	1.57
1899–1908	5,799,921	19,927	3.44	18,843,652	28,774	1.53

FATALITY RATE 3.46 PER 1000 FOR LAST 10 YEARS

It appears that the rate during 1909 was 3.39 per 1000, against an average rate of 3.46 for the decade. The highest rate occurred in 1907, when it reached 4.15, and the lowest in 1903, when it was only 3.16. During 1909 the highest rate in any one State was for British Columbia, or 8.88 per 1000, while the lowest rate was for Iowa, or only 1.56 per 1000. During the decade the highest rate was for Utah, or 12.93 per 1000, while the lowest rate was for Missouri, or only 1.46. It may safely be asserted that under conservative methods of mining, and with a due regard to known safety devices, the fatality rate, even in comparatively dangerous coalfields, should not exceed 2 per 1000. On examination of the table it appears that while in a few of the States, Territories and Provinces the rate has occasionally fallen below 2 per 1000, it has, as a rule, exceeded 3 per 1000, and in some cases reached almost incredible proportions. Of course, such an excessive rate as that for Utah during 1900, caused by a single disaster, is not a fair measure of the degree of local hazard in mining operations, but it is evident that most of the Western States have high accident rates, and this appears to be particularly true of the Pacific Coast States, including British Columbia.

BETTER CONDITIONS IN 1909 THAN DURING PRECEDING FIVE YEARS

Table III exhibits the fatal accidents in coal mining in 1909, compared with the average for the preceding five years, both upon the basis of actual numbers and the rate per 1000 employed. The States showing an increase in the rate during 1909 over the preceding five years are, Colorado, Illinois, Indiana, Maryland, Michigan, Missouri, Utah, Washington, British Columbia and Nova Scotia. There was a decrease in the rate for 1909 from the average rate prevailing during the previous five years of 0.21 per 1000. The decrease was more marked in some of the States than in others, and was relatively largest in Montana, New Mexico and Oklahoma. During the five years ending with 1908 only four of the States experienced fatal rates of less than 2 per 1000, while eight experienced rates of 4 or over per 1000. The lowest average rate during the five-year period was experienced in Missouri, or only 1.26 per 1000, but the Missouri rate during 1909 was 2.31 per 1000.

FATALITY RATE HAS BEEN INCREASING DURING LAST QUARTER CENTURY

Table IV affords a means of convenient comparison of the fatal rate in coal mining during 1909, with those of previous years, showing the number of employees, the number of persons killed, and the rate per 1000 employed for each of the 25 years 1885 to 1908. The table has also been arranged in five equal periods of five years each, and it is shown that the fatal rate has increased from 2.41 during the first five years to 3.60 during the last. The decrease in the rates for 1908 and 1909 are not reflected in the average rate, which is the highest on record during the 25-year period. The average rate during the quarter of a century of mining experience has been 3.07 per 1000, which may be said to be 50 per cent. in excess of what the normal fatality rate should be, with a due consideration of the nature, circumstances, labor supply, etc., in the coal mines of North America.

LACK OF UNIFORMITY OF STATISTICAL METHODS MAKES INTERNATIONAL COMPARISONS OF DOUBTFUL VALUE

A comparison of the American fatality rate with the corresponding rates of certain foreign countries is subject to the criticism that the statistical methods are not always identical, and that what may be reported as a fatal accident in one country may not be reported as such in another. There are also serious doubts as to the methods by which the number

of employees are determined, and it is open to question whether in some countries the reported average is not really the total number of names on the payroll, but it may be assumed that this is not the case in the principal coal-mining countries of the world where statistics have been collected and published for many years.

Subject to these limitations the accompanying two tables are of considerable interest: Table V shows the number of fatal accidents in the principal coal-mining countries of the world during the decade ending with 1908, and Table VI the corresponding annual and average fatality rates.

For purposes of convenient comparison Table VII shows the fatal-accident rate in American and foreign coal mines, including the number of persons employed, the number killed and the rate per 1000 for each year of the decade ending with 1908, also by quinquennial periods and for the decade as a whole.

American Rate Apparently Twice That of Europe

According to this comparison the average fatality rate for the coal mines of North America for the decade ending with 1908 was 3.44 per 1000, against an average foreign fatality rate of 1.53. The American rate has increased from 3.22 per 1000 during the first five years, to 3.60 per 1000 during the second five years, or at the rate of 4.87 per cent.; while the foreign rate has increased from 1.48 per 1000 to 1.57 per 1000, or at the rate of 20.9 per cent. If, during the ten-year period ending with 1908, the foreign fatality rate of 1.53 per 1000 had prevailed in the coalfields of North America, the number of deaths would have been only 8874 against the 19,927 which actually occurred. The comparison emphasizes the much greater risk of coal mining in North America than in other countries of the world, and the question to be answered by mine managers, staff officials and engineers is whether the excess in the fatal-accident rate is due to inherent causes, or is subject to substantial reduction by improvements in mining methods, the quality of the laber supply, discipline, education, safety devices, etc.

Coal Mining in Georgia in 1909

The United States Geological Survey reports that the total production of coal in Georgia in 1909 was 211,196 short tons, having a spot value of $298,792, a decrease of 53,626 short tons, or 20 per cent., in quantity, and of $65,487, or 18 per cent., in value from the production of 1908.

Coal production in Georgia has shown a decreasing tendency since 1903. The production in 1909 was the smallest since 1897 and was only a little more than half the output in 1893, when the maximum production for any one year, 416,951 short tons, was made. The decrease in production in 1908 and 1909 was due to the withdrawal by the State of the convicts who were employed as miners under lease, and to the inability of the operators to obtain enough free labor to keep the mines up to their capacity.

A partial offset to the decreased production is noted in the larger relative returns to the operators shown by the advance in the average price per ton from $1.22 in 1904 to $1.28 in 1906, $1.38 in 1907 and 1908, and $1.41 in 1909, though this benefit is in turn partly offset by the fact that decreased production is necessarily attended with an increased cost per unit of output.

All the Coal Is Hand Mined

All the coal produced in Georgia is hand mined, no undercutting machines being employed. At one establishment the slack coal used in the manufacture of coke is washed before it is charged into the ovens. In 1909, 94,300 short tons of this coal was washed, yielding 85,290 tons of cleaned coal and 9010 tons of refuse.

During 1909 there were 2 fatal and 56 nonfatal accidents in the coal mines of Georgia. Both of the fatal accidents and 22 of the nonfatal accidents were due to falls of roof or coal. Three men were injured (none fatally) by explosions of powder, and 31 injuries were due to miscellaneous causes. There was no explosion of gas or dust in the mines.

Parts of two counties in the extreme northwest corner of Georgia are underlain by the coal measures of the southern Appalachian coalfields. The Walden basin of Tennessee crosses Dade county in Georgia and, extending southwestward, becomes the Blount mountain and Warrior basin in Alabama. The Lookout basin, a narrow outlying area, extends from Etowah county in Alabama in a northeasterly direction into Walker county, Georgia. The total area of the coalfields in Georgia is estimated at 167 square miles, the smallest of all the State coalfields, and not all of this contains workable coal.

All the coal mined in Georgia is high-grade bituminous and makes a good steam fuel. As bunker coal it has no superior in the South Atlantic States. It also makes excellent coke, and about 30 per cent. of the output is made into coke which is sold to the furnaces at Chattanooga and other points in Tennessee and Georgia.

According to the estimates of M. R. Campbell, of the United States Geological Survey, the total original coal supply of Georgia was 933,000,000 short tons, from which there had been mined to the close of 1909, 8,599,714 short tons, representing (including loss in mining) an exhaustion of about 12,750,000 short tons. This would leave still in the ground a total of about 920,250,000 short tons, of which about 600,000,000 tons may probably be minable.

Coal Mining in Oregon During 1909

The U. S. Geological Survey reports that the total production of coal in Oregon in 1909 was 87,276 short tons, having a spot value of $235,085, differing slightly from that of the preceding year, when the output amounted to 86,259 short tons, valued at $236,021. The difference was a little over 1000 tons in quantity and a little less than $1000 in value.

Only two mines, the Newport and the Beaver Hill, both in Coos county, ship coal in large quantities, the shipments being made almost entirely by sea to San Francisco. This trade in 1909 was slightly less than in the preceding year, the shipments showing a decrease of 1139 short tons. There was also a decrease of about 1000 tons in the colliery consumption, but a gain of more than 3000 tons in sales to local trade. All the coal shipped from the Beaver Hill mine is washed, but the refuse from the washery contains enough combustible material to permit its use as fuel at the mines. This fact accounts for the comparatively large quantity of coal reported as "used at mines for steam and heat."

All the coal mined in the State is lignitic in character, but because of the cheap water transportation to its principal market, San Francisco, it is able to compete to some extent in that city with the higher grades of coals from Washington, British Columbia, the Rocky Mountain States, and Australia.

In 1909, as in 1908, the coal mines of Oregon were free from labor disturbances. The only casualties in 1909 were 1 man killed (by gas explosion) and 10 men injured.

According to estimates prepared by M. R. Campbell, of the United States Geological Survey, the total coal-bearing formations of Oregon are limited to an area of 230 sq.mi., the original contents of which are placed by Mr. Campbell at 1,000,000,000 short tons.

Coal was first noticed in the Coos Bay region about 50 years ago, Prof. J. S. Newbury having reported in 1855 that the coal deposits of Coos Bay had begun to attract attention. Some mining was done there in 1855 and 1872, and in 1876 two mines—the Eastport and the Newport—were in active operation. The Newport, however, was the only one to survive. The Beaver Hill mine was opened in 1895. This was at first an uncertain factor, but is now one of the important producers.

The first record of coal production in Oregon is contained in the census report of 1880, when 43,205 short tons were mined. The production has exceeded 100,000 tons in four years only—1896, 1897, 1904 and 1905—the maximum being obtained in 1904, when it reached 111,540 tons. The total production to the close of 1909 has amounted to 1,963,927 short tons.

Coal Mining in California in 1909

The United States Geological Survey reports that the total production of coal in California in 1909 was 45,836 short tons, having a spot value of $95,042, an increase of 27,081 tons, or 144 per cent., in quantity and of $54,840, or 73 per cent., in value from 1908, a larger percentage of increase than was shown by any other State in the Union.

The increase in production was due entirely to the operations of the Stone Cañon Consolidated Coal Company, whose mine is in Monterey county. This company had expended large amounts of money during the two preceding years in development work and in preparing its plant for extensive operations. Unfortunately, because of faults encountered in the coal beds and the inability to procure efficient labor, the expenses incurred largely exceeded the estimated cost. Then, after the plant had been completed and 25 miles of railroad to the Southern Pacific tracks constructed, heavy floods and cloudbursts so damaged the property that the resources of the company were exhausted in making the repairs, so that in October, 1909, a receiver was appointed, and the works were shut down. In the nine months from January to September, however, this company had shipped more than 75 per cent. of the total output of the State for the year. In addition to meeting the other obstacles it encountered the company was compelled to put its coal into competition with a large supply of Australian coal that was forced on the market at the lowest prices ever offered in San Francisco.

The Stone Cañon product is a true bituminous coal and with favorable freight rates should compete successfully for domestic purposes with foreign coals in the markets of San Francisco and other cities of the State.

The remainder of the output in 1909 came from Amador and Riverside counties, principally from Ione, in Amador county. All of this was lignite.

Competition with Petroleum

Development of other bituminous coal properties in Monterey and San Benito counties has been held back by the enormous increase in the production of petroleum in California and its use by transportation and manufacturing industries, which has practically eliminated coal as a steam-raising fuel in the State.

The production of crude petroleum in California has increased from 33,098,598 barrels in 1906 to 39,748,375 barrels in 1907, to 44,861,742 barrels in 1908, and to 54,433,010 barrels in 1909. By far the larger part of this product is used as fuel and, estimating 3½ barrels of petroleum as equivalent in efficiency to a ton of coal, the total production of California petroleum in 1909 was equivalent to more than 15,500,000 tons of bituminous coal. California's petroleum production in 1909 was larger than the entire output of the United States in any year prior to 1896. Petroleum is a better steam-raising fuel than coal, requires no fireman, and produces no dust, cinders, or ashes, and it is not remarkable that coal mining in the State is at a disadvantage.

The records of the California State Mining Bureau show a production of coal in that State as early as 1861. It was at that time one of the 16 coal-producing States. During the later part of that decade and throughout the seventies the coal output of California exceeded 100,000 tons annually and in 1880 it reached a maximum of 237,000 tons. Since 1881 the production has been irregular, having been largely influenced by the imports of Australian and British Columbia coals. The receipts of Australian coal have depended principally on the wheat production and shipments from the Pacific coast. Vessels bringing Australian coal as return cargoes have given very low freight rates.

Statistics of Coal Production in Illinois

Teh total production of coal in Illinois for the fiscal year ending June 30, 1910, is but little less than the output of the preceding year, notwithstanding the suspension in mining which continued from April 1 to June 30. The report for the year, therefore, includes but nine months' operation and indicates that the mining equipment of the State is far in advance of normal market requirements. Another feature worthy of comment is that presented under the head of Mining Accidents, which, on account of the disaster at the Cherry mine, where 259 miners lost their lives, registers the greatest annual death loss yet shown. Deducting the number killed on account of the Cherry catastrophe, leaves for the balance of the State, 131 fatal accidents, a number considerably less than for any year since 1892.

A brief summary of the year's statistics follows: There were 881 producing mines in 1910, which compares with 886 in 1909; the total output of all mines, in tons of 2000 lb., was 48,717,853 tons, which compares with 49,163,710 tons in 1909. The average value of coal per ton, all grades, at shipping mines, was $1.016; the aggregate home value of the total product was $50,204,207. Concerning the operation of mines, it is shown that there were 216 motors in use underground; mining machines were used in 114 mines, which compares with 107 mines in 1909. The mining machines in actual use numbered 1291, and 18,176,254 tons of coal were produced by these machines. Approximately 40,000 men were engaged in coal mining, and of this number, 28,137 miners worked underground.

As to the cost of mining, the average price paid per gross ton for hand mining was $0.597; the average price per gross ton for machine mining was $0.462. During the year, 1,254,095 kegs of powder were used for blasting coal. In the various accidents of the year, 390 men were killed, of which number 259 perished in the Cherry disaster. In the year 1909, 213 men were killed. For each life lost, 124,917 tons of coal were mined; the number of deaths per 1000 employed was 5.2. For each million tons of coal produced, eight men were killed.

Coal Mine Explosion in Alberta

The cause of the explosion in the Bellevue mine of the Western Canada Collieries Company, on Crow's Nest Pass, has not been determined. Unverified reports indicate that about 50 men were killed in this disaster.

Immediately following the explosion, mine officials and government inspectors were rushed to the scene. A special train chartered by the company arrived at the mine about midnight on the day of the explosion; this train brought a large quantity of rescue apparatus from Fernie, Ashworth and Michel.

Mine Explosion in West Virginia

In a mine explosion which occurred at the Middleton mine of the Consolidation Coal Company on Dec. 19, three men were killed outright and a number seriously injured. The explosion occurred about 6:45 in the morning, just as the men were entering the mine to begin work for the day. It is thought the explosion may have been the result of gas accumulating in the workings from a nearby gas well.

The new Sabinas Coal Company, at Cloete, Coahuila, Mex., has broken ground preparatory to erecting 60 new coke ovens. This company also will erect about 100 new houses for the miners. The new coke ovens of the Carbonifera de Sabinas Company, at Rosita, Mexico, are nearing completion.

MINING AND METALLURGICAL PATENTS

A CLASSIFIED LIST OF NEW INVENTIONS

A copy of the specifications of any of these patents issued by the United States Patent Office will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. British patents are supplied at 40 cents. In ordering specifications, correspondents are requested to give the number, name of inventor and date of issue.

COAL AND COKE

COKE—Apparatus for the Distillation of Coal and the Recovery of the Products. Richard Sloane Richards, Wraysbury, and Robert William Pringle, Richmond, England. (U. S. No. 974,919; Nov. 8, 1910.)

COKE-DRAWING MACHINE. Howard Greer, Jr., Chicago, Ill. (U. S. No. 977,522; Dec. 6, 1910.)

COKE OVEN and Door Therefor. Frederic W. C. Schniewind, New York, N. Y. (U. S. Nos. 976,931 and 976,935; Nov. 29, 1910.)

COKE OVEN. Walter Winstanley Peck, Manchester, England. (U. S. No. 974,423; Nov. 1, 1910.)

COKE-OVEN DISCHARGING APPARATUS. Frederic W. C. Schniewind, New York, N. Y. (U. S. No. 976,934; Nov. 29, 1910.)

GAS DETECTION—Improvements in Means or Arrangements for Detecting and Indicating the Presence of Gas in Coal Mines and Other Places. W. Alderson and J. H. Holmes, Newcastle-on-Tyne, Eng. (Brit. No. 24,371 of 1909.)

MINING MACHINE. Alfred U. Davis, Lutherville, Md. (U. S. No. 974,645; Nov. 1, 1910.)

MINING-MACHINE BIT. Ralph E. Noble, Chicago, Ill., assignor to Morgan-Gardner Electric Company, Chicago, Ill. (U. S. No. 976,835; Nov. 22, 1910.)

PEAT GAS-PRODUCING PROCESS. Jean Delphice Oligny, Montreal, Quebec, Canada, assignor to Peat Gas and Coal Company, Montreal, Canada. (U. S. No. 977,469; Dec. 6, 1910.)

WASHING—Apparatus for Washing, Grading and Classifying Coal or Other Material. Frank D. Baker, Denver, Colo. (U. S. No. 976,425; Nov. 22, 1910.)

COPPER

CONVERTER. Ralph Baggaley, Pittsburg, Penn. (U. S. No. 977,922; Dec. 6, 1910.)

EXTRACTION—Process of Extracting Copper from Ore by Leaching in Place. William L. Austin, Riverside, Cal. (U. S. No. 975,106; Nov. 8, 1910.)

REFINING—Process of Refining Copper. Walter S. Rockey and Hilliary Eldridge, New York, N. Y. (U. S. No. 978,212; Dec. 13, 1910.)

SMELTING—Method of Smelting and Refining Copper Ores and Compounds. Ralph Baggaley, Pittsburg, Penn. (U. S. No. 977,996; Dec. 6, 1910.)

GOLD AND SILVER

AMALGAMATOR. Joseph H. McNeil, East Saugus, Mass. (U. S. No. 975,704; Nov. 15, 1910.)

CYANIDING—Treatment of Precious Metalliferous Ores. John Collins Clancy, New York, N. Y. (U. S. No. 976,043, 976,044, 976,045; Nov. 15, 1910.)

DREDGER BUCKET. Charles M. Hickey, Stockton, Cal. (U. S. No. 975,239; Nov. 8, 1910.)

EXTRACTION—Improved Process for Recovering Precious Metals from Ores. J. H. Reid, Newark, N. J. (Brit. No. 24,839 of 1909.)

HYDRAULIC GIANT. Seneca L. Berry, Sunnyvale, Cal. (U. S. No. 978,107; Dec. 6, 1910.)

HYDRAULIC MINING—Flush-Sluice Concentrator. Warren H. Merritt, Copper Center, Alaska, assignor to Valdez Creek Consolidated Mining Company. (U. S. No. 978,468; Dec. 13, 1910.)

PLACER SEPARATOR. Dudley J. Forbes, Portland, Ore., assignor to the Hydraulic Gravity Separator Company, Portland, Ore. (U. S. No. 975,684; Nov. 15, 1910.)

IRON AND STEEL

BLAST-FURNACE STOVE GAS BURNER. Arthur G. McKee, Cleveland, Ohio. (U. S. No. 975,556; Nov. 15, 1910.)

ORE TREATMENT—Process of Extracting Iron from Its Ores. Stephen G. Martin, Chicago, Ill., asignor of one-third to William O. Bartholomew, St. Louis, Mo., and one-third to Edward Schaaf, St. Marys, Mo. (U. S. No. 975,625; Nov. 15, 1910.)

REGENERATIVE FURNACE. Luther L. Knox, Avalon, Penn., assignor to Keystone Furnace Construction Company, Pittsburg, Penn. (U. S. No. 973,943; Oct. 25, 1910.)

LEAD, ZINC AND OTHER METALS

ANTIMONY—Process for Recovering Antimony from Ores and the Like. J. R. Masson, Melbourne, Victoria, Australia. (U. S. No. 975,148; Nov. 8, 1910.)

LEAD—Method of Freeing Litharge from Metallic Lead Mixed with It. Louis S. Hughes, Joplin, Mo., assignor to Picher Lead Company, Joplin, Mo. (U. S. No. 975,955; Nov. 15, 1910.)

