

THE ENGINEERING AND MINING JOURNAL



Entered at the Post-Office of New York, N. Y., as Second-Class Mail Matter.

VOL. LXII. DECEMBER 19. No. 25.

RICHARD P. ROTHWELL, C. E. M. E., Editor.
 ROSSITER W. RAYMOND, PH. D., M. E., Special Contributor.
 SOPHIA BRAKUNLICH, Business Manager.
 PUBLISHED EVERY SATURDAY BY THE SCIENTIFIC PUBLISHING CO.

Subscriptions are PAYABLE IN ADVANCE. For the United States, Mexico and Canada, \$5 per annum; all other countries in the Postal Union, \$7.
 The address slip on the paper will show date of expiration of subscription. When change of address is desired both old and new address should be sent.
 NOTICE OF DISCONTINUANCE.—The JOURNAL is not discontinued at expiration of subscription but is sent until an explicit order is received by us, and all arrears are paid as required by law. The courts hold a subscriber responsible until the paper is paid for in full and ordered discontinued. PAPERS RETURNED ARE NOT NOTICE OF DISCONTINUANCE.

Main Office: 253 Broadway (P. O. Box 1833), NEW YORK.

New York Cable Address—"ROTHWELL." (Use McNell's or A B C 4th Edition Code.)
 London Cable Address—"WELLSROTH."

Branch Offices: Chicago, Ill., Monadnock Building, Room 737.
 Denver, Colo., Boston Building, Room 206.
 San Francisco, Cal., 12 Montgomery Street, Rooms 11 and 12.
 London, Eng., E. Walker, Man'g., 20 Bucklersbury, Room 366.

CONTENTS.

	Page.
Steel and Iron in Coal Mine Surface Plants.....	577
The Iron Industry in the Hocking Valley.....	577
Cost of Operating Mining Machinery.....	577
The Price of Anaconda Stock.....	577
The Langlaagte Royal Mine.....	577
The Position of the Steel Trade.....	578
"Write-Ups"—Or Honest Reports.....	578
New Publications.....	579
Books Received.....	579
Mineral Resources of Florence, Idaho.....	579
Mining in Mexico.....	579
The Cyanide Process vs. Chlorination.....	579
The Percentage of Zinc in Slag.....	580
Oceanic Gold.....	580
Abstracts of Official Reports.....	581
* The Rife Hydraulic Engine.....	582
The Mine Fires at New Straitsville, O.....	582
The Ve'na Briquette Process.....	582
* The Limonites of Alabama Geologically Considered.....	583
Hoepfner's Electrolytic Process for the Production of Copper, Silver and Other Metals Directly from the Ores.....	584
Iron Ore Mining in Sweden.....	584
The Westphalian Coal Field in Germany.....	585
Recent Decisions Affecting the Mining Industry.....	585
Patents Relating to Mining and Metallurgy.....	586
Notes: Utilizing Blast Furnace Slag, 580—Calcium Carbide, 580—Lead and Zinc Ores in Norway: 580—A Portable Steel Hospital, 580—A Chemical Plant at Niagara, 581—Aluminum as a Conductor of Electricity, 581—Prices for Railroad Coal in England, 581—Electric Railroads in Europe, 581—Utilization of Blast Furnace Gases, 582—Settling Floating Coal Dust, 582—German Iron Ore Trade, 582—German Iron Production, 582—Peat in Hungary, 584—Graphite in Ceylon, 586—A Portable Asphalt Plant, 586.	
* Illustrated.	
Personal.....	587
Obituaries.....	587
Societies and Technical Schools.....	587
Industrial Notes.....	587
Trade Catalogues.....	588
Machinery and Supplies Wanted.....	588
Mining News:	
United States:	
Alabama.....	588
Arizona.....	588
California.....	588
Colorado.....	588
Idaho.....	589
Indiana.....	590
Kansas.....	590
Maryland.....	590
Missouri.....	591
Montana.....	590
Nevada.....	590
New Mexico.....	591
North Carolina.....	591
Ohio.....	591
Oregon.....	591
Pennsylvania.....	591
South Dakota.....	591
Tennessee.....	591
Utah.....	591
Washington.....	591
West Virginia.....	591
Wyoming.....	591
Foreign:	
Br. Columbia.....	591
Tasmania.....	591
Und' Kingdom.....	591
Late News.....	592
Markets:	
Coal:	
New York.....	592
Buffalo.....	592
Chicago.....	592
Pittsburg.....	592
Metals:	
Iron:	
New York.....	593
Buffalo.....	593
Chicago.....	593
Cleveland.....	593
Pittsburg.....	593
Gold & Silver.....	594
Prices, Statistics, Imports and Exports.....	594
Foreign and Domestic Coins.....	595
Copper.....	595
Tin.....	595
Lead.....	595
Spelter.....	595
Antimony.....	595
Nickel.....	595
Platinum.....	595
Quicksilver.....	595
Minor Metals.....	595
Chemicals and Minerals:	
New York.....	596
Liverpool.....	596
Valparaiso.....	596
Meetings.....	597
Dividends.....	597
Assessments.....	597
Mining Stocks:	
New York.....	596
Boston.....	596
Cleveland.....	596
Salt Lake City.....	596
San Francisco.....	597
Br. Columbia.....	597
London.....	597
Paris.....	597
Quotations:	
Boston.....	598
Ind. and Coal.....	598
Colo. Springs.....	598
New York.....	598
Pittsburg.....	598
St. Louis.....	598
San Francisco.....	598
Baltimore.....	598
Miscellaneous.....	598
London.....	599
Paris.....	599
Mexico.....	599
Valparaiso.....	599
Shanghai.....	599
Denver.....	599
Philadelphia.....	599
Salt Lake City.....	599
Aspen.....	599
Helena.....	599
Duluth.....	599
Mining Co's:	
List of.....	600
Advt. Index.....	17
Advt. Rates.....	18