MAGNESIUM—Improvements in the Purification of Magnesium and Magnesium Alloys. Chemische Fabrik Griesheim-Elektron, Frankfort-on-Main, Germany. (Brit. No. 23,439 of 1909.)

TIN—Process of Removing Tin from Tinplate Waste. Heinrich Brandenburg, Kempen-on-the-Rhine, Germany. (U. S. No. 974,463; Nov. 1, 1910.)

TUNGSTEN—Treatment of Tungsten Ores. Charles Morris Johnson, Avalon, Penn., assignor to Crucible Steel Company of America. (U. S. No. 977,096; Nov. 29, 1910.)

ZINC—Process of Producing Metallic Zinc. Oliver B. Dawson, El Paso, Tex. (U. S. No. 976,557; Nov. 22, 1910.)

ZINC—Treatment of Zinc Ores by the Precipitation Process. Adolphe Desgraz, Hanover, Germany, assignor to Imbert Process Company, New York, N. Y. (U. S. No. 975,217; Nov. 8, 1910.)

ZINC AND LEAD—Improvements in and Relating to the Separation of Zinc and Lead from Mixed Sulphides, Ores or Products. C. A. L. Wilhelm, Hamburg, Germany. (Brit. No. 26,410 of 1909.)

ZINC-LEAD ORES—Improvements Relating to the Treatment of Refractory Zinc-Lead Ores. P. C. C. Isherwood, Leytonstone, Eng. (Brit. No. 21,584 of 1909.)

ZINC PIGMENTS—Process for Producing Zinc Pigments from Liquors Obtained from Pyrites or Pyrites Cinder and the Like. John Herbert Thwaites, Peterborough, England. (U. S. No. 975,907; Nov. 15, 1910.)

MINING—GENERAL

AIR RESERVOIR for Mines. Patrick Quinn, Forbes Road, Penn. (U. S. No. 978,642; Dec. 13, 1910.)

BLASTING—Miner's Combined Fuse Clipper and Splitter. Samuel H. Lunsford, Linton, Ind. (U. S. No. 975,968; Nov. 15, 1910.)

DRILL—Rock Drill. Charles A. Hultquist, Bisbee, Ariz. (U. S. No. 978,586; Dec. 13, 1910.)

DRILL—Water-Power Mining Drill. Carl A. Hanson, Seattle, Wash. (U. S. No. 977,302; Nov. 29, 1910.)

DRILLS—Improvements in and Relating to Feeding and Reversing Gear for Electrically Operated Rock Drills. R. Pohde, Plotsensee, near Berlin, Germany. (Brit. No. 26,051 of 1909.)

DRILLS—Improvements in Valve Motions for Rock Drills and Other Direct-Acting Engines. Ingersoll-Rand Company, New York. (Brit. No. 14,947 of 1910.)

EXPLOSIVES—Dynamite Thawer. Sheridan S. Scholl, Roanoke, Va. (U. S. No. 978,659; Dec. 13, 1910.)

FLUME—Metallic Flume. George L. Hess, La Junta, Colo. (U. S. No. 973,656; Oct. 25, 1910.)

FLUME GATE. Matt H. Worley, Redlands, Cal. (U. S. No. 973,606; Oct. 25, 1910.)

MINER'S CANDLESTICK. Antonio Viera, Ray, Ariz. (U. S. No. 974,316; Nov. 1, 1910.)

ORE DRESSING—GENERAL

AGITATOR. Louis T. Sicka, Milwaukee, Wis., assignor to Allis-Chalmers Company, Milwaukee, Wis. (U. S. No. 978,667; Dec. 13, 1910.)

CLASSIFIER—Ore Classifier. Arthur D. J. Malchus, Silverton, Colo. (U. S. No. 975,971; Nov. 15, 1910.)

CONCENTRATION—Attachment for Wilfley Tables. Walter F. Smith, Philadelphia, Penn., assignor to Carolinas Monazite Company, Gloucester City, N. J., a Corporation of New Jersey. (U. S. No. 975,648; Nov. 15, 1910.)

CRUSHING—Improvements in or Relating to Crushing or Grinding Auriferous Quartz and Other Hard Ores or Substances. G. Johnston, Glasgow, Scotland. (Brit. No. 17,087 of 1909.)

CRUSHING MILL. Thomas Joseph Sturtevant, Wellesley, Mass., assignor to Sturtevant Mill Company. (U. S. No. 977,235; Nov. 29, 1910.)

GRIZZLY—Shaking Grizzly. Charles H. Gunn, Marysville, Cal. (U. S. No. 975,413; Nov. 15, 1910.)

JIG—Ore Jig. George H. Williams, Chicago, Ill. (U. S. No. 976,419; Nov. 22, 1910.)

JIGS—Improvements in and Connected with Hydraulic Jigs. D. Jeffrey, Lanark, Scotland. (Brit. No. 24,257 of 1909.)

SEPARATION — Centrifugal Separating Washing Apparatus. Lamartine C. Trent, East Auburn, Cal. (U. S. No. 978,238; Dec. 13, 1910.)

SEPARATION—Process of Electrostatic Magnetic Separation. Henry M. Sutton, Walter L. Steele, and Edwin G. Steele, Dallas, Tex. (U. S. No. 977,570; Dec. 6, 1910.)

SETTLING TANK—Tank for Settling, Filtering and Collecting Solids from Liquids. John Edward Rothwell, Denver, Colo., assignor to Colorado Iron Works Company, Denver, Colo. (U. S. No. 976,923; Nov. 29, 1910.)

SLIME CONCENTRATOR. Sam H. Boylan, Colorado Springs, Colo. (U. S. No. 976,430; Nov. 22, 1910.)

WASHER—Ore and Coal Washer. Henry W. Falker, Ashland, and Franklin Schultz and John F. Wagner, Tamaqua, Penn. (U. S. No. 977,087; Nov. 29, 1910.)

METALLURGY—GENERAL

AIR—Method of Heating Air by Waste Gases. George Westinghouse, Pittsburg, and Alexander M. Gow, Edgewood Park, Penn., assignors to said Westinghouse. (U. S. No. 976,966; Nov. 29, 1910.)

BALANCE—Miner's and Assayer's Scale. Harrison S. Coe, Palo Alto, Cal. (U. S. No. 977,513; Dec. 6, 1910.)

DESULPHURIZING—Treating Sulphides or Sulphates. Utley Wedge, Ardmore, Penn., assignor to the Furnace Patent Company, Philadelphia, Penn., a Corporation of Pennsylvania. (U. S. No. 976,525; Nov. 22, 1910.)

ELECTRIC FURNACE. Franz von Kügelgen, Holcombs Rock, Va., and George O. Seward, East Orange, N. J., assignors to Virginia Laboratory Company, New York, N. Y. (U. S. No. 978,171; Dec. 13, 1910.)

ELECTRIC SMELTING — Apparatus for Electric Smelting. Frank Creelman, New York, N. Y., assignor to the Willson Carbide Works Company of St. Catharines, Ltd., St. Catherines, Canada. (U. S. No. 978,137; Dec. 13, 1910.)

ELECTROLYTIC EXTRACTION—Art of Extracting Meals Electrolytically. James Hart Robertson, New York, N. Y. (U. S. No. 978,211; Dec. 13, 1910.)

FURNACE. James B. Ladd and David Baker, Philadelphia, Penn., assignors to Ladd & Baker, Inc. (U. S. No. 968,485; Aug. 23, 1910.)

ROASTING — Annular Ore-Roasting Kiln. John Zellweger, St. Louis, Mo. (U. S. No. 976,769; Nov. 22, 1910.)

SMELTING—Improvements in and Relating to Means for Heating Smelting Furnaces and the Like. Adolf Wirtz, Mulheim-Ruhr, Germany. (Brit. No. 21,652 of 1909.)

PERSONAL

Mining and metalurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

S. F. Shaw is returning to New York from a professional visit to Costa Rica.

Leslie A. Kozminski sailed from Vancouver, B. C., Dec. 30, for Melbourne, Australia.

Oscar V. White, manager of the Slocan Star mine, Slocan, B. C., has been visiting Spokane, Washington.

A. J. Becker, superintendent of the Lucky Jim mine, Slocan, B. C., was in Winnipeg, Manitoba, lately.

L. D. Godshall has resigned as manager of the Needles Mining and Smelting Company, at Needles, California.

F. S. Witherbee, of Witherbee, Sherman & Co., New York, has returned from a stay of several months in Europe.

E. W. Oglebay, of Oglebay, Norton & Co., Cleveland, Ohio, will start early in the new year on an extended foreign trip.

Dr. H. S. Washington, of Washington & Lewis, New York, sailed for Brazil, Dec. 20. He expects to be absent about four months.

E. V. Buckley, manager of the Queen gold mine at Sheep Creek, Nelson mining division, B. C., has gone to Wisconsin on a vacation.

S. S. Fowler, of Nelson, B. C., has been examining mining properties on Princess Royal island, in the Coast district of British Columbia.

E. H. Strehlke, superintendent of the Ely-Calumet Mining Company, was seriously injured Nov. 30, being struck by a rock falling down the shaft.

David Cole, for some time past with the Greene-Cananea, on Jan. 1 becomes manager of the Ray Consolidated Copper Company's property in Arizona.

Victor G. Hills has returned to Denver, Colo., after making an examination of the new Scheelite mine, at Moose River, Halifax county, Nova Scotia.

Theodore Dwight, of New York, has entered the Catlin-Powell Company, having acquired the interest of Mr. Powell, who retires on account of ill health.

W. A. Paine, president of the Copper Range Consolidated and the Lake Company, has returned to Boston after a brief visit at the mines in the Lake Superior district.

Emil Melzer has returned to Baker City, Oregon, from a professional visit to the new cyanide plant of the Alaska Treadwell company, at Douglas island, Alaska.

John Hampson, formerly superintendent of the Brown Alaska Company's Mamie mine on Prince of Wales island, Alaska, recently left Nelson, B. C., for England.

James MacNaughton, general manager of the Calumet & Hecla and subsidiary companies, accompanied J. Parke Channing, who was at the various mines for two weeks, to Boston.

Charles F. DeBardeleben has been chosen vice-president and general manager of the Alabama Fuel and Iron Company, succeeding his father, the late Col. Henry F. DeBardeleben.

C. C. Burger has returned to New York, after having examined the mines of the Utah Consolidated Company at Bingham, Utah, and the United Verde Extension at Jerome, Arizona.

H. P. Porter, recently of the firm of Schafli & Porter, engineers, Houston, Texas, has been appointed chief engineer of power of the Cerro de Pasco Mining Company, with office at La Fundicion, Peru.

Reginald E. Hore, graduate of the Michigan College of Mines, and formerly of Toronto, was recently appointed assistant State geologist of Michigan. He is now in charge of the Houghton office of the Survey.

William H. Yeandle, who had charge of the Barron mine of the Pachuca & Real del Monte company, has been appointed assistant superintendent of the mines in the Pachuca district belonging to that company. His headquarters will be at the San Juan mine, at Pachuca, Mexico.

N. V. Hansell has been in Norway, Sweden and Germany for some weeks in the interest of the American Gröndal Kjellin Company, Ltd., New York. With him was Charles E. Herrmann, representing the Gates and other interests operating the Moose Mountain iron mine in Ontario.

F. W. Jorgensen, of New York, and E. W. A. Jorgensen, secretary of the Batopilas Mining Company, left New York last week for a trip of inspection at the property at Batopilas, Mexico. Gilmore Goodland and C. H. C. Moller, acting chairman of the new company recently incorporated in London, to lease and operate part of the property, will also inspect the mines.

John Hays Hammond, on Dec. 22, in St. Petersburg, was received by the Czar Nicolas, and gave the Emperor an outline of the plans which he and his associates have for the investment of American capital in Russia. The Czar and the ministry are said to be favorably impressed with the proposed enterprise. Mr. Hammond left St. Petersburg Dec. 25, on his way to New York.

OBITUARY

Ambrose Lanfear Norrie died in New York, Dec. 21. He had just returned from a trip to Europe. He was a son of the late Gordon Norrie, after whom the great Norrie mine, on the Gogebic iron range in Michigan, was named. Mr. Norrie was educated as a mining engineer, but retired from practice some years ago. He owned large interests in the Norrie and other iron mines in Michigan, and in coal mines in Pennsylvania. He was a director of the Rochester & Pittsburg Coal and Iron Company, and a member of a number of clubs. He left a wife and two children.

SOCIETIES and TECHNICAL SCHOOLS

Mining and Metallurgical Society of America—This society has recently been incorporated under the laws of the State of New York.

Utah Society of Engineers—A dinner was given at the Commercial Club, Salt Lake City, Dec. 20. Following the dinner, R. B. Ketchum, of the University of Utah, gave a talk illustrated by especially prepared drawings on "The Design of Reinforced Concrete Beams." The discussion was led by R. Kletting. About 60 members were present. The entertainment committee announced several trips under consideration, among which were a visit to the saline beds west of Great Salt Lake, a trip to Bingham, and one to Tintic.

Canadian Clay Products Manufacturers Association—The annual convention was held at Toronto, Ont., Dec. 14-16. President W. McCredie of Lyons, Ont., in the chair. In his opening address the president urged the establishment of a chair of Ceramics in connection with Toronto University, that young men might receive a scientific training in clay-working. A committee was appointed to urge on the Dominion Government the need of a technical school for clay workers. A considerable part of the time of the convention was devoted to discussion on the standardization of brick. Robert Davies, Toronto, was elected president; D. A. Lochrie, vice-president; D. O. McKinnon, secretary-treasurer.

University of Washington—The new stamp-milling and concentrating plant of the School of Mines, at Seattle, is now in readiness for the short course for practical mining men which begins on Jan. 4 and lasts three months. The mines building has been newly equipped with assay furnaces, additional balances, power-driven sampling equipment, drafting tables and all laboratory conveniences. No examinations are required for entrance to the short course and the studies are so arranged that any person interested in mining may follow them, regardless of his previous training. There are no charges, except for books and materials actually used. Instruction is given by seven different departments under the following subjects: The mineral industry, mining, fire assaying, metallurgy, chemistry, mineralogy, geology, mining law, surveying, forge; with field trips to mines, mills and smelters.

EDITORIAL CORRESPONDENCE

Reports From Our Own Representatives on Important Events From Many Important Mining Centers of the World

San Francisco

Dec. 22—A transaction of great importance to Meadow Lake district, Nevada county, has just taken place in the bonding of the Oro Grande group to people who intend to develop and to build a reduction plant. The Oro Grande was originally located in the 60's during the Meadow Lake or Summit City excitement, and has been owned for many years by John P. Clark, of North Bloomfield, and F. J. Cook, of Sierra City, but they have been unable to do any more than the annual assessment work. They have now bonded it to a syndicate of capitalists of Tonopah and Goldfield, represented by Ramsey & Clute, of Reno. The price to be paid is understood to be $300,000. There are several veins in the group, of which the principal is the Oro Grande, the vein in which is in some places 100 ft. wide. The deepest shaft is only 150 ft. Meadow Lake district has been one of the conundrums of mining in California. Though known many years and at one time having a large population, it has been virtually deserted for years, no one having been able to treat the ores. A few men have stuck to the district, among them Clark and Cook.

It seems that when the oil men adopted a tentative bill to present to Congress and sent on a delegation to submit their views to the Congressional committees, they thought only of remedial measures for themselves and left out the gold miners as well as the natural-gas men. The omission of the word "gas" in the draft of the bill sent to Washington has aroused the ire of the natural-gas men, who contend that gas is as legitimate a discovery as oil and that the two have always been linked together by the Land Office. The natural-gas men are now preparing to send on delegates in their own interest and to present their views. The original committee left out "gas" for fear it would weaken their petition. They also left out "gold," but the gravel miners of the State, especialy those in drift mining, do not seem to have got together to show that the present rulings affect them as badly as they do the oil interests. The Yard decision, which is the basis of the present trouble, was made on placer-gold mines and it was only when it was applied to oil that any very great interest was aroused in it, or opposition manifested. Yet as far as discovery on 20-acre tracts and transfers of title before discovery are concerned, the drift miners are as badly off as are the oil men. But no move whatever has yet been made by the gold miners to have their side of the case presented in Congress.

The recent find of a rich silver-lead vein not far from Darwin, Inyo county, has resulted in a general prospecting of the whole section. Most of the ground is open. Men familiar with the region say that the new finds are much more promising than were those at Modoc, or Cerro Gordo in times past.

The field consumption of oil in the different districts is large. In the Kern River field in October, with 1593 wells pumping and 44 drilling, the consumption of oil was 180,000 bbl. In McKittrick district the consumption was 20,000 bbl.; in Midway, 39,000 bbl.; in Sunset district, 30,000 bbl.; and at Coalinga, 13,000 bbl.

Denver

Dec. 22—The general discussion of the Colorado mining conditions has stimulated a study of the situation by those largely interested which will surely benefit the industry in the end. Already new interests are investigating the opportunities in the State and there is a prospect of much legitimate activity in the spring.

The management of the Malm reduction plant of the Western Metals Company expects to have the plant at Georgetown running in about two months. The testing plant is already running and is experimenting on the treatment of Leadville zinc-carbonate ores, which it is believed it can treat at such a low cost as to allow a profit on low-grade ores.

The New York divers who successfully started the drowned pumps at Aspen, as stated in a recent issue of the JOURNAL, were sent for to do the same for the Helena mine in Iowa gulch at Leadville, but the divers found it impossible to descend below the air pump on account of the pressure against them by the air exhaust from the pump. The air pump is 90 ft. below the water level, which at present is 400 ft. in the shaft. The station pump is at the 500 level.

Salt Lake City

Dec. 26—The United States Smelting, Refining and Mining Company has recently made arrangements to treat custom milling ores containing zinc at its Midvale plant. There has been a rearrangement of the machinery in the Huff electrostatic part of the equipment, whereby the efficiency has been increased between 40 and 50 per cent. This has brought the capacity beyond the company's own requirements, and part of the plant will be placed at the disposal of customers, who have ores containing lead, zinc and iron. This will make an immediate market for some Bingham, Park City, Stockton and other ores, for which there has been little or no demand.

Arrangements were made between the Silver King Coalition Mines Company and the Uintah Treasure Hill, Dec. 19, by which the Treasure Hill group of about 27 claims will be acquired by the former company. The purchase price is reported to have been $100,000, or 10c. a share for the Treasure Hill stock. The property consists of 200 acres, and about 70 acres, owned jointly with the Silver King. The Treasure Hill company filed a suit some time ago, calling for a partition of the ground held jointly, and a sale by order of the court would have taken place Dec. 19, if the above adjustment had not been arranged. Directors of the Uintah Treasure Hill have ratified the sale, and a meeting of the stockholders will be called shortly to approve their action. The Silver King has agreed to its part of the transaction. The properties of the companies adjoin, and connections will at once be made between the Silver King and Treasure Hill workings. The court has continued the sale's day for three weeks, which will give the companies time to make the actual transfer and dismiss the action.

Phoenix, Arizona

Dec. 23—The Arizona constitutional convention has adopted an amendment to the corporation commission article, which is expected to have the effect of putting all "wild-cat" mining companies operating in Arizona out of business. It provides that all corporations offering stock for sale to the public shall be subject to inspection by the commission. The measure is considered the most drastic of that character enacted in any State.

Butte

Dec. 24—Representatives of the Anaconda Copper Mining Company and the Northern Pacific Railway Company have recently been in Libby, the county seat of Lincoln county, checking up the lands of their respective companies. It is understood that where there have been mineral locations made on land belonging to the lumber department of the mining company, the company will release the

land to the claimants, and the Northern Pacific will in turn give the mining company enough of its lands to make up for the loss. There are 7000 acres of land in the vicinity of Libby which will be affected by this change. It is understood that the deal between the mining company and the railway company conveys all the railway company's congressional grant land in Montana to the mining company.

Birmingham, Ala.

Dec. 26—Joseph H. Hoadley, of New York, president of the Alabama Consolidated Coal and Iron Company, has been in the Birmingham district inspecting the properties of the company and investigating recommendations made by H. S. Matthews, vice-president and general manager, looking to improvements and developments. It is understood that the Alabama Consolidated intends to do much development when conditions in the iron and steel market improve.

Announcement is made that shortly after Jan. 1 steps will be taken looking to the construction of a pipe line to the Alabama natural gasfields in Fayette county, in the western part of the State. The pipe line will cost over $800,000 and will provide fuel for some of the larger industries in the Birmingham district.

Indianapolis

Dec. 27—The legislative committees of the United Mine Workers and of the Mine Operators are holding joint meetings to discuss recommendations to the legislature. There never was a better feeling or a more harmonious effort to bring about needed legislation. The Indiana legislature convenes Jan. 14, and there is much speculation regarding mine legislation. The mine workers will urge the passage of a compensation and labor pension act providing for a tax of 1 per cent. on the coal output, to be collected and apportioned by the State in the event of loss of life or limb by mine accidents, also of a law that will make the operators pay the shotfirers and a law requiring miners to pass examination and prove their qualification to enter and work in a mine.