The use of steel and iron in the construction of surface plants for coal mines, is being seriously considered by the more thoughtful mine owners and operators in the West. The cost is said to be from 15 to 18 per cent. more in Illinois or Indiana than wood, while the depreciation in iron or steel is less than one-half that of wood. Again, the steel or iron tower requires more careful planning and construction; but it lasts longer and can be renewed and used at another mine, when the one at which it was built has been worked out and abandoned, while the wooden tower cannot.

The blast furnaces in the Hocking Valley in Ohio, none of which are now running, are fast falling into decay. At the time they were constructed these furnaces were considered modern plants in every respect. Some of them were surrounded by workmen's houses, and many of these houses were never used; indeed it is said that several of the furnaces ran only a few months altogether, and one at least never was in blast.

The Ohio ores were of too low a grade, containing too much sulphur and phosphorus to make their treatment profitable. Furthermore, the limestone and the Lake Superior ore, which was mixed with the low-grade Ohio ore, had to be transported too far. The Ohio iron industry illustrates the losses to which invested capital is subject, when such investment is not preceded by careful scientific investigation.

If manufacturers of mining machinery, and electrical appliances in particular, would keep a close and accurate record of the cost of maintenance and efficiency, as well as of the first cost, of their machines in actual operation, they would be in much better condition to meet prospective customers. If one mine owner visits his neighbor who has a new piece of machinery and makes inquiry relative to the same, he is nearly always misled. The mine operator who has a good thing wishes to keep it to himself. Mine owners and operators will invariably refuse to give this information to their competitors, or if they do give information it will be misleading. Manufacturers could secure this information very easily, as a record is kept of every piece of machinery in all well-organized mines, and they would thus be in a position to give the information to an intending purchaser.

Since the recent sale of the Hearst Estate interest in the Anaconda Mining Company's stock to the same investors in England who made the original purchase of that stock, the market for the shares has been closely observed by those interested here and abroad. The immediate effect of the additional purchase was to strengthen the market and the course of the price of copper being favorable, there was nothing to be apprehended by investors or speculators. These took our analysis of the situation, and of the accounts of the company as correct and gained courage with the promise of full reports, at least annual, possibly semi-annual and probably even more full than the last published statement in the *Engineering and Mining Journal*.

The critical point has now arrived and the "quiet pool" that was arranged during the necessary period for realizing the last purchase has been dissolved, and all stock offered has been disposed of without creating a flurry in the market, the highest price for Anaconda stock having been about \$33.50, and the price to-day being \$30.50, or actually higher than it was on December 13th, the day before the pool was dissolved. The price of copper warrants this support, and the price of silver has not been so low as to make any material difference in the profit to the Anaconda Company.

Next week we expect to publish the detailed accounts up to June 30th of this year and to make then full analytical comments upon them. The stockholders are to be congratulated upon the inauguration of a system that enables them to know at least as soon as any one else in the market the real financial position of the company. In this instance we are glad to be able to state that the forthcoming accounts are most satisfactory and that the Anaconda Mining Company is in a flourishing condition. With regard to a plain, full and straightforward statement of accounts, it is only what we know would come from Mr. Hamilton Smith, as witness the statements of the Alaska Treadwell and the Alaska Mexican companies.

A great deal has been said in the recent accounts from London of the closing down of the mills and mine of the Langlaagte Royal Company on the Witwatersrand—a company altogether distinct from the Langlaagte Estate, which is one of the great mines of the Transvaal. It has been suggested that the closing might be for stock-jobbing purposes, or possibly for effect on the Transvaal government; and the fact that the concern is one of the Barnato companies, would give some color to such a supposition. A little investigation of the known facts about the company, however, seem to show quite sufficient reasons for closing. With a total capital of \$900,000 par value, and about \$1,500,000 actually invested, the company owns a large number of claims and has a mill of 140 stamps, with apparently abundance of ore developed; the operations

have never paid and a heavy debt has accumulated, chiefly in the form of advances made by the Johannesburg Consolidated Investment Company. The reasons for this condition are found in the reports made to the Chamber of Mines, which give the average yield of gold, from all sources, per ton of ore crushed as follows: May, 0.25 ounce; June, 0.35 ounce; July, 0.43 ounce; August, 0.32 ounce; September, 0.33 ounce. The quantities given are in crude bullion, and the average for the five months was about \$5.50 per ton, which accords well with results previously reported. With the costs of mining and milling which obtain on the Witwatersrand, and which do not fall below \$6.50 per ton in the best-managed mines, there is, of course, no possibility of profit from such returns, and the closing was probably the wisest course.