There is doubt as to whether Thomas L. Lewis has been reëlected president of the Mine Workers of America or whether John P. White, of Iowa, will be returned the victor. The most reliable information would indicate Mr. Lewis' election by a safe plurality. It is certain that Mr. Lewis has made large gains in Indiana over his vote a year ago.

Cobalt

Dec. 27—Canadian Refining and Smelting Company is building a smeltery to treat Cobalt ores at Orillia, Ont., which place in conveniently situated with regard to the silver district, being about the same distance from the town of Cobalt as Copper Cliff. The smelting charges will be about the same as at the other Canadian smelteries, but this new company has agreed that all the ore shall be sampled at its expense, at Campbell & Deyell's works in Cobalt. The initial capacity of this plant will be 20 tons per day, and only high-grade ore will be treated. At the present time Canadian smelteries are treating about 75 per cent. of the output of high-grade ores, the remainder going to the United States, England and Germany.

Toronto

Dec. 26—In order to encourage the copper industry the Canadian government has passed an Order-in-Council, declaring that no royalty shall be imposed on the products of copper-mining locations for 10 years from Jan. 1, 1910, and that no reservation be made in the patents issued for such locations of a royalty on the sale of the products thereof during that period.

The first Porcupine stock to be placed on the market was the Hollinger, and it is stated that the issue was largely oversubscribed. It is probable that in the near future a great number of stocks, many of them worthless, will be floated, as many thousands of claims have been staked and are being sold for a few hundred dollars. The Minister of Mines for Ontario, his signified his intention of putting a stop to "wildcatting," but this, no doubt, will be an impossibility, although some of the more obnoxious forms can be suppressed. There are now over 200 teams hauling freight into Porcupine, and there is a boom in real estate.

A force of 250 men is engaged in pushing construction work on the Porcupine branch of the Temiskaming and Northern Ontario railway. The number will be doubled.

Mexico City

Dec. 22—Recently interest has been taken in nitrate deposits reported in Presidio county, Tex., and in the eastern part of the State of Chihuauha. These deposits are described in an article by Dr. William B. Phillips, now State geologist of Texas, as follows:

"During the last few years, reports of the discovery of a deposit of nitrate of soda in Presidio county, Texas, have found their way into the local papers. The locality is about 45 miles south of Valentine, a station on the Galveston, Harrisburg & San Antonio railway, about 150 miles southeast of El Paso, and about two miles from the Rio Grande. The samples that have been analyzed by D. W. Reckhart, of El Paso, and were secured by T. R. Owen, of Candelaria, Tex., and L. H. Davis, of El Paso, showed a considerable variation in the contents of nitrate. The analyses were as follows: 26.5, 7.1, 36.6, and 71 per cent. of sodium nitrate. These analyses do not seem to represent any known thickness of the deposit. Assuming that the above analyses represent the same thickness of material, the average contents in nitrate of soda is 25.37 per cent. This assumption may or may not tally with the actual facts and we await further information.

"The deposit of nitrate appears to underlie a sheet of lava of undetermined nature and thickness, but whether it may be derived from this lava or be the product of agencies of another sort is as yet unknown. Such prospecting as has been carried on there is quite insufficient to determine the extent or quality of the deposit. Along the Rio Grande, both on the Mexican and on the Texas side, other finds of nitrate of soda have been made. Several years ago I received a 50-lb. sack of earth from the Mexican side, opposite the town of Presidio del Norte, and within easy reach of the Kansas City, Mexico & Orient railway, now under construction from Chihuahua to the Rio Grande. It was found to contain 10 per cent. of nitrate of soda. But the most promising of all the discoveries is that on the Texas side of the Rio Grande and near the little settlement of Candelaria. Near the mouth of Tornillo creek, Brewster county, another deposit of nitrate of soda is reported, and south of the Chisos mountains, remote from rail. It is an interesting circumstance that localized deposits of nitrate of soda should be reported from regions where mineralized hot waters make their way to the surface. On the Mexican side of the river, about three miles from the river, are a number of hot springs, and another occurs near the mouth of Tornillo creek above mentioned.

"The Candelaria nitrate deposits occur in a region which has an annual rainfall of about 15 in., quite enough to affect in a quite serious manner the commercial aspects of the case.

"In this connection, mention may be made of the discovery of nitrate of potash in a cave in El Paso county north of the Texas & Pacific railway. This salt occurs there in crystaline veinlets, derived, it is thought, from the excrements of bats, rats. etc., as the cave afforded indisputable evidence of having been used by these creatures for many years."

A deposit of nitrate is also reported from the State of Colima, near the line of the Pacific branch of the National Railways. This deposit is of a similar nature to that on the northern boundary being evidently a lava-buried lake bed. For many years the Indians have used this deposit in a small way for the purpose of the manufacture of fireworks for religious and other purposes. No attempt has been made to develop the deposit, which is said to run about 11 to 17 per cent. sodium nitrate.

THE MINING NEWS

Reports of New Enterprises, New Machinery, Installations, Development Work and Property Transfers The Current History of Mining

Alaska

A strike of importance has been made on Squirrel river, a tributary of the Kobuk river in the Nome country. From $100 to $300 per day per shovel have been mined, and many prospectors will go to the scene.

Dull-Stevens—This property, in the Auk Bay district, will be operated next spring. M. F. Howe, Juneau, represents the company.

Mt. Andrew—A 2000-ton shipment of iron and copper ore was the latest shipment from this property, on Prince of Wales island. W. C. Freeburn, Ketchikan, has charge of the property.

Sheppard & McKenzie—This company has started development on the property on Dall bay.

Arizona

Gila County

National Mining Exploration—Reorganization plan is issued: Iron Cap Copper Company is to be formed under Maine laws with $1,500,000 common stock and $500,000 7 per cent. noncumulative preferred stock, all of $1 par. Preferred is retirable at 110 and convertible into common. National Mining Exploration stock will be assessed 20c. per share, payable before Jan. 19, 1911. Old stock will be exchanged share for share of new common; and receive preferred stock for assessment. New common will be held in voting trust for five years. The National Mining Exploration has $1,500,000 stock authorized, par $1, of which $1,167,563 is issued. Bonded debt is $250,000 all deposited to secure loan of $100,000. Floating debt is $60,000, making actual indebtedness $160,000.

Ray Central—The directors have announced that Weed & Probert are making an examination and that a report will be submitted to the stockholders at the annual meeting, Jan. 18. The company has 1965 stockholders.

Mohave County

S. A. Giles, of Colorado Springs, Colo., has taken an option on the J. F. T. group and the Silver King group of mines in the I. X. L. basin, at Kingman. These mining properties are owned by Smith & Sawyer, Gaddis & Perry Company, W. A. Studley and E. D. Swope. He also took an option on the Oneida mines, owned by Gaddis & Perry Company, at Lorena flat.

Yavapai County

Arizona Rainbow Mining Company—This company has purchased the Picnic mines near Mayer and will develop.

Yuma County

Savahai—The G. A. Marsh Company, of Parker and Los Angeles, has purchased these mines from L. M. and W. R. Bailey, including nine claims eight miles north of Videl, on the Parker division of the Santa Fe railroad. Development will be started at once, and a road to Videl built.

California

The November production of oil in California fell off materially from the preceding month and was less than any month since March. The entire production aside from field consumption was 5,753,625 bbl., an average of 191,787 bbl. per day. It is thought that unless more gushers come in, a still further reduction of output will occur. In May the State yield was 7,172,313 bbl., the largest monthly output on record. At present over 30,000,000 bbl. are in storage.

Butte County

Amosky—This new company, organized at Oroville, will work the Banner mine. Roger Kitrick is president and Charles L. Bills, secretary.

Calaveras County

Economic—This mine, at Esmeralda, of the Standard Amalgamated Exploration Company, of Boston, will have its milling capacity increased to 200 tons of ore daily. A cyanide plant is to be put in and another compressor. Oliver Reece is in charge.

Anglo-American Mining Company—This company has been organized to work a gravel channel near Railroad flat.

Eldorado County

Lady Edner—L. S. Woodbury, of Great Falls, Mont., has bonded this mine at Grizzly flat. The different gravel channels will be located by drills.

Rising Sun—James, Richards & Philbrook have taken a bond on this mine, near Kelsey. The machinery for a 10-stamp mill is on the ground.

Pacific—Another strike of excellent ore has been made in this mine, at Placerville. A mill will shortly be built.

Fresno County

Davis Flat—This company has started its 5-stamp mill.

Humboldt County

Dobbins Bar—This placer mine and also the Iese Bar placer claim, on Rock creek, 20 miles from Orleans, on the Klamath river, are being opened by Herkebrath and Kneer.

Southern Belle—Hill & Vandercook promise an early resumption of work, a syndicate having taken a long lease and bond on the group.

Villareal—The discovery of rich ore in this mine has stimulated prospecting between Darwin and Cerro Gordo. While the deepest shaft is only 15 ft., silver-lead ore is being shipped. The claims are three miles off the main road to Darwin.

Mono County

Masonic Mountain—Work on this property, as Masonic, will shortly begin.

Pittsburg Liberty—At this mine, Masonic district, three shifts of men are driving on a 6-ft. vein of $20 rock.

Nevada County

Coan—At this Nevada City mine, Daniel McGonigal, superintendent, the hoist has been installed and the building has been completed for the 10 stamps.

Pittsburg—At this Nevada City mine, 10 stamps are being added to the mill.

San Bernardino County

A rich silver strike is reported on Old Woman mountain, in the Eastern section of the county. Some of the ore carries 300 oz. of silver and 12 per cent. copper.

Paradise—At this mine, near Barstow, Manager H. Galeron has completed a 10-stamp mill.

Shasta County

The dredge of the Consolidated Dredging Company, sunk last October in the Sacramento river, near the mouth of Middle creek, has been sold to laborers who had claims against the company and they intend to raise and repair it.

Black Tom—This company, at French gulch, is running a 10-stamp mill and has 50 men on development.

American—At this mine, French gulch, near the Gladstone, a hoisting plant is being installed.

Gladstone—This mine, at French gulch, owned by the Hazel Mining Company, J. O. Jillson, manager, has its shaft 1700 ft. deep. The mine is a dividend payer.

Afterthought—The company continues to prosecute work at the mines at Ingot. Eighteen men are on the payroll and the retimbering of the workings and development of ore are progressing along normal lines. The Ingot smelter has been idle for three years, and it was recently stated by the management that no effort would be made to operate it until a branch railroad had been built from Ingot to connect with the main line of the Southern Pacific.

SIERRA COUNTY

William Shippsy has interested New York capital to develop his quartz claims.

Loganville—Ore containing free gold has been encountered in the Westall mine.

Four Hills—All the property of this company in Sierra and Plumas counties has been deeded to W. F. A. Hood. It consists of nine quartz and placer claims, 320 acres of patented timber lands, two mill sites, water rights and reduction works.

Red Star—Several tons of ore richer than anything hitherto discovered in this rich camp has just been uncovered in the mine near Alleghany. One piece of less than 50 lb. yielded over $2000.

Fruitvale—A compressor and power drill plant has been put in this mine. Andrew Fitzgerald, superintendent.

TULARE COUNTY

A shipment of 150 pounds of first-class chrysophrase, valued at $60,000, has been made to New York from the mines of the Himalaya Mining Company, near White river. J. W. Merrils is the superintendent.

TUOLUMNE COUNTY

Snell—This mine, near Knight Creek, has been bonded to San Francisco men by J. B. Curtin and the Dorsey heirs. The ore in the mine is free milling.

Berkeley—At this mine, formerly the Ida Klein, a hoist is being erected and grading for a mill is under way.

Colorado

CHAFFEE COUNTY

Madonna—This Denver company reports a rich copper strike at the mine in the Monarch district, near Salida. The November shipments were 25 cars of $40 ore. K. E. Burton is manager. The Lily mine in the same district is also shipping.

CLEAR CREEK COUNTY

A number of the larger mines at Georgetown are producing handsomely under the leasing system, which seems to be peculiarly adapted to mining operations in Upper Clear Creek. The most notable at present are the old Seven Thirty and Smuggler mines on Brown mountain. The Mendota and the Aetna report discoveries of shipping ore.

Peters Tunnel—This project, controlled by the Deep Tunnel Drainage and Milling Company, E. M. Palink, manager, has resumed. The tunnel is on the Little Dorit vein.

United States Mining, Milling and Smelting Company—This company has been incorporated to build a 1000-ton mill at the mouth of the Newhouse tunnel, at Idaho Springs. The plan is to have the mill in three units each with special treatment scheme. H. B. Clifford is at the head of the project.

LAKE COUNTY—LEADVILLE

Yak—The work done at the 600-ft. mark below the tunnel level in the Cambrian quartzite has resulted in opening a large body of ore of excellent grade, and from which a large tonnage is going out daily.

Adelaide—This property, in Adelaide park, leased to Henry Beamer, is shipping high-grade from a new strike on the 230-ft. level.

Louise—Otto Thurn will sink a new shaft on this South Evans district property, on the north end of the claim, abandoning the shaft on which work has been going on for two years.

Climax—This Fryer Hill property has been leased to L. Buchanan, who will explore it for zinc ore.

PARK COUNTY

Magnolia—The Holmes Mining and Development Corporation has purchased this mine, at Alma, on Northstar mountain, from W. H. Powless. The Magnolia adjoins the Lee Goss, and has the extension of the Kansas vein.

SAN MIGUEL COUNTY

About 30 years ago the mines of the Ophir section, San Miguel county, were producing gold and they must have been discovered about '76, a current story of those days being that the Osceola showed much virgin gold on the outcrop and the man who discovered it, being entirely ignorant, refused to stake it because it showed "free brass." The Suffolk mine is one of the early big producers, and now it is to be resuscitated by Milwaukee capitalists, who have purchased the group with its mill and tramway, and are busy blocking out ore, under the management of George Pickett. The company is known as the Ophir Gold Mining and Milling Company. The Hattie mine has been taken over by a Detroit concern, known as the Modern Gold of Ophir Company, which has installed machinery and will develop through the winter. Eastern people have also taken hold of the Favorite mine, and are operating the Suffolk mill under lease. Occasional high-grade shipments are also being made from the Caribou and Carbonero.

TELLER COUNTY—CRIPPLE CREEK

There has been another change in the formation of the ground in the heading of the Roosevelt tunnel, and the breast recently was dry. In all there is some 6500 gal. per min. coming through the tunnel. This may be utilized for power, as it is expected this flow will continue many years. Below the portal there is an ideal power site. In all probability the tunnel company will organize a subsidiary company to build a power plant. It is figured that there is 52,000,000 gal. stored for every vertical foot, so it will be 10 years before all of the water goes out. The heading of the tunnel is going ahead at a good rate and the water line is dropping in every mine in the camp, each property showing some fall in the water, even in the very east end.

Indiana

SULLIVAN COUNTY

Shirley Hill Coal Mining Company—This company has filed a petition for an injunction against Country Treasurer Edward Ward to prevent him from forcing the collection of taxes on $8360 of alleged omitted property. The incoming legislature will be asked for a law making the method of taxing mine property more specific.

VIGO COUNTY

Arrangements are being made for the running of a miners' train by the Chicago & Eastern Illinois from Terre Haute to Clinton. The necessity of such a train is pointed out by H. V. Shelburn, of the Miami Coal Company, which has extensive mining interests in the Clinton field. Mr. Shelburne says the train will carry a large number of miners from Terre Haute, Brazil, Ehrmandale, Burnett and other mining towns in the Clinton fields. Many miners own their own homes and would be enabled to live in them, whereas at present they are compelled to live in Clinton or mining camps while working in the Clinton field.

Kansas

Lockport—C. C. Playter has purchased the Mammoth mill and will move it on to the Lockport tract, at Galena, where he will open up a daylight mine south of the Mess mine.

Michigan

IRON

Explorations are being continued in the Iron River district on the Menominee range. The Munro Iron Mining Company has two drills exploring section 26, 43-34, east of the Swanson and Michaels properties, and owned by the Wisconsin Land and Lumber Company. The Steel Corporation has a drill on the Brown property, section 27, 43-35. Another one is on the Waite farm, section 20, 43-34, for the Huron Mining Company. The Cleveland-Cliffs Company is increasing its holdings in Bates township. It has recently started diamond-drill work on the Kranz and Gustafson properties, section 23, 43-34. Another crew is on Peter Sjoquist's farm, in section 22, 43-34. The Verona Mining Company, Pickands, Mather & Co., which has been exploring the Spies lands, in section 23, 43-35, east of the James mine, near Iron river, has suspended operations. It is understood that ore was cut but it was low-grade.

Minnesota

The Interstate company, the Minnesota mining division of the Jones & Laughlin, is about to award a contract for stripping the Longyear mine, east of Hibbing. It is estimated that the removal of 4,000,000 cu.yd. of earth will be necessary. The stripping at the Susquehanna mine at Hibbing requires the removal of earth ranging in depth from 80 to 150 ft. and excellent progress has been made. It is estimated that 2,000,000 cu.yd. have been taken from the pit.. John R. Harrington, of Virginia, one of the owners of the Jack Pot near Chisholm, says that the shaft has already reached 300 ft., and within two months it is expected to attain the point at which ore was encountered by the diamond drill, 450 ft. down.

Missouri

The Kansas Natural Gas Company has raised the price of fuel gas for the mines from 12½c. to 25c. per 1000 cu.ft. This will compel most of the mines using gas under the boilers to burn coal, as the new price will hardly pay.

Daisy—This mine, at Springfield, has been sold by V. N. Bray, of Springfield, to George Mutschler, of Springfield, and Benjamin Schnierie and D. R. Emmons, of Kansas City, for $40,000. This is the old Pierson Creek mine that has produced a large tonnage of ore.

Clara Bell—This mill, near Belle Center has burned.

Granby—This company, operating on Oronogo has drained the ground and has commenced operations.

Henrietta—This company has completed the construction of the new tailing mill on the Old Judge tailing pile at Oronogo.

Little Francis—B. M. Seward and C. C. Yoder have purchased two-thirds of the Little Francis mine, at Neck City, on the Quick Seven lease, from Henry McGill and Lewis Schweickert, for $25,000.

Oronogo Circle—This mine, at Oronogo, has broken the hoisting record of the district by hoisting 1035 cans of dirt, 1000 lb., in an eight-hour shift at the No. 3 shaft. The distance hoisted was 273 ft. and a Freeman double-engine, first-motion hoist was used. This same shaft recently made a record of 800 cans per shift for a week's run, or 400 tons per shift from one shaft.

Montana

Butte District

C. F. Kelley, chief counsel for the Anaconda company, has issued a statement with reference to the controversy between that company and the Butte & Ballaklava company, concerning the ownership of the Mountain Chief claim, north of the Ballaklava claim. Mr. Kelley says that the Anaconda company proposed a plan for the prosecution of development work to demonstrate the position of the apex of the orebody and the ownership of the vein. This was agreed to but Mr. Kelley charges that early in 1910 the Ballaklava company broke the agreement by beginning excavating and stoping of the orebody. After an unavailable protest the Anaconda company filed suit on Aug. 22 and obtained a restraining order against the Ballaklava, which has been in force ever since. Mr. Kelley alleges that the trial of the case has been repeatedly postponed at the request of the Ballaklava company. He adds: "There is no expectation that there will be a compromise in the case and it is not believed by the Anaconda company that the case is one which will permit of a compromise waiving the claims of the Anaconda company to any part of the orebody in question, or to the recovery of damages for ore which has been extracted by the Ballaklava company."

Butte & Ballaklava—The hearing on the order to show cause why the restraining order heretofore issued against the company in the Anaconda Copper Mining Company case should not be continued in force until the final determination of the suit was continued recently until Jan. 23, on account of the necessity of the court hearing election contest cases.

Anaconda—Stoping on the 1300- and 1800-ft. levels of the Badger State was begun about a month ago, all ore previously shipped having been taken out in development. On the 1800-ft. level the crosscut is being extended north. The ore bins are being enlarged to one-half again their original capacity. At the Mountain View mine hoisting in the main shaft wll probably be discontinued on Jan. 1 to allow the main hoist to be changed so that it may be operated by air. This will take from six to eight weeks. A new engine will be set up for use in the three-compartment air shaft which is the same depth as the main shaft and about one-half the normal output of the mine will be hoisted by that means. The output of the Badger State will be increased also during the shutdown at the Mountain View. At the Pennsylvania mine the crosscut south on the 1800-ft. level has progressed 1200 ft. and has cut No. 1 vein, on which drifts are being run east and west. About 900 tons are being produced daily.

North Butte—The shaft, now down 2400 ft., will be sunk to the 2800-ft. level the first part of 1911. On the Edith May vein at the 2200-ft. level a winze has been sunk 112 ft. and a drift run from there about 200 feet.

Fergus County

The sapphire mines, now owned by the New Mine Syndicate, in Fergus county, were discovered in 1891, but were only slightly developed for several years thereafter. In 1906 John Burke sold his interest in the mines to the American syndicate and active operations have been carried on ever since. The vein is known as the Yogo vein and is six miles long. On this vein the New Mine syndicate owns 13 and the American syndicate seven claims. The stones obtained from the matrix are usually small and are used by watch manufacturers. The New Mine Syndicate has recently sent a 3600-lb. shipment of sapphires to its London office.

Jefferson County

Boston & Corbin—Sinking on the shaft continues steadily and 1100 ft. has been reached.

Lewis and Clark County

Strawberry—Recent test runs have proved so satisfactory that the management has ordered a 10-stamp mill which will be in operation by February.

Sanders County

Camas Copper Mining and Milling Company—The company has been incorporated by L. L. Colvin, H. G. Remick, S. K. Williams, D. C. Hervey and H. H. Carlson; capital, $600,000. Its claims are near Camas, and carry copper, silver and gold.

Nevada

Esmeralda County

At Pigeon Springs, 40 miles east of Goldfield, a syndicate of Goldfield men, consisting of C. G. Patrick, Charles Stevenson and Bob Ellsworth, have resumed operations in an old working. The company has a 10-stamp mill situated four miles from the property. Charles Stevenson is in charge.

Ohio Mining Company—This company has been organized at Lorain, Ohio, to operate a lease on C.O.D. ground at Goldfield.

Gotham Mining and Leasing Company—This company will operate leases on the Alamo and Silver Moon properties, at Lucky Boy. J. J. McCarthy will have charge. The Alamo shaft will be sunk from the 750-ft. level to 1500 feet.

Luning Gold Mine Syndicate—This property at Luning, claims to have 96,000 tons of $20 ore blocked. Financial arrangements for money for a mill are being made. Robert B. Todd, of Los Angeles, is in charge.

Lander County

Kimberly Consolidated—The company reports the expenditure of $130,202 on the property in 10 months. Plans for a 60-stamp mill are being made. Work on the 20-stamp unit will start in January. Henry Anderson, Reno, is president.

Nye County

There is more actual mining now being carried on in Nye county with regard to the extraction of pay ore, than at any

time since 1906. This fact is borne out by the compilation of the bullion tax statement for the quarter ended Sept. 30, 1910. The statements as returned by the different mining companies in the county show that the tax for the quarter amounted to $13,917. The net yield or value on which the taxes were levied amounted to $192,971, obtained from 107,911 tons of ore milled.

Tonopah Mining—November profits amounted to $155,000, compared with October figures of $169,000. Net profit for 1910 should be in the neighborhood of $2,000,000.

Greenwater Copper Mines and Smelters Company—This Nevada company which has $225,000 cash in the treasury but no mine, is negotiating for the property of the Empire Copper Company at Yerington. It is reported that George Wingfield will be interested with the company in the Empire operation. The Greenwater company has examined over 50 mines during the year.

Tonopah - Belmont — Operations will soon be transferred to the new Belmont shaft and the Desert Queen shaft will then be used as an auxiliary.

MacNamara—A station is started at the 700-ft. level preparatory to a crosscut to the orebody on the 800-ft. level southeast of the fault. Ore is being shipped to Coram, Cal.

Return Mining Company—This company, C. M. Complin, manager, is developing in Nye county, 70 miles southeast of Austin. Ore is being shipped.

Jim Butler—The compressor and motor have been installed and shaft work will soon begin.

WHITE PINE COUNTY

Nevada Consolidated—The company has closed a contract with Standard Oil Company for oil for fuel purposes, which will be substituted for coal.

New Mexico

Cerrillos Lead Mining Company—This company has been formed to operate in the Cerrillos district. F. C. Wilson, of Santa Fé, is in charge.

Caprock—These mines, east of Tucumcari, are being developed in charge of J. F. Hopkins. Franklin W. Merritt, of Duluth, is interested.

Oregon

GRANT COUNTY

Red Boy—The capital of this company has been increased from $1,000,000 to $1,400,000, a fund has been created for further development. The property is near Granite.

JACKSON COUNTY

Centennial—This mine will be operated this winter by Rhoten & McGee, of Gold Hill. Lumber is being transported for the flume and dam.

JOSEPHINE COUNTY

The Deep Gravel and Simmons-Cameron mines have been acquired by a New York company, headed by O. A. Turner.

Blalock—This placer property has been leased to John Willtrout, of Placer, who will install machinery and operate.

LANE COUNTY

West Coast—Kelso, Wash., people have purchased the interest of the Wheeler estate in this mine, near Cottage Grove, and $15,000 will be spent in development.

Utah

BEAVER COUNTY

Work in the Star district has been held back on account of the limited supply of water. The pipe line from wells in the valley is completed, but the operation of the new water system has been delayed by the nonarrival of a pump.

South Utah—During October and November, 34,971 tons of ore were milled, producing 2848 tons of concentrates, which averaged 9.62 per cent. copper, and carried a total of 219 oz. gold and 3300 oz. silver. The value of the mill ore and the saving have not been made public. About 700 tons per day are being milled.

White Rock—A car of ore running 46 per cent. lead and 30 oz. silver with some gold and copper has been shipped recently. This ore came largely from the 100-ft. level. The property adjoins the Harrington-Hickory mine of the Majestic property.

Majestic—New pumping equipment is being installed, which it is expected will overcome the water difficulties.

Horn Silver—At the annual meeting in Salt Lake City, Dec. 6, the number of directors was increased from seven to nine. Work on the new 75-ton mill has been started. The old mill building will be utilized, and provided with new equipment.

Red Warrior—New ore has been encountered near the 4-A. stope, and has been opened up for some distance. A crosscut is being driven on the 500, and stoping will be started from this level.

Utah Mining, Milling and Transportation—The orebody on the 300 level of the Lady Bryan has been opened for 20 ft., and carries around 35 per cent. lead, 55 oz. silver and 2½ per cent. copper. Six inches along the footwall run especially high in silver. Shipments are being made.

Moscow—Four cars of ore have been shipped recently, bringing $8424, or an average of $2106 to the car. Three more cars are on the road. During the spring and summer, the company paid off indebtedness of about $30,000, but was unable to work at full capacity, on account of lack of water. One car of the four cars mentioned above carried 26 per cent. lead, 73 oz. silver and 3.8 per cent. copper per ton, bringing $2507. Ore is being mined from the 400-ft. level, and from winzes below it.

JUAB COUNTY

Victoria—Drifting is being done on the 1500 level for the ore zone, which it is expected will be reached in a few hundred feet. There is some talk of building a tramway to the railroad in the spring.

Grand Central—A station is being cut above the 900, where the workings connect with the shaft on the Mammoth side, from which ore has been hoisted for a number of years. When the ore house now being built is completed, ore will be brought up through the new Victoria shaft on the Eureka side.

Colorado—The output has been increased to some extent and is between 80 and 100 tons a day. A part of this is from the new ore which was recently uncovered.

Tintic Standard—Work will be resumed on the 700- and 1000-ft. levels, after the temporary shutdown. On the 700, the drift has followed the vein 30 ft., and has encountered bunches of carbonate and galena ore. On the 1000 level 100 ft. of drifting has been done, and mineralized quartz, showing copper staining found.

Uncle Sam—Ore has been cut in a raise above the main level which indicates the continuation of the body for 125 ft. from where first encountered. It is thought that this ore is headed for the Richmond-Anaconda property, controlled by the Uncle Sam. A 50-ton car, marketed recently is reported to have brought $1700. Last month considerable second-class ore was shipped, but the present output is largely first-class.

Iron King—The tunnel is in about 3000 ft., and is being driven 5 ft. a day. Enough ore is being shipped to pay operating expenses.

Dragon Iron—Crosscutting has been started on the 800-ft. level, to prospect for the Iron Blossom gold and silver vein, which has been followed to within a short distance of the Governor property, and is trending toward this company's claims. Shipments of iron ore are being made.

Iron Blossom—Several important strikes have been made recently. The fissure along which the gold and silver ore occurs on the 500, and which has been opened on the second, third, fourth, fifth and sixth levels, has been opened on the 800, and also on the 1700 level of the No. 1, or South shaft. Gold and silver ore has been cut on the 500 level underneath the cave. This ore is reported to be of better grade than the South shaft reserves, running especially

well in silver. A contract for silicious gold-silver ores with the American Smelting and Refining Company is reported.

Tintic Central—Drifting will be done on the 1030 level, east of the shaft, to cut a mineralized fissue opened on the 870 level.

SALT LAKE COUNTY

Utah Copper—It is reported that the Shawmut Copper Company claims at Bingham have been purchased by the company, and will be used for railroad purposes, and as a dumping ground.

Utah Mines Coalition—Suit involving an accounting for stock was filed by E. A. Ulrey against R. H. Strickland, Dec. 19. The plaintiffs allege that they entered into an agreement with the defendants, and furnished them with funds to develop certain properties in Big Cottonwood, with the understanding that one-half of any money and stock the defendants obtained should go to them. It is alleged that the defendants received a large amount of stock, after organizing the company, but refused to deliver one-half as agreed. The defendants deny that the agreement was in force, when the company was organized, and say that there is therefore nothing due.

Columbus Consolidated—After two weeks of pumping, during which time the mine was flooded from below the 400 to the station at the 200 level, the water is reported to be under control, and receding.

SEVIER COUNTY

Annie Laurie—The petition of A. A. Bell, trustee, in bankruptcy for this mine, asking the court to order the receiver to turn the property over to him has been denied by Judge Christensen, who ordered the property to be sold to the highest bider, at Richfield, Dec. 29, to satisfy the mechanic's lien amounting to $25,000, and other claims aggregating $110,000.

Canada

BRITISH COLUMBIA

Rambler-Cariboo—Ore is being hauled to Three Forks for shipment to Trail. About 300 tons has been hauled part way. Ore is being mined down to the 1050-ft. level, and there is much of it available. Arrangements have been made to maintain an output of about 200 tons per month. Average metal content of last 600 tons was 97 oz. silver per ton and 42 per cent. lead.

Whitewater and Whitewater Deep—Consequent on destruction of concentrating mill by fire and lack of transportation facilities, railway bridges and trestles having been burned and not rebuilt, the lessees are no longer operating the mine outcrop. The "deep" of the Whitewater vein is being developed by the Deep Mine, Ltd., and J. L. Retallack & Co. are exploiting another part of the Whitewater group, below the outcrop property.

Society Girl—Shipment of ore has been commenced. Tonnage for December will be about 200 tons sorted ore, averaging 12 oz. silver per ton and 50 per cent. lead. The mine is in the vicinity of the St. Eugene, East Kootenay.

Cornell—The Tyee Copper Company acquired from the Northern Texada Mines, Ltd., its lease of the Cornell, one of the Van Anda group, on Texada island. During seven months of 1910 there was shipped from the Cornell 4501 tons of ore averaging 4.47 per cent. copper, and 4.07 oz. gold and 1.73 oz. silver per ton.

Granby—Output of ore for calendar year is approximately 1,100,000 tons. Developments on Cliff mine, Rossland, and Hidden Creek mine, Observatory Inlet, both held under option of purchase, are encouraging.

Beatrice—This mine, in Lardeau district, is again shipping silver-lead ore and being further developed, after having been idle several years.

ONTARIO

The shipments from Cobalt for the week ended Dec. 16 were: Nipissing, 510,520 lb.; Drummond, 420,000; La Rose, 170,000; Coniagas, 126,500; Right of Way, 120,350;; Hargraves, 120,000; Little Nipissing, 113,610; Cobalt Lake, 65,700; Chambers-Ferland, 65,000; O'Brien, 64,060; Buffalo, 58,040; Trethewey, 54,840; McKinley-Darragh, 45,370; total, 1,933,990 lb. Bullion—Temiskaming, 19,824 oz.; Buffalo, 14,400; total, 34,224 ounces.

Union Abitibi—This Larder Lake company will shortly install a 10-stamp mill.

O'Kelley—This property in Gowganda has been sold to a syndicate of Cobalt and Liskeard men, who will develop.

Floyd—This Cobalt company has gone into liquidation.

Coniagas—At the annual meeting, Dec. 17, the report showed cash on hand $242,900 and ore at the smelter and in transit valued at $374,087. The net profit for the year was $753,888, and expenses were $256,524. The ore reserves are estimated at 15,500,000 oz. Cost of production was 13.28c. per oz. During the year the company treated 1788 tons of ore and shipped 2,726,609 Troy oz. of refined silver.

Beaver—Another oreshoot has been opened up on the 300-ft. level of this Cobalt property. This vein, which is known as No. 5, was encountered on the surface and tested at the upper levels, but yielded nothing of a high-grade character until struck at the 300 level, where it varies from 500 oz. to 3000 ounces.

Trethewey—At a recent meeting of this Cobalt company, the directors decided to increase the capital from $1,000,000 to $2,000,000 in order to have funds to acquire other properties. This action met with opposition.

Hargrave—High-grade ore 4 in. wide was recently struck on No. 3 vein at the 300-ft. level about 80 ft. from the Kerr Lake line. On the same vein 60 ft. above, drifting is being done toward Kerr lake, high-grade ore continuing all the way in the face of the drift. Rich ore is being extracted from No. 1 vein.

Mikado—Manager Nickerson states that an orebody 12 ft. wide has been encountered in the seventh level, having an average assay value of $20 gold per ton in this Lake of the Woods district gold property.

ONTARIO—PORCUPINE

Newman-Mancha-Johnston Syndicate—This syndicate, composed of Louisville, Ky., and Hailebury capitalists has secured a number of claims, including the eight Healey locations in Deloro; the Ritchie group of four claims, and the two Mancha properties in central Deloro. Development work has begun and some good showings encountered.

Edwards—It is announced that the Tisdale location of W. S. Edwards has been bought by Young Brothers, of North Bay, for about $10,000.

Dome Mines—A contract has been placed for a 40-stamp mill with a capacity for 250 tons of ore per day. A representative of the company has inspected the leading gold mines in America in order to ascertain the best system of ore treatment.

QUEBEC

Drilling operations on lots 14 and 15, DeLery in Beauce county, have demonstrated the existence of pay alluvions on the left bank of the river, in the vicinity of the confluence of LaBranche and Gilbert river. The bedrock is between 30 and 35 ft. depth on the westerly boundary; near the easterly boundary it was encountered at 79 ft. It is the intention to run an adit into the hillside on the left bank of the Gilbert river and drain the whole stretch of bedrock between the fence dividing lot 15 and 16 and La Branche, permitting easy exploitation of the gold alluvions.

Preparations for the installation of the hydraulic elevator on the Ruisseau Des Meules, one mile from Beauceville, are proceeding rapidly. The creek has been diverted into its old bed by a dam a little above the upper adit for the purpose of facilitating the excavation of a place 25x50 ft. for the reception of the elevator. The seven-mile canal from Lake Fortin down to the gold alluvions, also the 600-ft. dam on the lake, are completed with the exception of a rock cut in the upper part of the canal. Eleven flumes of a total length of 4300 ft. form part of the latter. The maximum capacity of the canal is 2000 miner's inches with a

velocity of 3½ ft. per second. The grade is 1 ft. in every 600. The penstock will be located 225 ft. above the mechanical elevator, furnishing water to a 2000, ft. pipe line to two monitors. It is expected that washing will commence May, 1911.

Quebec Mines and Metal Company—This company, operating in the county of Beauce, is sinking on its Calway copper property, five miles from Beauceville. The vein has a vertical dip and consists of copper glance, silicate minerals, calcite and epidote. Its width is several inches; the ore occurs in clean streaks and also in the disseminated form between well defined walls. The country rock is a diabase porphyry. The shaft is down 32 ft. and it will be sunk to 100 ft. and at that depth drifting will be commenced.

Yukon Territory

Two dredges of the Canadian-Klondike Mining Company, operating on the Boyle concession, shut down Dec. 15, completing a remarkable record for length of a dredging season in the north. The dredges started April 24 and ran a total of 233 days. Next season these dredges will be driven with power from the Treadgold North Fork plant, for which a canal has just been completed to divert this branch of the Klondike river. It will be the largest power plant in the north.

Mexico

Chihuahua

L. W. Knotts and Pedro Alvarado have leased Europa and Europa No. 2 to Francisco Rueda y Quijano, of Parral, and development will start within the next 30 days. The properties are a short distance northeast of Parral, and have the continuation of the Tajo vein.

La Republica—Operations for November were: Tons crushed, 1140; revenue, 83,131 pesos; operating charges, 51,605 pesos; capital expenditure, 4689 pesos.

Torres Mines, Ltd.—The British company owning this Parral mine will double the output. The mine now has an 80-ton mill and 20,000 tons reserves reported.

Durango

The Velardeña smeltery is working three lead furnaces and three copper furnaces. Business seems to be good and the plant working to capacity. An increase in business for the smeltery is expected, as miners seem inclined to send ore here. A new sampling mill has been added to the old one and in it the smeltery samples all high-grade ore. It can very conveniently sample an entire car of very high-grade ore in the new mill, whereas it was unable to do so regularly in the old mill, due to the large amount of ore sampled and also to the fact that it received much low-grade ore which it was always afraid of salting. The smeltery is making favorable contracts.

The mining in the Valardeña district is unchanged, with no new men in the field. E. E. Payne is working the Santa Ines mine, which has paid from development. Carter Barker is working his Hileta properties as well as the San Francisco Mining Company's properties. Frank Kaerwer is again working his mine and making shipments to the Asarco smeltery. Juan M. Campos is working the Conchas mine and shipping. Aside from the above there is little independent mining going on.

The American Smelters Securities Company, at Velardeña, is working the Terneras mine and the Copper Queen, but it has curtailed the mining in the Santa Maria mine. From the Terneras mine it gets silicious ores, from the Copper Queen mine copper ore, and from the Santa Maria mine sulphides and milling ore. The company is using an aërial tramway for transporting the ore from the Terneras mine to Valardeña, where it loaded in cars and sent to the smeltery, 3 km. away.

The recent reorganization suggested by the committee of stockholders of the Mexican Consolidated Mining and Smelting Company has fallen through. In a circular sent the stockholders from Boston the committee announces that out of a total of 240,000 shares only holders of 85,000 shares deposited their stock under the reorganization plan. The small number of shares deposited, says the committee, makes it impossible for them to carry on the reorganization as contemplated, and having been unable to carry on any further negotiations with Mr. Stallforth, the stock deposited in Boston will be returned to the holders and the money refunded.

George Stinson will begin development upon the group of mines which he recently filed upon in the Mapimi district.

Prudencio Corrales and Pedro Salgado, who own eight mining claims in the Tepehuanes district, are preparing to start work.

Rafeal Zepeda, of Guanacevi and other mine owners of the district will, it is reported, install a mill at a cost of about 300,000 pesos to treat the ores from their properties. Mr. Zepeda owns the Rosario mine, which has been reopened recently, after being closed for some time.

Hidalgo

A company composed of J. P. Warr, general manager of the Blaisdel-Coscotitlan syndicate, Hedley Ludlow, of the Amalgamated Milling Company, Richard N. Rabling and G. Gonzalez, has been organized at Pachuca, for the purpose of installing a mill with an initial capacity of 100 tons per day, in El Chico district. The company will have a capital of 400,000 pesos. Contracts for ore sufficient to supply the full capacity of the plant have been made.

Mexico

Esperanza—The company reports the return for November as follows: Mill ran 27 days and crushed 19,892 dry tons. Estimated product, $166,503; net profit, $44,387.

Seguranza—An option on this property, in the Zacualpan district, for nearly 2,000,000 pesos has been given by George A. Waddel, president. It is reported that the option is to the Guggenheim interests, but this is not confirmed.

Sonora

A syndicate of Canadians is negotiating for the purchase of North Tigre and Fortuna mining properties, in El Tigre district, Sonora. An engineer, representing the prospective purchasers, recently made an inspection of the mines, and his report is said to have been favorable.

Charles Davidson has applied to the Federal Government for privileges to prospect for oil on the Tiburon island.

Calumet & Sonora—The main shaft is being lowered from the 400 to the 600 level, and drifting is under way on the 40-ft. level.

Greene-Cananea—All work in the vicinity of Sierra de Cobre No. 1 shaft has been temporarily stopped. A precipitating plant, equal to the capacity of the present one, is in erection at the concentrator.

Sonora Verde—Small shipments of ore are being made to El Paso.

Ohio Mining and Smelting Company—Arrangements for the shipping of the product of the company's Sierra mine to the Fundicion have been made.

Democrata—New pumps are being installed.

Zacatecas

Two new mining companies have been organized in Saltillo under the direction of Ing. Antonio Villareal. One of these is to be known as the Compañia Minera El Banco Mercantil, which is to exploit the lead-silver mine of that name in the Concepcion del Oro district. The other company is to be known as the Compañia Minera La Perlita, and will operate the mines known as La Peral, La Perlita and La Cocinera.

South Africa

Transvaal

The gold production in November was, from the Witwatersrand, 617,905 oz.; outside districts, 24,686; total, 642,591 oz. This is 10,556 oz. less than in October. For the 11 months ended Nov. 30 the total output was 6,675,555 oz. in 1909, and 6,893,125 oz.—or $142,480,893—in 1910; an increase of 217,572 oz. this year. The number of Kafirs employed in November was 194,756, a decrease of 1943 from the October report.

THE MARKETS

Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics

Coal Trade Review

New York, Dec. 28—The coal trade in the West is active, but is settling down to a more normal condition than has been the case for some months past. Supplies at the mines are abundant and railroad service shows some improvement. There are still plenty of complaints about car supply, and room for improvement. The larger consuming centers, however, seem to have passed all danger of shortage.

In the East the bituminous trade is rather quiet. Car supply is not as good as it was; in fact, rather worse than in the West. The anthracite trade is quiet and steady.

Colliers for Foreign Trade—The second of two large steam colliers built for the Berwind-White Coal Company, at Middleboro, England, has just been launched. They are of steel, 425 ft. long, and have a carrying capacity of 8500 tons of coal each, with all facilities for rapid loading and unloading. Their engines will give them a speed of 11 to 12 knots per hour.

Coal Traffic Notes

Anthracite tonnage of Baltimore & Ohio railroad 10 months ended Oct. 31, was 744,799 tons in 1909, and 837,447 in 1910; increase, 82,648 tons.

Coastwise shipments of coal from chief Atlantic ports 10 months ended Oct. 31, long tons:

	Anthracite.	Bitum.	Total.	PerCt.
New York...	11,842,439	9,329,063	21,171,502	59.9
Philadelphia	1,607,508	3,939,563	5,547,071	15.7
Baltimore....	203,252	3,068,137	3,271,389	9.3
Newp't News	.....	2,420,029	2,420,029	6.8
Norfolk.. ...	.....	2,955,199	2,955,199	8.3
Total.....	13,653,199	21,711,991	35,365,190	100.0
Total, 1909.	13,540,824	20,105,218	33,646,042	.....

The increase in anthracite this year was 112,375 tons; in bituminous, 1,606,773; total, 1,719,148 tons, or 5.1 per cent. New York includes all the harbor shipping points; Norfolk includes Sewalls Point.

Bituminous-coal and coke tonnage of leading railroads in Pennsylvania and West Virginia, 10 months ended Oct. 31, short tons:

	Bituminous.	Coke.	Total.
Pennsylvania.....	34,050,735	11,159,102	45,209,837
Balt. & Ohio..	26,063,673	3,652,075	29,715,748
Buff., Roch. & Pitts.	6,144,230	548,066	6,692,296
Buff. & Susqueh'na	1,177,945	232,759	1,410,704
Penn. lines, N. Y. C.	6.433,698	57,317	6,491,015
Pitts. & L. Erie.....	9 828,213	5,187,299	15,015,512
Pitts. Shawmut & N.	860,873	10,058	870,931
Norfolk & Western.	14,435,376	2,293,241	16,728,617
Ches. & Ohio.....	13,280,949	381,613	13,662,562
Virginian.....	1,046,509	24,657	1,071,166
Total.....	113,322,201	23,546,187	136,868,388
Total, 1908.....	96,250,858	20,867,041	117,117,899

The increase in coal this year was 17,071,343 tons; in coke, 2,679,146; total, 19,750,489 tons, or 16 per cent. Anthracite tonnages of Pennsylvania and Baltimore & Ohio are given elsewhere.

New York

Anthracite

Dec. 28—The hard-coal market is steady. Demand for steam sizes is especially good. The weather has continued cold, but there has been less interference with harbor and local deliveries.

Schedule prices for domestic sizes are $4.75 for lump, $5 for egg and stove and $5.25 for chestnut, all f.o.b. New York harbor. Steam sizes are unchanged. We quote for pea, $3@3.25; buckwheat, $2.25@2.75; No. 2 buckwheat, or rice, $1.80@2.25; barley, $1.40@1.75; all according to quality, f.o.b. New York harbor.

Bituminous

The seaboard soft-coal market is quiet. Sales are moderate only, both for harbor and New England trade, and it is necessary to look for opportunities of placing coal.

Prices are not strong, but have not changed materially since the last report. Gas coals bring about $1.05 at mine for ¾-in., 95c. for run-of-mine and 75c. for slack. Good steam coals can be had at prices which work out from $1 up to $1.40 at mine, for run-of-mine.

Car supply is a vexing question on most lines; in fact, nearly all the railroads are a little behindhand. Transportation is a little better than it was, but is still rather slow.

In the coastwise vessel market rates can hardly be said to have changed; but they are strong and vessel owners are stiff about charters. From Philadelphia to Boston, Salem and Portland, rates range from 85c. for large vessels, up to $1 for small boats. From New York 70@75c. is charged to points around Cape Cod.

Birmingham

Dec. 26—Just as soon as the labor will return to the mines there will be a resumption of operations at the coal mines in Alabama and the coal will find a ready demand. Orders are in hand for all the coal that can be mined and the operators are not losing any opportunity to make the best of the situation. The Tennessee company, while cutting down its iron production and lessening its own needs for coal, has taken on orders for coal and for that reason is operating all mines on full time.

The production of coke is steady and there will be a need for all that can be manufactured, despite the curtailment of the iron output. Some coke will be accumulated, as under normal conditions the make is not up to all requirements.

Chicago

Dec. 27—Quiet conditions exist in the local coal market, the demand for steam and domestic kinds alike being light and the supply plentiful. Mild weather is again over Chicago territory and manufacturing needs are lighter with the holiday season. The stocks of retailers are said to be small, but steam users evidently are using less coal and domestic consumption is on a basis of short-supply buying. Without a sudden and widespread cold wave, dealers do not look for a marked increase in demand. Nearly all lines of business are under noticeable tension so steam coals will be bought cautiously. Supplies are large, from Illinois and Indiana especially. All shipments should be light until the market improves. Eastern coals are in large supply and smokeless has difficulty in holding to its standard quotations of $4.30 for lump and $3.30 for run-of-mine, the former being the stronger. Hocking is the firmest coal in the market, at $3.40. Illinois and Indiana coals bring $2.10@2.75 for lump, $1.80@2 for run-of-mine and $1.45@1.75 for screenings. Anthracite has fair sales, with chestnut much in demand and scarce.

Cleveland

Dec. 26—Local demand continues brisk for domestic coals and good for steam coal. The situation rests on car supply, which is still poor, and on transportation, which is very slow. Coal is snapped up as fast as it arrives.

Prices are nominally unchanged but premiums are being paid for coal specially wanted. It is almost impossible to get Pocahontas at any price.

Indianapolis

Dec. 27—There is apparently no let up to the prosperity in the Indiana mines. The steady cold weather has made the local demand for coal good and continuous. The mines are working full time and the miners are all employed.

Pittsburg

Dec. 27—Demand for coal is light, on account of holiday stoppages at the mills. The holiday week has also affected do-

mestic trade. Consumers are generally pretty well stocked; at any rate they are not putting in coal this week. Slack continues rather scarce, but there is enough for the trade this week. The leading interest has made no change in prices, and some shading continues on the few sales that have been made. Car supply is good, except on the Baltimore & Ohio, which is still behind. Quite a number of mines have been closed this week for several days on account of the holiday. For the reasons given there is nominally no change in prices. We continue to quote: Mine-run and nut, $1.15; ¾-in., $1.35; 1¼-in., $1.40; slack, 82½@85c. per ton.

Connellsille Coke—Apparently the central-agency plan is to come up in a new form. Application is to be made for a Pennsylvania charter for the Fidelity Coal and Coke Company, with $300,000 capital stock. The plan is for the new corporation to buy the entire output of as many operators as will join, the company to instruct from week to week how much that output shall be. How many producers will come in is unknown. The incorporators claim to have 7000 ovens promised, but that will be too few to make a success.

There is nothing new in the way of contracts worth noting. Some scattering negotiations are going on. In the absence of sales, quotations are continued nominally as follows: Prompt furnace, $1.40@1.50; contract furnace, $1.60@1.75; prompt foundry, $2@2.10; contract foundry, $2.25@2.50, at ovens.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ending Dec. 17 at 292,612 tons, an increase of only 177 tons over the previous week. Shipments were 9008 cars, an increase of 758 cars.

Coal Rates in the Central West—W. H. Stevenson, chairman of the Transportation and Railroads Committee, and Ira S. Bassett, traffic manager, of the Chamber of Commerce, of Pittsburg, issued invitations under date of Dec. 22 for a meeting with representatives of the coal and coke interests of Pittsburg, Jan. 7, "to discuss questions relating to the rate situation on coal and coke to the Lakes." It has frequently occurred that questions relating to Pittsburg which have differently affected different classes of the membership of the Chamber of Commerce have been sidetracked or shelved, and it has been openly charged that some men were members of the chamber in order to discourage certain work rather than to encourage it. We understand special pains were taken to get the present invitation to those in particular who are anxious to have rates reduced from Pittsburg to the Lakes. The subject is really an old one, having been agitated vigorously in the nineties, while in recent years, on account of the general prosperity, it has commanded little attention. It is simply that, comparing ton-mileage rates, the railroads have discriminated against Pittsburg district coal and in favor of various southern Ohio and West Virginia fields. To the Pittsburg district this is discrimination; to the railroads it is equalization, it being necessary to make the differentials in order to give southern Ohio and West Virginia the Lake outlet and distribute the tonnage among the roads. Claims are made that an adjustment can be secured without intervention of the Interstate Commerce Commission, but this is to be doubted. A prophecy is also made that the stirring up of the subject at this time of the relative position of the different districts will precipitate a coal war of no mean proportions. It is not improbable that developments in the coal situation in the next few months will be of unusual interest.

St. Louis

Dec. 26—The market this week has naturally been slow owing to the holidays. There has been very little of interest and outside of the general depression with a slight weakening in price there is scarcely a feature worth noting. Standard coal has gotten to a point where the selling price is practically the cost of production. High-grade coal is holding its own pretty well and there is still a fair margin of profit in it.

The car shortage is still very keen, though owing to the lack of demand, operators are not complaining.

The price of screenings is holding up well and they are locally worth 55@60c. per ton f.o.b. mine. This is the one bright spot in the market; there seems to be a permanent improvement in screenings and it begins to look as if operators can anticipate getting a good price from screenings for at least 10 months of the year.

Current prices in the St. Louis market are as follows:

Illinois, Standard:	Mine.	St. Louis.
6-in. lump and egg	$1.60	$2.12
2-in. lump	1.20	1.60
Mine-run	1.00	1.52
Screenings	0.50	1.02
Trenton:		
6-in. lump and egg	2.50	3.02
3-in. nut	2.00	2.52
Staunton or Mt. Olive:		
6-in. lump	1.80	1.32
2-in. lump	1.75	2.27
Mine-run	1.20	1.72
Screenings	0.60	1.12
Carterville:		
6-in. lump or egg	1.75	2.42
3-in. nut	1.70	2.37
Mine-run	1.25	1.92
Screenings	0.75	1.42
Pocahontas and New River:		
Lump or egg	2.25	4.75
Mine-run	1.25	3.75
Pennsylvania Anthracite:		
Chestnut	....	7.20
Stove or egg	....	6.95
Grate	....	6.70
Coke:		
Connellsville foundry	....	5.40
Gas house	....	4.90
Smithing	....	4.15

Prices at East St. Louis are 20c. per ton below the St. Louis quotations.

Anthracite—The situation is in good shape though the demand on all sizes is slowing down a little. There is not much anthracite in transit at the present time.

FOREIGN·COAL·TRADE

German Coal Trade—Exports and imports of fuel in Germany, 10 months ended Oct. 31, metric tons:

	Exports.	Imports.	Excess.
Coal	19,363,915	9,307,424	Exp. 10,056,491
Brown coal	50,112	6,139,200	Imp. 6,089,088
Coke	3,365,579	531,859	Exp. 2,833,720
Briquets	1,593,216	192,332	Exp. 1,400,884
Total	24,372,822	16,170,815	Exp. 8,202,207
Total, 1909	23,130,323	17,407,073	Exp. 5,723,250

The exports this year included 51,060 tons of coke to the United States.

German Coal Production—Coal production of German Empire 10 months ended Oct. 31, metric tons:

	1909.	1910.	Changes.
Coal	123,315,202	126,030,092	I. 2,714,890
Brown coal	56,057,269	56,284,894	I. 227,625
Total mined	179,372,471	182,314,986	I. 2,942,515
Coke made	17,637,527	19,393,499	I. 1,755,972
Briquets made	15,581,566	16,093,027	I. 511,461

Of the briquets reported this year 12,441,945 tons were made from brown coal or lignite.

Nova Scotia Coal—Shipments of coal from Nova Scotia mines, 11 months ended Nov. 30, long tons:

Company:	1909.	1910.	Changes.
Dominion	2,286,278	3,014,774	I. 728,496
Nova Scotia Steel	734,241	765,624	I. 31,383
Inverness	209,184	246,874	I. 37,690
Acadia	255,589	257,499	I. 1,910
Intercolonial	232,798	217,015	D. 15,783
Total	3,718,090	4,501,786	I. 783,696

The total increase was 21.1 per cent. Only one company showed a decrease this year.

Welsh Coal Prices—Mesrs. Hull, Blyth & Co., London and Cardiff, report prices of coal on Dec. 17 as follows: Best Welsh steam coal, $3.96; seconds, $3.78; thirds, $3.60; dry coals, $3.72; best Monmouthshire, $3.54; seconds, $3.36; best steam small coal, $2.28; seconds, $2.04. All prices are per long ton, f.o.b. shipping port, cash in 30 days, less 2½ per cent. discount.

IRON·TRADE·REVIEW

New York, Dec. 28—The last week in the year is almost invariably a dull one in the iron and steel trades. This year the dullness is emphasized by the general waiting attitude which the trade has assumed. This waiting position is justified if there is anything in the general belief that the leading interests will, in due time, make a general reduction in the prices, which they are now so strenuously resolving to hold up. It looks as if there was a good deal in that belief, and it is not to be wondered at that buyers are holding off, and taking only what they need for early use.

In finished material there has been little new business in most lines. About

all that is forward is in structural work; and here it is noteworthy that the large fabricating companies in the East are taking contracts on a basis which involves a considerable reduction in the prices of steel. Some small rail orders have been placed, and also some orders for railroad cars; but there has been no general buying movement by the railroads.

There has been some buying of pig iron, chiefly of foundry and basic, but in rather small lots. On large orders there is an uncertainty about prices. The merchant-furnace people have been holding conferences and trying to get together in some way, but apparently without much result so far.

Reports are that the Steel Corporation mills are running at about 50 per cent. of capacity and larger independents at between 50 and 60 per cent.

Baltimore

Dec. 27—Exports for the week included 112,000 lb. lead to Belfast; 70,200 lb. spelter and 1,598,350 lb. steel billets to Liverpool; 757 tons steel rails and 106,425 lb. rail joints to Costa Rica. Imports included 1621 tons spiegeleisen and 361 tons ferromanganese from Rotterdam; 5600 tons iron ore from Cuba.

Birmingham

Dec. 26—The curtailment in the pig-iron production in Southern territory is on an extensive scale, and there will hardly be a resumption until the general market conditions improve and the accumulated stocks have been worked off. There is a little iron moving out yet. There is a fairly good bunch of orders on the books for delivery during the coming year. A few inquiries were received during the first part of this month for iron to be delivered on during the first-half of 1911, while an inquiry or two—which receives no favorable reply at all—came in for iron to be delivered during the entire year. The quotations are around $11 per ton, No. 2 foundry, but lately the statement has been made that some of the manufacturers were selling below that figure.

The steel plant of the Tennessee company has shut down and is not to resume until about the middle of January, perhaps a little later. The rolling mills of the Tennessee company, however, will resume operations next week, there being orders on hand that must be given attention.

Charcoal iron commands $22.50 per ton and the make, not very large even at the best, will not be disturbed during the holiday season.

The scrap-iron business is quiet, as is the foundry-iron trade.

Chicago

Dec. 27—Very dull conditions exist in the iron market. Sales of pig iron are confined to small lots for needs of 30 to 60 days from the date of the order, and are of both Northern and Southern without marked preference for either. The two interests, buyers and sellers alike, are in a waiting mood, expecting some decided change with the passing of the New Year line. Northern No. 2 is quoted at $16 and Southern No. 2 at $15.35, Chicago ($11, Birmingham), nominally, but a good-sized order could probably be placed at 25 or 50c. less. Nobody, however, is placing good-sized orders. Local furnace stocks are said to be very small and melters apparently are running close to their requirements. Inquiries are very few and are not expected to increase under rumors of price reductions in iron and steel products. Sales of these products are light and are expected to continue light through holiday week. Coke is dull with Connellsville at $4.90, Chicago.

Cleveland

Dec. 27—Iron-ore receipts at Lake Erie docks for the season were 34,042,897 tons; stocks Dec. 1 were 9,426,681 tons, 460,892 tons more than a year ago. Nothing doing yet about next season's prices.

Pig Iron—Some scattering small orders make up the business for the week. Prices are nominally unchanged, but a few large orders would probably bring out low quotations.

Finished Material—Some good contracts for structural steel are pending. Otherwise the year closes very quietly. Specifications come in rather slowly.

Philadelphia

Dec. 28—As an outcome of much quiet conferring by eastern Pennsylvania pig-iron interests, efforts are being made to harmonize differences among furnace interests by agreeing upon a price list. Some form of agreement or understanding is expected to be arrived at before the close of the week, but such an early adjustment depends upon the willingness of certain manufacturers who are not in perfect accord with the purpose. Trade has been going from bad to worse as to prices. Large consumers are simply waiting to see the end, and meantime are buying from hand to mouth. Further restriction of output, or at least a banking of furnaces, is in sight unless a buying movement can be started. Mill men are buying forge for immediate use only. Some New England buyers expect to close this week for two or three thousand tons.

Steel Billets—All recent negotiations are off for some reason. Buyers are awaiting developments.

Bars—At present, production is curtailed as usual at this season, and local iron agents report a general standstill among buyers.

Sheets—Unless early January brings important business, there will be a further curtailment. Store distribution has fallen to almost nothing and mill orders are trifling.

Pipes and Tubes—Pipe orders are now assured for January, most of them from points in the South, including Baltimore. A fairly encouraging business for this season is coming in and no further shading is made.

Plates—Car-building orders now being placed, with the assurance of more to come, have encouraged Eastern plate-mill interests somewhat, but the business compared to capacity is trifling.

Structural Material—The new business this week is trifling and related only to old contracts. Bridge work is held up. All of the business pending in which Eastern mill interests are concerned would fall under 10,000 tons.

Scrap—Nothing whatever has been done in the scrap yards. Deliveries are difficult, and supplies secured during recent tours of dealers will remain where they are until customers are found.

Pittsburg

Dec. 27—The market remains stagnant, the dullness being increased by the holiday week. Prices remain generally unchanged, and no cutting is reported, because no business has been done. The last week in the year is always quiet; and new buying can hardly be expected in the face of the general belief that prices will be readjusted downward in January. It is said, however, that specifications on contracts have been coming in a little more freely. Production is still being kept down to present requirements. The holiday stops in most mills will not be cut short. The year closes with everyone waiting for the January developments in more or less uncertainty.

Following a meeting convened in Philadelphia, Dec. 16, of eastern foundry-iron producers, and to which the foundry-iron producers of the Central West sent several representatives, a meeting of the latter was held in Cleveland, Dec. 21, at which the situation was discussed in its various bearings but without arriving at any tangible results, either as to price control or reduction of output. The latter is obviously essential, since stocks are large and, if anything, are increasing at the moment. The next day the basic-iron producers met in Cleveland. Their proposition is to have a single selling agent, much after the style followed with bessemer iron. The coöperation of a leading merchant producer of basic iron was sought, but this was refused, presumably on the ground that a division of orders was also required, and word has gone out that it is impossible to put the deal through without this coöperation.

Pig Iron—No sales have been made to change recent quotations of $15, Valley, for bessemer. Basic is still uncer-

tain, but we can continue the nominal quotation of $13.25, for prompt, while on the basis of sales made some time ago for first half at between $13.25 and $13.50 the market for delivery over the whole half year can be quoted nominally at $13.50, Valley. Foundry iron remains openly quotable at $13.75@14, Valley. It is reported that one interest is willing to take $13.50, Valley, but this is not certain; at any rate it is not proved by sales.

Ferromanganese—The market has continued very quiet and remains nominally quotable at $38.50, Baltimore.

Steel—With few transactions prices have been held, for both bessemer and open-hearth, at $23 for billets and $24 for sheet bars, f.o.b. Pittsburg or Youngstown mill.

Sheets—Demand is dormant for the present. Production is small as a number of mills shut down this week for inventory and repairs. Prices as discussed at the meeting of Dec. 15 are understood to be well held: Black, 2.20c.; galvanized, 3.20c.; painted corrugated, $1.55; galvanized corrugated, $2.75, Pittsburg.

St. Louis

Dec. 26—The market in pig iron has been dull and scarcely any inquiries were received worth mentioning last week. The price of $11.25 per ton, f.o.b. Birmingham, and $14.75, St. Louis, are the prevailing figures for No. 2 foundry.

FOREIGN IRON TRADE

German Iron Trade—Exports and imports of iron, steel and machinery in German Empire 10 months ended Oct. 31, metric tons:

	Exports.	Imports.	Excess.
Iron and steel..	4,001,560	460,342	Exp. 3,541,21
Machinery.....	320,546	60,114	Exp. 260,439
Total.....	4,322,106	520,456	Exp. 3,801,650
Total, 1909.....	3,488,098	436,004	Exp. 3,052,082

Imports of iron ore for the 10 months, 8,215,259 tons; exports, 2,476,597. Imports of manganese ore, 447,779; exports, 2679 tons.

British Iron-ore Consumption—The completed statistics of iron-ore consumption in Great Britain for the full year are, in long tons:

	1908.	1909.	Changes.
Ore mined.....	15,031,025	14,979 979	D. 51,046
Ore imported.....	6,057,510	6,328,623	I. 271,113
Pyrites residue....	569,182	593,301	I. 24,119
T otal.....	21,657,717	21,901,903	I. 244,186
Less ore exported..	7,740	8,149	I. 409
Consumption	21,649,977	21,893,754	I. 243,777

Of the ore imported last year 4,725,914 tons came from Spain, 481,632 from Algeria, 290,198 from Sweden and 261,406 from Greece.

British Foreign Trade—Exports and imports of iron and of machinery in Great Britain, 11 months ended Nov. 30, are valued by the Board of Trade returns as below:

	Exports.	Imports.	Excess.
Iron and steel	£39,393,735	£ 8,124,603	Ex. £31,269,132
Cutlery and hardware..	5,846,431	1,165,574	Ex. 4,680,857
Machinery...	26,733,668	4,074,947	Ex. 22,658,721
New ships....	8,640,856	.....	Ex. 8,640,859
Total..... ..	£80,614,690	£13,365,124	Ex. £67,249,566
Total, 1909..	71,206,823	12,333,041	Ex. 58,873,782

Increase in exports, £9,407,867, or 13.2 per cent.; increase in imports, £1,032,083, or 8.4 per cent. The quantities of iron and steel reported were, in long tons:

	1909.	1910.	Changes.
Exports	3,850,559	4,215,621	I. 365,062
Imports	1,085,925	1,218,394	I. 132,469

The imports were largely of crude or semi-finished material, as pig iron, billets and blooms.

British Iron Ore Imports—Imports of iron ore into Great Britain 11 months ended Nov. 30 were 5,712,220 long tons in 1909, and 6,415,595 in 1910; increase, 703,375 tons. Of the imports this year 4,434,660 tons were from Spain.

METAL MARKETS

New York, Dec. 28—The metal markets continue generally quiet, but there are some signs of increased movement apparent.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
Nov. 1910..	$1,376,011	$ 4,313,500	Imp.$ 2,937,489
" 1909..	15,649,281	3,863,637	Exp. 11,785,644
Year 1910..	57,444 422	54,245,886	" 3,198,536
" 1909..	122,301,517	42,003,194	" 80,298,323
Silver:			
Nov. 1910..	5,265,595	4,827,254	Exp. 438,341
" 1909..	4,951,483	4,694,807	" 256,676
Year 1910..	51,299,913	41,479,718	" 9,820,195
" 1909..	52,294,344	41,984,006	" 10,310,338

Exports from the port of New York, week ended Dec. 24: Gold, $12,700; silver, $828,613, chiefly to London. Imports: Gold, $253,061, principally from Cuba and South America; silver, $122,948, from the West Indies and South America.

Gold—With some demand from Germany and other European markets, the price of gold on the open market in London advanced slightly, 77s. 9⅛d. per oz. being quoted for bars. American coin was 76s. 4½d. per oz. There is some talg of gold imports in New York, but none have been made.

Platinum—The market continues quiet. Sales have been light, and there are reports of weakness in the foreign market. Dealers quote $38.50 per oz. for refined platinum, and $40.50@41 per oz. for hard metal, 10 per cent. iridium.

Silver—The market under the influence of the holiday season shows a slightly downward tendency. The India operators have lately shown a disposition to part with some of their holdings, and this has, of course, accented the fall.

SILVER AND STERLING EXCHANGE

Dec.	22	23	24	26	27	28
New York....	54⅜	54⅜	54⅛	....	54	53⅞
London .	25⅛	25⅛	25	....	....	24⅛
Sterling Ex..	4.8530	4.8535	4.8525	....	4.8525	4.8505

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Exports of silver from London to the East, as reported by Messrs. Pixley & Abell, Jan. 1 to Dec. 15:

	1909.	1910.	Changes.
India.....	£6,521,400	£6,835,500	I. £ 314,100
China.....	1,885,000	1,373,500	D. 511,500
Straits.....	114,600	.....	D. 114,600
Total.....	£8,521,000	£8,209,000	D. £ 312,000

Indian Council bills in London sold at an average of 16.06d. per rupee for the week.

Foreign trade of the United States, 11 months ended Nov. 30, as valued by the Bureau of Statistics, Department of Commerce and Labor:

Merchandise:	1909.	1910.
Exports.....	$1,555,720,931	$1,636,990,585
Imports.....	1,336,776,480	1,425,770,128
Excess, exports.....	$ 218,944,451	$ 211,220,457
Add excess of exports, silver.....		9,820,195
Add excess of exports, gold.....		3,198,536
Total export balance.....		$ 224,239,188

The gold and silver movement in detail is given in the table at the head of this column.

Gold and silver movement in Great Britain, 11 months ended Nov. 30:

	Imports.	Exports.	Excess.
Gold.....	£53,908,384	£47,272,938	Imp.£6,635,446
Gold, 1909...	48,870,126	43,101,383	Imp. 5,768,743
Silver.....	13,163,535	12,300.390	Imp. 863,145
Silver, 1909..	10,844,404	11,557,834	Exp. 713,430

Of the silver imports this year a total of £10,529,829 is credited to the United States.

Copper, Tin, Lead and Zinc

NEW YORK

Dec.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. New York, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
22	12¾ @13	12.55 @12.60	38¼	4.50	4.35 @4.37½	5.45 @5.47½	5.30 @5.32½
23	12¾ @13	12.55 @12.60	38¼	4.50	4.35 @4.37½	5.42½ @5.45	5.27½ @5.30
24	12¾ @13	12.55 @12.60	38⅛	4.50	4.35 @4.37½	5.42½ @5.45	5.27½ @5.30
26	.....	.....	....	....	.....	.....	.....
27	12¾ @13	12.55 @12.60	38⅛	4.50	4.35 @4.37½	5 42½ @5.45	5.27½ @5.30
28	12¾ @13	12.55 @12 60	38¼	4.50	4.35 @4.37½	5 42½ @5.45	5.27½ @5.30

The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

LONDON

Dec.	Copper. Spot.	Copper. 3 Mos	Copper. Best Sel'td	Tin. Spot.	Tin. 3 Mos	Lead, Spanish.	Zinc, Ordinaries.
22	56¾	57⅛	60⅛	173¾	174¼	13 3/16	24
23	56⅝	57⅜	60½	174⅜	174⅞	13 3/16	24
24	.....	.....	.....	.....	.....	.....	.....
26	.....	.....	.....	.....	.....	.....	.....
27	.....	.....	.....	.....	.....	.....	.....
28	56	56¾	60¼	175⅝	175½	13 3/16	23⅞

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £12 = 2.61c.; £23=5c.; £60 = 13.04c. ± £1 = ± 0.21¾c.

Copper—The holiday dullness pervades the market. Manufacturers are busy stock taking and have not yet shown any interest in laying in a further supply of copper. On the other hand, there has been no pressure to sell. Transactions have been few and far between. The week just elapsed has, we think, been the dullest of the year. The quotations both for Lake and electrolytic are practically nominal, although representative of the very small business transacted. Electrolytic is very freely offered at 12¾c., delivered, 30 days, which is equivalent to about 12.60, cash, New York. We quote the market as nominal and unchanged from last prices, 12¾@13c. for Lake copper, and 12.55@12.60c. for electrolytic copper in cakes, wirebars and ingots. Casting copper is quoted nominally at 12¼@12⅜ cents.

Copper sheets are 18@19c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 14¼c. base, carload lots at mill.

On Dec. 22, the London market for standard spot was £56 15s. and for three months £57 10s. On Friday, it was 2s. 6d. lower. The market was then closed for the Christmas holidays until Wednesday, Dec. 28, when it opened lower, and closed at £56 for spot, and £56 15s. for three months. It is also very dull and quiet.

Exports of copper from New York for the week were 8106 long tons. Our special correspondent reports the exports from Baltimore for the week at 704 tons.

Tin—America sent some good-sized orders to the London market during the latter half of last week. This made it easy for the bull syndicate to put up prices again. In view of the holidays, business remained very dull from Dec. 24 to Dec. 27, but at the opening on Dec. 28 the London market evinced a very strong tone. The market closes a trifle easier, but still firm, at £175 7s. 6d. for spot, and £175 10s. for three months. January tin in this market is being quoted at 38½ cents.

Lead—There is a fair business doing from day to day at last prices, 4.50c., New York, and 4.35@4.37½c., St. Louis.

The market for Spanish lead is a trifle lower, being quoted at £13 3s. 9d., and English at £13 6s. 3d. per ton.

Spelter—The market is quiet. The volume of business is small, and the orders that have presented themselves have been eagerly competed for, so that prices have again gone off again, and at the close St. Louis is quoted at 5.27½@5.30c., and New York 5.42½@5.45 cents.

The London market is unchanged, good ordinaries being quoted at £23 17s. 6d. and specials at £24 2s. 6d. per ton.

Base price of zinc sheets has been reduced ¼c., and is now $7.50 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

Aluminum—Very little business has been done. Prices are a little lower, and No. 1 ingots can be had for 22½c., New York.

Antimony—The market is still dull. Cookson's is quoted at 7½@7⅝c. per lb. U. S. is unchanged, at 7⅜@7½c., while 7@7⅛c. is named for outside brands.

Quicksilver—The market is steady, with prices unchanged. The New York quotations are $42 per flask of 75 lb. for large lots; $44@45 for jobbing orders. San Francisco, $41.50 for domestic business and $2 less for export. London price is £8 per flask, £7 10s. being quoted by second hands.

Cadmium—Current quotations are 60@70c. per lb. in 100-lb. lots, f.o.b. New York, according to quantity of metal.

Magnesium—The price of pure metal is $1.50 per lb. for 100-lb. lots, f.o.b. New York.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 500-lb. lots up to 55c. for 200-lb. lots. The price of electrolytic is 5c. higher.

Spanish Metal Exports

Exports of metals and minerals from Spain, nine months ended Sept. 30, reported by *Revista Minera*, in metric tons:

Metals.	1909.	1910.	Changes.
Pig and manuf. iron	44,416	36,314	D. 8,102
Copper	12,884	13,216	I. 332
Copper precipitate..	13,678	11,076	D. 2,602
Lead	141,461	142,491	I. 1,030
Zinc	907	1,655	I. 748
Quicksilver	1,488	1,309	D. 179
Minerals.			
Iron ore	5,801,609	6,322,278	I. 520,679
Manganese ore	10,782	4,630	D. 6,152
Copper ore	849,061	751,590	D. 97,471
Lead ore	2,741	2,715	D. 26
Zinc ore	97,158	97,324	I. 166
Pyrites, iron	1,020,775	1,136,969	I. 116,194
Salt	441,232	406,453	D. 34,779

Imports of phosphate of lime, 60,218 tons in 1909, and 90,356 in 1910; superphosphates and basic slag, 113,126 tons in 1909, and 149,272 in 1910; nitrate of soda, 24,141 tons in 1909, and 24,578 this year.

British Metal Imports and Exports

Imports and exports of metals in Great Britain, 11 months ended Nov. 30, figures in long tons, except quicksilver, which is in pounds:

Metals:	Imports.	Exports.	Excess.
Copper, long tons	119,777	76,030	Imp. 43,747
Copper, 1909	158,733	57,798	Imp. 100,935
Tin, long tons	40,530	39,370	Imp. 1,160
Tin, 1909	38,919	37,664	Imp. 1,255
Lead, long tons	202,339	44,663	Imp. 157,676
Lead, 1909	189,090	42,220	Imp. 146,870
Spelter, l'g tons	126,355	8,285	Imp. 118,070
Spelter, 1909	108,496	7,637	Imp. 100,859
Quicksilver, lb.	3,309,049	1,713,647	Imp. 1,595,402
Quicksilver, '09	3,169,061	1,567,087	Imp. 1,601,974
Minor met's, tons	4,984	20,693	Exp. 15,709
Minor, 1909	5,025	19,938	Exp. 14,913
Ores:			
Tin ore and con.	23,739	.....	Imp. 23,739
Tin ore, 1909	21,964	.....	Imp. 21,964
Pyrites	741,940	.....	Imp. 741,940
Pyrites, 1909	701,869	.....	Imp. 701,869

Copper totals include metallic contents of ore and matte. Exports include reexports of foreign material. Miscellaneous metals include nickel, aluminum and the minor metals and alloys. Of the imports in 1910, the United States furnished in all 416 tons copper matte, 35,941 tons fine copper, and 31,301 tons lead. This lead was chiefly Mexican, refined in this country.

Zinc and Lead Ore Markets

Platteville, Wis., Dec. 24—The base price of 60 per cent. zinc ore started at $42 and slumped to $40 at the week end. The base price paid for 80 per cent. lead ore was $53@55 per ton.

SHIPMENTS, WEEK ENDED DEC. 24.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Mineral Point	867,070	.....	.....
Galena	777,700	.....	.....
Platteville	595,690	.....	249,400
Cuba City	372,480	138,000	1,083,230
Benton	254,900	.....	.....
Harker	224,400	.....	.....
Highland	224,300	53,680	.....
Linden	75,930	.....	.....
Hazel Green	.....	60,000	.....
Total	3,137,570	251,680	1,332,630
Year to date	123,240,964	11,037,624	26,919,130

Shipped to separating plants during week, 3,020,850 lb. zinc ore.

Joplin, Mo., Dec. 24—The highest price reported paid for zinc sulphide ore was $45, the assay base $38@42 per ton of 60 per cent. zinc contents. Zinc silicate sold on a base of $22@25 per ton of 40 per cent. zinc contents. The average price, all grades of zinc, was $40.14 per ton. The market price of lead ore was unchanged at $56 base for 80 per cent. lead, the highest price being reported at $56.50. Average, all grades of lead, $55.76 per ton.

The new smelter at Webb City this week took in 1,500,000 lb .of lead from

one holding company, and the works are to be started the first of the new year with a large stock of ore in the bins. It is rumored that a strong St. Louis company has been chosen selling agent for the new smelter, with a guaranteed market for a continuous output of metal.

Zinc prices were stronger at the week-end, with heavy purchases by one company, which advanced its buying scale $4 over last week. The production was light, many of the mines closing on Friday night, to remain closed until Jan. 2 next.

SHIPMENTS, WEEK ENDED DEC. 24.

	Zinc lb.	Lead lb.	Value.
Webb City-Carterville	4,127,920	2,464,070	$153,615
Joplin	1,548,900	130,130	37,170
Galena	752,620	158,300	19,485
Alba-Neck	684,040	4,030	15,152
Duenweg	723 950	21,710	13,062
Spurgeon	531,650	26,410	7,789
Miami	.....	189,590	5,118
Carthage	214,590	3,040	4,488
Carl Junction	191,270	.....	4,208
Jackson	113,460	6,820	2,509
Badger	71,320	6,590	1,532
Cave Springs	70,160	1,720	1,449
Oronogo	80,050	.....	1,324
Sarcoxie	62,360	.....	1,278
Quapaw	63,000	.....	1,260
Totals	9,235,290	3,012,410	$269,439
52 weeks	581,138,120	86,165,580	$12,858,774
Zinc value, the week, $185,425; 52 weeks, $11,603,555			
Lead value, the week, 84,014; 52 weeks, 2,258,891			

MONTHLY AVERAGE PRICES.

Month.	Zinc Ore.				Lead Ore.	
	Base Price.		All Ores.		All Ores.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$41.25	$47.31	$38.46	$45.16	$52.17	$56.99
February	36.94	40.69	34.37	39.47	50.50	53.64
March	37.40	43.60	34.71	39.71	50.82	51.26
April	38.63	41.00	37.01	39.33	55.63	49.72
May	40.06	40.19	37.42	37.51	56.59	48.16
June	44.15	40.20	40.35	37.83	57.52	48.80
July	43.06	39.63	41.11	36.80	53.74	48.59
August	48.25	40.13	44.54	37.32	57.60	49.75
September	47.70	43.45	44.87	39.96	56.11	54.73
October	49.50	43.31	45.75	40.50	55.02	53.18
November	51.31	47.20	48.29	43.20	53.94	54.80
December	49.45	.....	47.57	.....	55.26	.....
Year	$43.98	.....	$41.20	.....	$54.60	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Other Ore Markets

Iron Ore—The Lake Superior season is closed and all buying of ore will now be done on next year's prices. No action has yet been taken toward fixing quotations.

In the East there is no organization of sellers, and no general quotations can be given. It may be said, however, that prices on the open market will range from 7 to 8c. per unit of iron delivered to furnace; which would be $3.50@4 for a 50 per cent. ore. Most ores, however, are sold under yearly contracts.

Manganese Ore—The base price, as fixed by large buyers, is 25c. per unit for manganese and 5c. per unit for iron content, for a base ore containing 49 per cent. or over in manganese, not over 0.20 phosphorus and 8 per cent. silica. Prices range down to 23c. per unit for 40 per cent. manganese; with deductions for excess of phosphorus and silica.

Tungsten Ore—Ferberite, wolframite and huebnerite ores, $6.50@7 per unit per ton of 2000 lb. of ore containing 60 per cent. of tungsten trioxide. For scheelite ore, 50c.@$1.50 per unit less.

Zinc Ores—For Rocky Mountain blende of good quality, especially as to iron and lead contents, the current price is for the zinc content, less 8 units, at the St. Louis price of spelter; with a deduction of $14@15 per 2000 lb. of ore. See also Joplin and Wisconsin ore markets.

Pyrites—Domestic pyrites are quoted at 11½@12c. per unit of sulphur at mines for furnace sizes. Spanish pyrites, furnace sizes, are 12@12½c. per unit, ex-ship. Arsenical pyrites are from ½@1¼c. per unit less.

CHEMICALS

New York, Dec. 28—The general market remains quiet, and it is not expected that there will be any improvement until the new year is fairly opened.

Copper Sulphate—Business is moderate and prices are unchanged at $4 per 100 lb. for carload lots, and $4.25 per 100 lb. for smaller orders.

Arsenic—The market is still dull and quotations are nominally unchanged at $2.25 per 100 lb. for white arsenic.

Nitrate of Soda—A little more business is reported, but there is no great activity in this article, and prices are unchanged at 2.12½c. per lb. for both spot and future positions.

MINING·STOCKS $

New York, Dec. 28—The market on the general exchange had very little life in it, and what there was seemed to be taken out by the double holiday. Business was light and price changes unimportant. Trading is still largely professional.

The Curb, like the Exchange, was quiet and rather depressed. Business was on a small scale, and there was little movement in quotations. The dullness applied to the copper stocks as well as other sections of the market.

At auction in New York, Dec. 22, sales included 10 shares Amalgamated Copper, $100 par, at $63.75, and five shares at $64 per share; 20,000 shares Royal Tinto Mining and Smelting Company, $1 par, $50 for the lot; five shares Electrical Lead Reduction Company and 14 shares Ohio & Indiana Consolidated Natural and Illuminating Gas Company, lumped with some industrials, $15 for the lot.

Boston, Dec. 27—Copper shares remain in a comatose state and the year closes a disappointing one so far as the local market is concerned. Aside from the metal situation events such as were witnessed in North Butte, Granby, Calumet & Arizona, Lake and Arizona Commercial early in the year and the Utah Consolidated episode of recent date have gone far to bring a feeling of uncertainty in the whole copper-share market.

COPPER PRODUCTION REPORTS.
Copper contents of blister copper, in pounds.

Company.	September.	October.	November.
Anaconda	22,200,000	22,100,000	21,900,000
Arizona, Ltd.	2,672,000	3,004,000	3,010,000
Balaklala	*nil*	928,360	.....
Copper Queen	6,903,759	7,060,796	7,372,776
Calumet & Ariz.	2,535,000	1,990,000	1,930,000
Detroit	2,128,000	1,757,836	1,840,939
East Butte	625,840	948,369	618,191
Imperial	*nil*	*nil*	.....
Mammoth	.....	.....	.....
Nevada Con.	5,151,208	4,980,300	5,200,000
Old Dominion	2,262,000	2,345,000	2,754,000
Shannon	1,418,000	1,286,000	1,420,000
Superior & Pitts.	2,125,000	2,095,000	2,160,000
United Verde, est.	.....	.....	3,000,000
Utah Copper Co.	7,077,035	7,582,212	4,567,000
Lake Superior dis.	16,700,000	18,500,000	20,400,000
Est. for non-reporting mines	.....	13,250,000	.....
Total production.	71,796,842	87,827,873	.....
Imports, bars, etc.	24,303,859	24,292,368	.....
Total blister	96,101,701	112,120,241	.....
Imp. in ore & matte	5,782,067	5,173,277	.....
Total	106,883,768	117,293,518	.....
Brit. Col. Cos.:			
British Col. Copper	622,702	702,154	917,994
Granby	.....	1,184,234	.....
Mexican Cos.:			
Boleo	2,061,300	2,278,454	.....
Cananea	3,565,000	3,576,000	3,658,000
Moctezuma	2,211,435	1,791,108	1,654,235

Lake Superior figures are estimated; others are reports received from companies, unless otherwise stated. Boleo copper does not come to American refiners.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
XII, 1909	117,828,655	69,519,501	59,546,570
Year, 1909	1,405,403,056	705,051,591	680,942,620
I, 1910	116,547,287	78,158,387	81,691,672
II	112,712,493	66,618,322	37,369,518
III	120,067,467	62,844,818	40,585,767
IV	117,477,639	67,985,951	31,332,434
V	123,242,476	59,305,222	45,495,400
VI	127,219,188	53,363,196	65,895,948
VII	118,370,003	56,708,175	59,407,167
VIII	127,803,618	67,731,271	61,831,780
IX	119,519,983	64,501,018	75,106,496
X	126,469,284	67,814,172	68,186,912
XI	119,353,463	60,801,992	67,424,316

	Visible Stocks.		
	United States.	Europe.	Total.
XII, 1909	153,003,527	236,857,600	389,861,127
I, 1910	141,766,111	244,204,800	385,970,911
II	98,463,339	248,236,800	346,700,139
III	107,187,992	254,150,400	361,338,392
IV	123,824,874	249,625,600	373,450,474
V	141,984,159	246,870,400	388,854,559
VI	160,425,973	239,142,400	399,568,373
VII	168,386,017	232,892,800	401,278,817
VIII	170,640,678	222,320,000	392,960,678
IX	168,881,245	218,444,800	387,326,045
X	148,793,714	211,276,800	360,070,514
XI	139,261,914	198,060,800	337,322,714
XII	130,389,069	193,200,000	323,589,069

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

The list of Lake Superior copper properties paying dividends is the same in number as for 1909, namely Calumet & Hecla, Quincy, Copper Range, Osceola, Mohawk and Wolverine and their total disbursement was $6,611,340, of which Calumet itself contributed $2,900,000. The so called porphyry mines have made increased payments in some cases. Among those to reduce have been North Butte, Calumet & Arizona and Granby, while Utah Consolidated after reducing its rate finally passed altogether.

It has been a year of declining prices and almost a lack of interest by the public. Brokers, those who do a strictly commission business have found it hard sledding and few have even paid expenses. With the advent of the New Year the hope springs that better things can be looked for.

Assessments

Company.	Delinq.	Sale.	Am t
Alpha Con., Nev.	Jan. 12	Feb. 12	$0.05
Alta, Nev.	Jan. 16	Feb. 6	0.03
Amador C. & G., Ida.	Dec. 15	Jan. 15	0.01
Amal. Nev. Mines Co.	Dec. 15	Jan. 15	0 05
Andes, Nev.	Jan. 19	Feb. 9	0.05
Beck Tunnel, Utah.	Dec. 13	Jan. 6	0.01
Belcher, Nev.	Jan. 3	Jan. 23	0.10
Bullion, Nev.	Jan. 9	Feb. 7	0.05
Con. Imperial, Nev.	Jan. 5	Jan. 30	0.01
Copper King, Ida.	Dec. 16	Jan. 16	0.01
Federal Ely, Nev.	Jan. 20	.....	0.01
Florence M. & M., Ida.	Feb. 20	Mar. 20	0.001
Horseshoe, Ida.	Dec. 19	Jan. 10	0.002
Ibex, Ida	Dec. 17	Jan. 17	0.002
Julia Con.	Jan. 19	Jan. 17	0.05
Keystone, Utah.	Dec. 15	Feb. 16	0.03
Leroy G & C., Ida.	Dec. 21	Jan. 10	0.001
Mexican, Nev.	Jan. 10	Jan. 31	0.20
New York Summit, Utah.	Jan. 19	.....	0.02
North Franklin, Ida.	Dec. 15	Jan. 16	0.005
Sierra Nevada, Nev.	Jan. 17	Feb. 8	0.10
Silver Queen, Utah.	Dec. 15	Jan. 10	0 004
Uintah-Treas. Hill, Utah.	Dec. 12	Jan. 6	0.01
Utah, Nev.	Jan. 10	Jan. 31	0.05
Vienna Vein, Ida.	Dec. 15	Jan. 16	0.001

Monthly Average Prices of Metals

SILVER

Month.	New York.		London.	
	1909.	1910.	1909.	1910.
January	51.750	52.375	23.843	24.154
February	51.472	51.534	23.706	23.794
March	50.468	51.454	23.227	23.690
April	51.428	53.221	23.708	24.483
May	52.905	53.870	24.343	24.797
June	52.538	53.462	24.166	24.651
July	51.043	54.150	23.519	25.034
August	51.125	52.912	23.588	24.428
September	51.440	53.295	23.743	24.567
October	50 923	55.490	23.502	25.596
November	50.703	55.635	23.351	25.680
December	52.226	.....	24.030	.....
Total	51.502	.....	23.706	.....

New York, cents per fine ounce; London, pence per standard ounce.

COPPER.

	New York.				London.	
	Electrolytic		Lake.			
	1909.	1910.	1909.	1910.	1909.	1910.
January	13.893	13.620	14.280	13.870	61.198	60.923
February	12.949	13.332	13.295	13.719	57.688	59.388
March	12.387	13.255	12.826	13.586	56.231	59.214
April	12.56½	12.733	12.93½	13.091	57.363	57.238
May	12.893	12.550	13.238	12.885	59.338	56.313
June	13.214	12.404	13.548	12.798	59.627	55.310
July	12 880	12.215	13.363	12.570	58.556	54.194
August	13.007	12.490	13.296	12.715	59.393	55.733
September	12 870	12.379	13.210	12.668	59.021	55.207
October	12.700	12.553	13.030	12.788	57.551	56.722
November	13 125	12.742	13.354	12.914	58.917	57.634
December	13.298	.....	13.647	.....	59.906	.....
Year	12.982	.....	13.335	.....	58.732	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Month.	1909.	1910.	Month.	1909.	1910.
January	28.060	32.700	July	29.125	32.695
February	28.290	32.920	August	29.966	33.972
March	28.727	32.403	September	30.293	34.982
April	29.445	32.976	October	30.475	36.190
May	29.225	33.125	November	30.859	36.547
June	29.322	32.769	December	32.913	.....
			Av Year	29.725	.....

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis.		London.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	4.175	4.700	4.025	4.582	13.113	13.650
February	4.018	4.613	3.868	4.445	13.313	13.328
March	3.986	4.459	3.835	4.307	13.438	13.063
April	4.168	4.376	4.051	4.225	13.297	12.641
May	4.287	4.315	4.214	4.164	13.225	12.550
June	4.350	4.343	4.291	4.207	13.031	12.688
July	4.321	4.404	4.188	4.291	12.563	12.531
August	4.363	4.400	4.227	4.290	12.475	12.513
September	4.342	4.400	4.215	4.289	12.781	12.582
October	4.341	4.400	4.215	4.271	13.175	13.091
November	4.370	4.442	4.252	4.314	13.047	13.217
December	4.560	.....	4.459	.....	13.125	.....
Year	4.273	.....	4.153	.....	13.049	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York.		St. Louis.		London.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	5.141	6.101	4.991	5.951	21.425	23.350
February	4.889	5.569	4.739	5.419	21.562	23.188
March	4.757	5.637	4.607	5.487	21.438	23.031
April	4.965	5.439	4.815	5.289	21.531	22.469
May	5.124	5.191	4.974	5.041	21.975	22.100
June	5.402	5.128	5.252	4.978	22.000	22.094
July	5.402	5.152	5.252	5.002	21.969	22.406
August	5.729	5.279	5.579	5.129	22.125	22.800
September	5.796	5.514	5.646	5.364	22.906	23.165
October	6.199	5.628	6.043	5.478	23.200	23.900
November	6.381	5.976	6.231	5.826	23.188	24.083
December	6.249	.....	6.099	.....	23.094	.....
Year	5.503	.....	5.352	.....	22.201	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PRICES OF PIG IRON AT PITTSBURG.

	Bessemer.		Basic.		No. 2 Foundry.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$17.18	$19.90	$16.40	$17.98	$16.26	$17.94
February	16.73	18.96	16.09	17.21	15.90	17.38
March	16.40	18.53	15.84	16.93	15.62	17.00
April	15.79	18.28	15.05	16.84	15.06	16.75
May	15.77	17.10	15.02	15.94	15.08	16.18
June	16.13	16.52	15.84	15.60	15.63	15.53
July	16.40	16.40	15.90	15.40	15.96	15.40
August	17.16	16.09	16.17	14.89	16.20	15.16
September	18.44	15.92	16.80	14.73	17.03	14.93
October	19.75	15.90	17.84	14.05	18.02	14.88
November	19.90	15.84	18.37	14.26	18.09	14.78
December	19.90	.....	18.15	.....	17.90	.....
Year	$17.46	.....	$16.46	.....	$16.40	.....

STOCK QUOTATIONS

COLO. SPRINGS Dec. 27

Name of Comp.	Bid.
Acacia	.05½
Cripple Cr'k Con.	.02⅜
C. K. & N.	.17
Doctor Jack Pot	.07½
Elkton Con.	.73½
El Paso	.85½
Fannie Rawlins	‡.05
Findlay	.06½
Gold Dollar	.12
Gold Sovereign	.03½
Isabella	.18½
Jennie Semple	.10½
Lexington	.01½
Moon Anchor	.03½
Old Gold	.04
Mary McKinney	.49
Pharmacist	.02
Portland	1.05
Vindicator	.01½
Work	.03½

SALT LAKE Dec. 27

Name of Comp.	Bid.
Bingham Copper	‡.15
Carisa	‡.12
Colorado Mining	.34½
Columbus Con	.19
Daly Judge	‡4.25
Grand Central	.82
Iron Blossom	.86
Little Bell	.95
Little Chief	‡.22
Lower Mammoth	.12
Mason Valley	9.70
Maj. Mines	‡.53
May Day	.09
Nevada Hills	2.12½
New York	‡.13
Prince Con	.60
Silver King Coal'n	1.80
Sioux Con	.31½
Uncle Sam	.45
Victoria	‡1.07½

SAN FRANCISCO. Dec. 27.

Name of Comp.	Clg.
COMSTOCK STOCKS	
Alta	‡.65
Belcher	.35
Best & Belcher	‡.16
Caledonia	.27
Challenge Con.	.09
Chollar	.16
Confidence	.40
Con. Cal. & Va.	.75
Crown Point	.34
Gould & Curry	.16
Hale & Norcross	.11
Mexican	.70
Occidental	.41
Ophir	1.22½
Overman	.25
Potosi	‡.30
Savage	.10
Sierra Nevada	.13
Union Con.	.26
Yellow Jacket	.39

Name of Comp.	Bid.
MISC. NEV. & CAL.	
Belmont	4.52½
Jim Butler	.25
MacNamara	.18
Midway	.16
Mont.-Tonopah	.90
North Star	.04
West End Con.	.53
Atlanta	.13
Booth	.68
C.O.D. Con.	‡.15
Comb. Frac.	.16
Jumbo Extension	.25
Oro	.05
Silver Pick	.05
St. Ives	.15
Tramps Con.	.02
Argonaut	‡1.00
Bunker Hill	‡7.25
Cent. Eureka	‡1.10
So. Eureka	‡6.25

N. Y. EXCH. Dec. 27

Name of Comp.	Clg.
Amalgamated	61¼
Am. Agri. Chem.	45⅛
Am.Sm.&Ref.,com	72⅝
Am. Sm. & Ref., pf.	102½
Anaconda	38¼
Batopilas Min.	2
BethlehemSteel pf	‡59
Federal M. & S., pf.	‡58
Goldfield Con.	8½
Great Nor., orectf.	56¾
Homestake	‡85
Nat'nalLead,com.	53
National Lead, pf.	‡106⅜
Nev. Consol.	18¼
Pittsburg Coal,pf.	‡66½
RepublicI&S,com.	30
Republic I & S, pf.	‡93½
SlossSheffi'd,com.	‡49¾
Sloss Sheffield, pf.	‡114¼
Tennessee Copper	34⅜
Utah Copper	44⅝
U. S. Steel, com.	71⅜
U. S. Steel, pf.	116½
Va. Car. Chem.	61½

N. Y. CURB Dec. 27

Name of Comp.	Clg.
Ariz.-Cananea	3⅜
Barnes King	‡5/16
Bonanza Creek	‡3
Braden Copper	4
B. C. Copper	7⅛
Buffalo Mines	‡2 1/16
Butte Coalition	19⅛
Caledonia	⅝
Calumet & Mont.	90
Canadian Mines	‡6¾
Chino	21⅛
Cobalt Central	10
Con. Ariz. Sm.	1 7/16
Davis-Daly	1½
Dominion Cop.	‡7
Ely Con.	31
El Rayo	4
Florence	1¾
Giroux	6¾
Greene Cananea	6¾
Guanajuato	3 1/16
Guerrero	1⅝
Guggen. Exp.	195
Kerr Lake	6¾
La Rose	4 1/16
McKinley-Dar-Sa.	1.25
Miami Copper	19¾
Mines Co. of Am.	5 1/16
Mont. Shoshone	‡.14
Nev. Utah M. & S.	⅞
Nipissing Mines	10⅞
Ohio Copper	1⅝
Pacific Sm. & M.	7/16
Precious Metals	1¾
Ray Central	2 1/16
Ray Con.	⅞
Red Warrior	1½
South Utah M. & S.	1
Standard Oil	617
Stewart	¾
Tonopah	8⅝
Tonopah Ex.	.99½
Tri-Bullion	½
Tularosa	½
Union Mines	¾
Yukon Gold	3¾

LONDON Dec. 28

Name of Com.	Clg.
Dolores	£1 10s 0d
Stratton'sInd.	0 3 3
Camp Bird	1 12 10½
Esperanza	1 18 1½
Tomboy	0 15 7½
El Oro	1 6 9
Oroville	0 6 0
Mexico Mines	7 17 6

BOSTON EXCH. Dec. 27

Name of Comp.	Clg.
Adventure	‡7½
Algomah	‡8⅜
Allouez	‡40
Am. Zinc	25¼
Arcadian	‡4
Arizona Com	‡14⅛
Atlantic	‡6
Bonanza	‡.50
Boston & Corbin	12
Butte & Balak	6
Calumet & Ariz.	47⅛
Calumet & Hecla	‡560
Centennial	‡17
Con. Mercur	‡6
Copper Range	67
Daly-West	3½
East Butte	11⅜
Franklin	9½
Granby	38
Hancock	20¼
Helvetia	‡2
Indiana	11¼
Isle Royale	‡17
Keweenaw	3
Lake	33
La Salle	7
Mass	‡7⅛
Michigan	‡3⅛
Mohawk	‡46
Nevada	18¼
North Butte	27
North Lake	‡6½
Ojibway	‡8
Old Dominion	‡36¾
Osceola	127
Parrot	‡12
Quincy	70
Shannon	11⅜
Superior	41
Superior & Bost.	5½
Superior & Pitts.	14
Tamarack	‡52
Trinity	4¾
U. S. Mining	34¾
U. S. Mining, pf.	47½
Utah Apex	‡2¾
Utah Con.	13
Victoria	‡2½
Winona	‡9⅜
Wolverine	118
Wyandot	‡1 1/16

BOSTON CURB Dec. 27

Name of Comp.	Last.
Ahmeek	‡183
Bingham Mines	‡2½
Boston Ely	.97
Boswycolo	‡.97½
Cactus	.24
Calaveras	2.00¾
Champion	.03½
Chemung	‡.08½
Chief Cons	1½
Cons. Ariz.	1⅞
Corbin	‡4.37½
Crown Reserve	2½
First Nat. Cop.	1⅝
Inspiration	8¾
Mackinaw	.43
Majestic	.39
Nat'l Mine & Ex.	.07
Nevada-Douglas	2⅜
Oneco	‡2.00
Raven Copper	.45
Rhode Island Coal	6
San Antonio	‡6
Shattuck-Ariz	‡24½
South Lake	7
Superior & Globe	.13
Trethewey	‡1⅛
Tuolumne Copper	‡4¾
Vulture	8¼
Yuma	.30

‡Last quotation.

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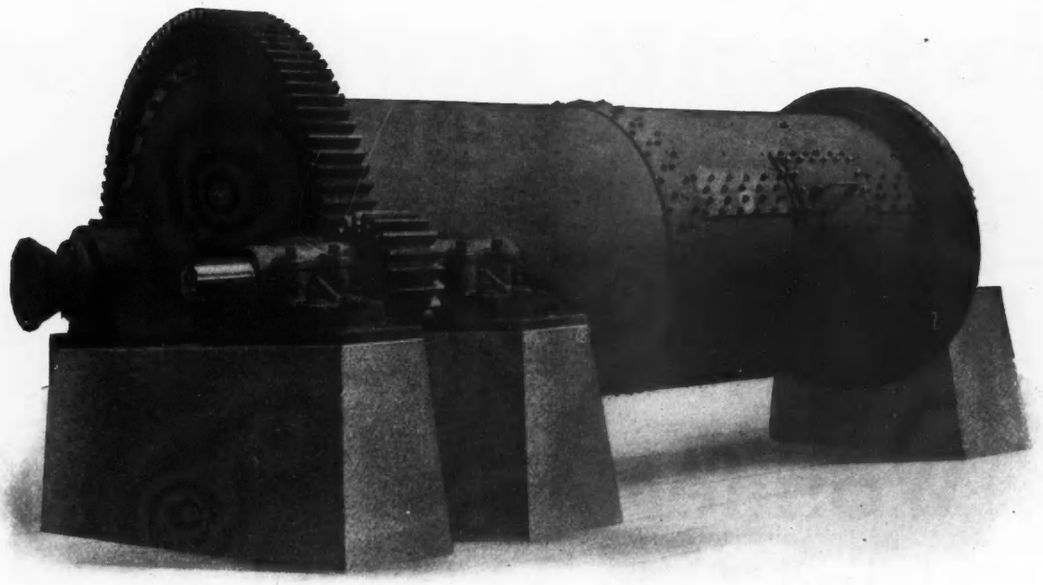
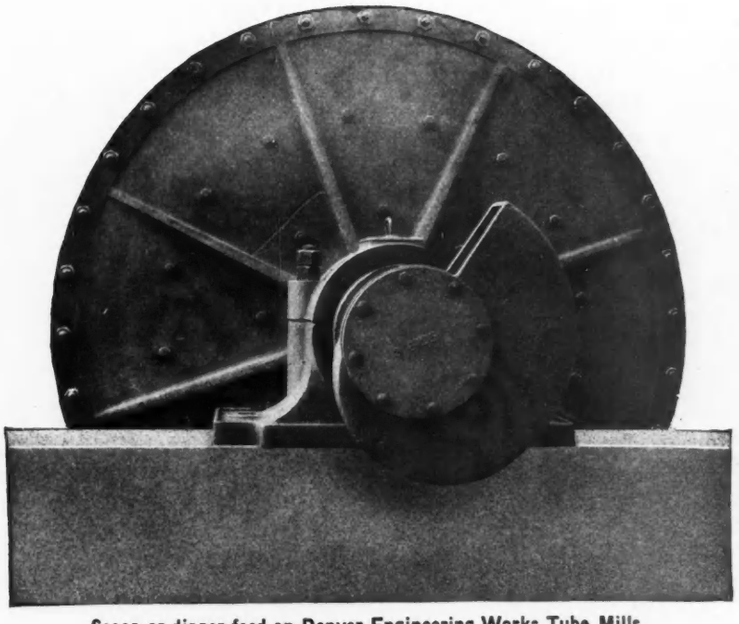


5 ft. x 16 ft. Mill—Note the substantial construction of the head, the bearings and the machine cut gears.



Scoop or dipper feed on Denver Engineering Works Tube Mills.
No stuffing box to wear and leak.

For regrinding to fine and uniform size, the simplest and cheapest machine is the tube mill. Our tube mills are the best. They contain improvements for minimizing power, labor and wear.

There is a method for determining the point where the increased extraction more than offsets the increased cost of regrinding

Write us for information.

THE DENVER ENGINEERING WORKS COMPANY

Denver, Colo., U. S. A.

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	SEATTLE:	Hallidie Machinery Company for Western Washington, Alaska and Vancouver.

53

Wonder Rock Drills
Using One-Third The Air

required by "two-man" drills cut more feet of holes per day. The Wonder Rock Drill is a "one-man" drill.

It will drill more feet of holes per cubic foot of air consumed than any other drill.

There is but one movable part to the Wonder Rock Drill—a combined piston, valve and hammer. There are no sensitive valves to waste air.

A very strong feature is the Double Air Feed Cylinder. It permits the hose to be attached to the air feed cylinder rather than the drill, avoids swinging the hose with the drill, saves unnecessary labor of operator swinging the hose, lengthens the life of hose and fittings, permits the drill cylinder and bit to be completely rotated, which gives a round, smooth hole, provides for a limited air supply while starting the drill hole and has but one source of air supply with but one throttle regulating same.

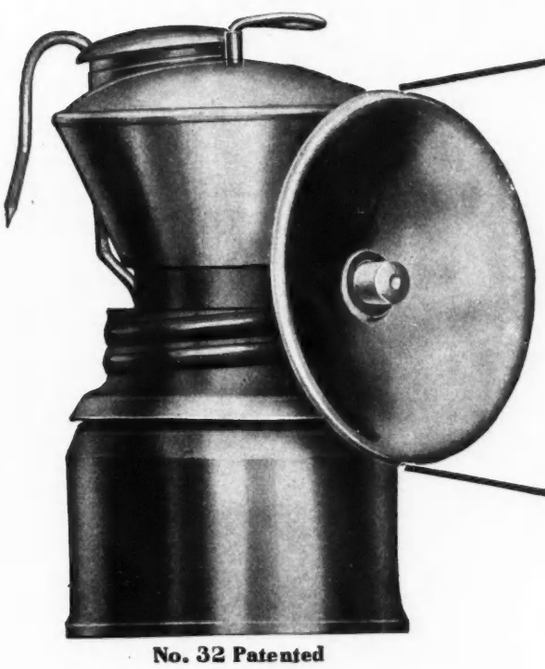
Thousands of Wonder Rock Drills have been sold and are everywhere giving complete satisfaction.

Write for Catalog, list of users and further particulars.

Hardsocg Wonder Drill Co.
Ottumwa, Iowa

The Baldwin Mine Lamp

The Solution Of The Problem Of Lighting The Mine



No. 32 Patented

Mining is a centuries-old industry. From the crudest beginnings it has grown and developed until today it stands as one of the great modern industrial activities.

And in that long evolution, every part of the business of mining has been completely changed. New methods have supplanted old; the new have, in turn, become old, and fresh and better methods taken *their* place. Each successive step has been an advance toward the *modern methods* of today.

And the men who are achieving the great mining successes are those who have seized upon these improvements.

The Baldwin Mine Lamp is the highest development in the evolution of devices for lighting the mine.

Its use—in the place of candles and oil lamps—is a *modern* method, one of the necessities if the mine is to be conducted on an up-to-date basis and not according to the dictate of years ago.

The Baldwin gives much *more* light and a brighter clearer light than either oil or candles.

It does not fill the necessarily close mine air with noxious fumes or smoke; it does not eat up the oxygen in the air as do oil lamps or candles.

It's safer; it's cleaner; it costs less at the end of the year; it makes more and better work possible by the miners.

The simplicity of construction is a particular feature of the Baldwin. **The Flow of Water Is Automatically Regulated** Study the sectional view. Note how the water is brought into contact with the carbide. It is delivered drop by drop and jarring or jolting cannot increase the flow. This is exclusive with the "Baldwin."

You get all the gas the carbide contains—you can't get more.

Sectional View

Our Free Trial Offer

We want you to try Baldwin Lamps and so will send you lamps on trial.

We pay all transportation charges. If, after trial, you like the Baldwin Lamps, pay us for them.

If not, send them back and the trial costs you nothing.

John Simmons Company

Manufacturers

102 Centre St. **New York**

Branches: San Francisco, Cal.; Butte, Mont.

DODGE

Rope Drives for the Economical Transmission of Power at Mining Plants

Successfully meeting the severe conditions under which power is transmitted at mining plants has been part of our practice for years.

Our engineers plan complete transmission and elevating and conveying outfits, specially designed to save power and expense of maintenance and attendance.

We make and furnish whatever type of transmission is required, and our experience has been that rope drives, correctly designed, will profitably solve many of the difficult problems at mines and smelters.

The American System of Rope Transmission is positive, and at the same time possesses great flexibility.

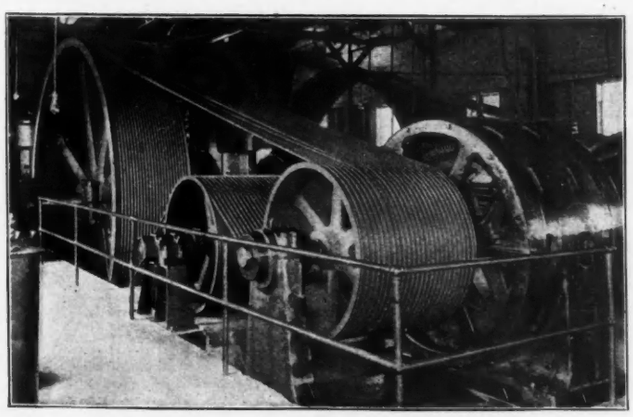
It is wonderfully efficient for main engine and for outdoor drives; also for vertical driving, to transmit power at angles, and to drive pumps, air compressors, and generators.

Boston & Mont. C. C. & S. M. Co., Butte, Mont.; Hercules Mng. Co., Burke, Idaho; Penn Iron Mng. Co., Vulcan, Mich.; Federal Mng. & Smltg. Co., Wallace, Idaho; Cia. Minera de Penoles, Mapimi, Dgo., Mexico; various plants of the Amer. Smltg. & Refng. Co.; and dozens of others—

Have installed Dodge Rope Drives and found them real profit producers.

If your power distribution problem is a troublesome one, Our Transmission Specialists Will Advise With You.

They will go over your sketches and data, and submit drawings of a Dodge Rope Drive, such as our long experience has proved most successful in similar situations—a drive which we can warrant to operate with real economy and efficiency.



Write us the conditions at your plant and get the information we can furnish.

We have gotten out a handsome book, No W-76, "Twenty-five Years of Rope Driving," containing information on this subject, of value to mining men. This book is 9" x 12", 104 pages. We will be glad to send a complimentary copy to owners, managers, superintendents, mechanical, chief and consulting engineers of mining and milling plants, who send the coupon or a letter.

Dodge Mfg. Co. Station L-17, Mishawaka, Indiana

Please send me your book, W 76, "Twenty-five Years of Rope Driving."

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Dodge Manufacturing Co.

Sta. L-17, Mishawaka, Indiana

"Everything for the Mechanical Transmission of Power" Elevating and Conveying Equipment, and the "Eureka" Water Softener and Purifier

BRANCHES AND AGENCIES IN PRINCIPAL CITIES

Alphabetical Index to Advertisers

The Most Powerful Arc Lamp On The Market

This new lamp gives *more light for less money* than any other single unit in the world. It gives as much light as five ordinary enclosed arc lamps on ¼ of the electrical energy. No other light compares in volume with the intensely brilliant light given by G-E Vertical Carbon Flame Arc Lamp. It marks a new era in arc lamp development and is the culmination of years of experience by the largest and leading manufacturer of arc lamps in the world.

General Electric
Vertical Carbon Flame Lamps

(For Direct Current Service Only)

This lamp is shorter than other flame lamps, more compact and attractive in appearance. The trimming is easy, since it is unnecessary to remove the casing. The mechanism is somewhat similar to that of the Standard D. C. Enclosed Arc Lamp and the arc remains always in the same position—an obvious advantage. Upon request we will explain fully many other desirable features. Learn from our illuminating experts *exactly how* you can use these lamps to advantage. A practical demonstration from our nearest representative when you desire it.

For Use In

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Steel Mills
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General Electric Company

Largest Electrical Manufacturer in the World

Schenectady, N. Y.

2863

Classified Index to Articles Advertised

It Pays To Spend Money For A Machine That Saves It.

ONE reason for the prosperity and activity of this country is because the people are good *spenders*.

We're not talking of the Willie Boys who dally with the lobster pots of Broadway.

We mean that all classes of business men are open-minded to anything that will help them to get better results in their work.

They do not close their minds or pocket-books to any device that will prove profitable.

They take the broad view that it is the ultimate result, not the first cost, that counts.

Therefore, they are willing to be shown.

In the advertising pages of the ENGINEERING AND MINING JOURNAL—in this very issue—you will find mining machines and devices that are ready to show you it will pay you to invest in them.

Look through these pages and find *how many* there are to which this rule applies.

Remember, it only pays to advertise—because it pays to read advertisements.

POSITIONS VACANT

Advertisements under this heading 50 cents for 50 words or less. Additional words, two cents a word. Cash or stamps must accompany order.

Wanted—Young man who can do simple coal mine surveying and mapping, to act as assistant to mine superintendent; state qualifications and salary wanted. Address Box 943, ENGINEERING AND MINING JOURNAL. Jan. 7.

Wanted—Young man capable of taking charge of coal mine office; no bookkeeping required; state qualifications and salary wanted. Address Box 942, ENGINEERING AND MINING JOURNAL. Jan. 7.

Wanted—By large manufacturing company, an experienced salesman, familiar with hydraulic and steam machinery; territory, South American countries; must speak Spanish; apply in writing, stating experience. Address "Hydrosteam," Post Office Box 824, New York City. t.f.

Wanted—A master mechanic for a lead smelter, who is thoroughly competent to look after the electrical end as well as the mechanical; only steady, sober and reliable men need apply with references, stating your training for such a position and when you could report for duty. Address "Lead Smelter," Care ENGINEERING AND MINING JOURNAL. Dec. 31.

SITUATIONS WANTED

Advertisements under this heading 50 cents for 50 words or less. Additional words, two cents a word. Cash or stamps must accompany order.

Superintendent—Experienced superintendent and engineer now located on development proposition in the Southwest, wishes to change position; engineered and managed successfully mining operations in South America, Michigan, Florida and the Southwest; speaks Spanish; can furnish best of references; married; will go anywhere on permanent work. Address Box 891, Care ENGINEERING AND MINING JOURNAL. t.f.

Mine accountant, American, single, with fair knowledge of Spanish, desires position in Mexico or South America; competent to handle mine, mill and metallurgical accounts, detailed costs, voucher systems, etc.; can furnish bond and best references covering past experience. Address "Mine Accountant," Apartado 218, Guadalajara, Mex. Jan. 28.

Mining engineer, at present manager of large property, desires to change for good reason. Experienced in all grades of mine work and management and if anything in the property can get it out. Age 36; graduate Michigan College of Mines. Present place worth $4,000 and expenses. Would accept less with company which has a future. L. L., ENGINEERING AND MINING JOURNAL. No. 664, T. F.

Experienced American engineer, reliable, good habits, thoroughly uptodate in modern mill practice and underground work, is open for engagement; 20 years of practical, mining and milling experience; technically educated, and a splendid record of executive ability; can furnish excellent references. Address Box 871, ENGINEERING AND MINING JOURNAL. t.f.

Mine manager or superintendent, open for engagement; technically educated; twelve years' experience as engineer, metallurgist, manager; construction of all kinds; eight years in Mexico and Spanish America; speak Spanish fluently; past three years general manager property in Mexico; A-1 references. Address "Tech.," ENGINEERING AND MINING JOURNAL. t.f.

American mining engineer, technically educated, with extensive and successful experience in the management of large properties in the United States and foreign countries, is open for engagement; understands all methods of mining work and timbering; experienced in latest cyanide practice and all other extraction methods; construction work of all kinds thoroughly understood; good executive ability; best of references from recognized concerns. Address Box 861, ENGINEERING AND MINING JOURNAL. t.f.

Technical graduate in mining engineering, age 29, desires a position as engineer or assistant superintendent, with an established mining company; has worked on the fuel branch of both State and the United States Geological Surveys, also on concentrating mill construction and operation, and is at present superintendent of construction and assistant operating superintendent of a large hydroelectric power company; references. Address Box 934, ENGINEERING AND MINING JOURNAL. Jan. 14.

Mine superintendent-manager, member of firm now having the entire responsibility of mines, is open to devote his personal attention to another mine where good results will give future rewards; ten years' experience gold, copper, lead, zinc, iron, all American camps, Mexico, Central America, Canada, South and Central Africa; established reputation for low costs and economy; expert in mining geology, mill erection and operating, stamps, amalgamation, cyanide, concentration, rolls, jigs, tables and separators, cost accounting; highest references. Address "Reliable," 5015 Wabash Ave., Chicago, Ill. Dec. 31.

Mill superintendent and metallurgist, experienced in construction and operation of mills, have just completed remodeling of amalgamation and cyanide plant to all sliming process, including sampling mill, battery, plates, tube mills, Pachuca agitators, vacuum filters, at present operating plant, also experienced assayer, desires position by first of year; Mexican experience; highest credentials furnished. Address "L. L. C.," ENGINEERING AND MINING JOURNAL. Jan. 14.

Mining engineer, Columbia graduate, of nine years' varied experience in practical work, assaying, surveying, examinations, and as mine superintendent, is open to engagement as superintendent, assistant, or examining engineer; three years in Mexico; prefers United States, but will go anywhere; personal interview desired, New York City; references exchanged. Address "Ready," ENGINEERING AND MINING JOURNAL. Jan. 14.

Mining engineer, with technical training, open for engagement as mine superintendent or manager in Mexico; fourteen years' practical experience of which ten have been in Mexico; economic handling of large mines and difficult transportation; Spanish spoken; excellent references. Address "Garnet," ENGINEERING AND MINING JOURNAL. Feb. 18.

Accountant (mine), age 37, single, nine years with present company, desires a change. Address Box 941, ENGINEERING AND MINING JOURNAL. Jan. 7.

Mine manager, mining engineer, technical graduate, with extensive and successful practical experience in the management of large mines, is open for engagement, preferably in Mexico; highest references; can give bond. Address F. S. Apartado 333, Guadalajara, Mexico. Jan. 28.

Mining engineer, twenty years' experience in Lake Superior district and the South as manager and general superintendent of mines and large quarries; thoroughly experienced in mining and concentrating ores by electricity and water and jig process; building railroads; aerial wire rope tramways and dams, installing steam and water power plants and mining, milling and selling talc in large quantities; best references. Address J. C. Fowle, Rochester, Vermont. Jan. 7.

A young and practically inexperienced graduate of a prominent mining school desires correspondence with some mining company where he can learn something; location immaterial, likewise position and salary; have spent two years in Cobalt and the southwest porphory coppers, and one year in the Michigan iron and copper countries. Address "Case," ENGINEERING AND MINING JOURNAL. Dec. 31.

Metallurgist, with 12 years' experience in lead and copper smelting with the largest smelters in Mexico, is open for engagement; capable of running and designing plants; used to Mexican labor and speaks the language; can furnish the best of references; would take charge of plant in either Mexico or South America. Address "Aguascalientes," Care ENGINEERING AND MINING JOURNAL. Jan. 7.

Mine foreman, American, 30 years of age, wishes position as foreman; has had 10 years' practical experience of underground work; thoroughly understands handling men, also expert on gasolene engines, can do all my own repair work on same; have had some experience in milling and cyaniding. Address Box 947, ENGINEERING AND MINING JOURNAL. Jan. 7.

Smelter accountant open for engagement; experienced in both smelter and concentrating plants; competent to handle metallurgical accounts, detailed costs, etc.; excellent references; age 38 years. Address Box 946, ENGINEERING AND MINING JOURNAL. Jan. 7.

Graduate mining engineer, twenty years' experience in United States, Mexico and South America, desires position with responsible company as manager or superintendent; reports furnished with surveys, maps, development and tonnage statistics, specialty; fluent Spanish; satisfactory references. Address "A. J. G.," Apartado 48, Durango, D'go, Mexico. Jan. 28.

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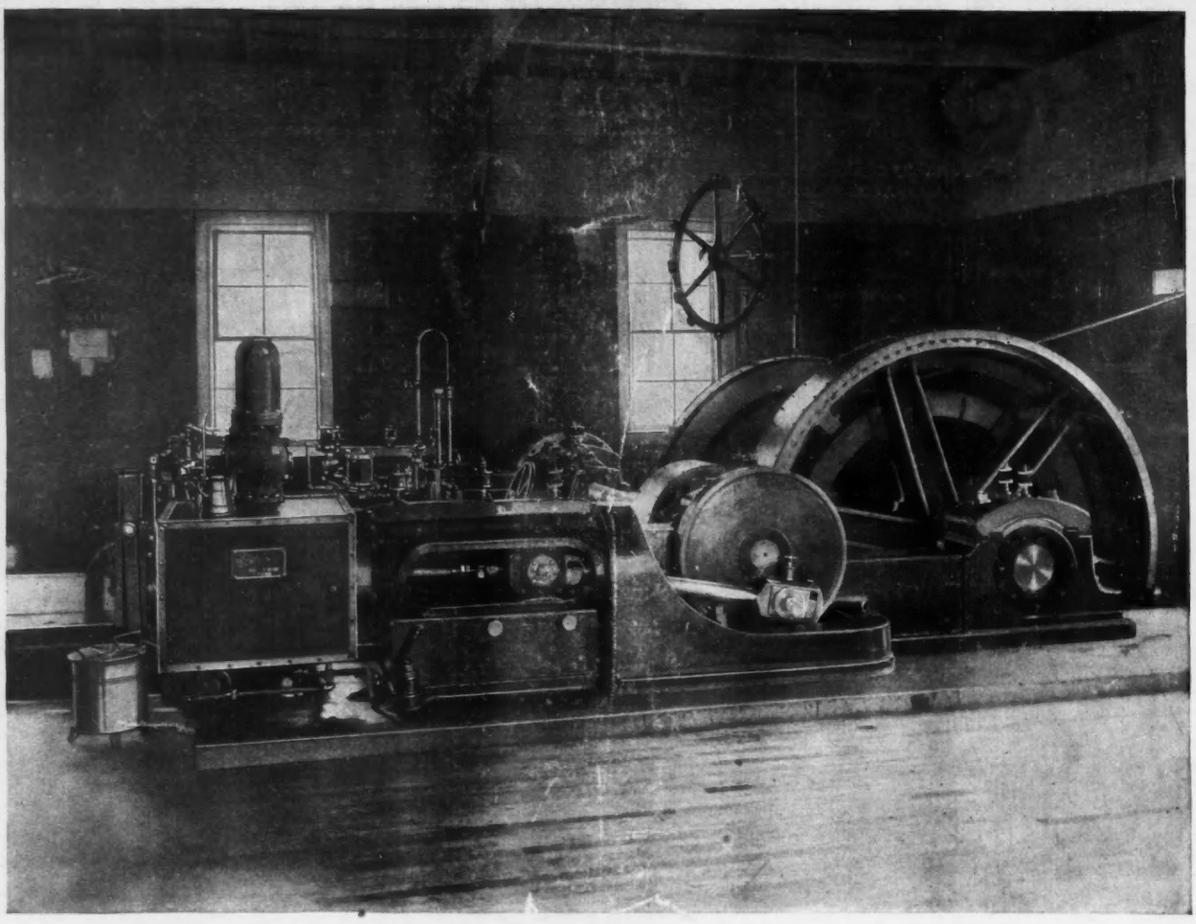

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