The disturbing effect comes from the fact that people are enquiring how many other companies are in a similar position. It is probable that the Langlaagte Royal is an extreme case, and that there are few other mines on the Witwatersrand where the ores are of quite so low a grade; but it is also probable that there are a number of other companies whose future ability to keep large mills going and pay dividends is dependent upon a reduction of mining and milling costs. For these the closest economy and most careful management is essential if they are to continue in existence, to say nothing of paying dividends to their stockholders.

The Position of the Steel Trade.

The nominal retention of the steel-billet pool, with the singular condition that all the members are at liberty to make their own selling prices, is a puzzling state of affairs at first sight; but it is explained by other happenings in the iron trade. The most important of these, perhaps, is the sale by the Lake Superior Consolidated Mines—the Rockefeller interest—of its Mountain Iron and Rathbun properties to the Carnegie Steel Company, which has been announced this week. The two properties include the best deposit of Bessemer ores on the Mesabi Range, and one of them, at least, can be worked by stripping and the steam shovel at a very low cost. It is understood, also, that the purchaser will have the use of the Rockefeller steamers to transport the ore at a fixed rate for the coming season. The sale further disposes of the rumor that the Rockefellers would build a large steel plant to use the ores from their own mines and to compete for the profits of that trade as well.

It must be remembered that the Carnegie Company is rapidly building a new railroad line to transport Lake ores to its Pittsburg mills at the lowest possible cost; and that it controls through the Frick Company the output of Connellsville coke. It has also secured enough of the non-Bessemer Mesabi and other ores to supply the basic open-hearth furnaces which it has been building.

The situation therefore is that the steel trade is now practically under control of this single company, which can, if it sees fit, put prices at a point so low that its larger competitors would be compelled to work at a loss, and the smaller ones would be practically extinguished; while the company itself could supply the steel, perhaps at no great profit, but certainly without losing money. It does not follow that it will adopt such a course; but the ability to do so will make it the dictator of the trade. The company has played its game very shrewdly, as usual, and with entire success. Under these conditions the continuance or abandonment of the steel pool really makes little difference.

With this comes the announcement of a reduction in steel-rail prices for 1897 to \$25 per ton at mill, a drop of \$3 from the level which has been maintained throughout the present year. This is a move in the right direction, though we believe it would have been still better policy had the quotation been made \$22; and that the mills would have a far greater amount of work under the lower rate.

"Write-Ups"—Or Honest Reports?

It is impossible to doubt that the mining districts of the West have been rather injured than helped by the injudicious and indiscriminate booming in the local press. This applies especially to the lesser camps, and in them to individual mines of minor importance. The great camps and the big mines not only do not need, but do not seek, this sort of advertising; in fact, it is often difficult to get reliable news about them.

The case is altogether different from that of the systematically organized "whooping up" of some boom camps by means of paid advertisements and paid editorial space, as in the notorious example of the Southern "boom towns" of five and six years ago, when the central object of the scheme was rather to sell town lots than to invite capital for serious development, for the heavy capitalists are not so likely to be influenced by this sort of shouting as are people of small means and those at a distance unable to look into things for themselves, or obtain expert advice, before investing. On the contrary, in our Western camps the efforts of

the local newspapers are almost invariably inspired by the most commendable motives, and the habit of overstating everything has become so common that nobody considers it dishonest, since it is generally understood that a liberal discount is to be taken off all around. The trouble is that no definite standard has been as yet set up by which to measure the amount of allowance to be made. If there were some such rule one could get at a fair approximation to fact by dividing every statement by, say, three, four, five, or whatever the proper co-efficient might be, and scaling down to one-third, one-fourth, etc., discarding the surplus as conventional embellishment. Nobody is deceived, yet the amount of information imparted is vaguely small.

This curious survival of the early misty days when "everything went" about mining is like the parallel one, on a larger scale, in which we occasionally find people who believe certain things, because they saw them "in print." This latter order of beings is rapidly becoming extinct. So also are those who are likely to be taken in by distorted accounts of mines or mining districts, and those who are thus deceived are hardly the ones whose opinion or backing would be of any substantial assistance to the camps or the mines boomed. On the contrary, a repulsive effect is the usual outcome. The poor tenderfoot and the trusting British "small investor" have been slowly passing through a bitter educational course, and most of them are already pretty far advanced, while a few have even graduated.

Our attention is recalled to the matter by a letter we have received from an Idaho camp. The writer, like many other recent correspondents, laments this needlessly exasperating situation. He says:

"It is an unfortunate fact that there is a tendency in our mining circles to magnify all circumstances connected with our standing as a mining country, and our local press, instead of checking this tendency, falls in line with it, thereby stimulating informants to greater exaggerations. The number of rich strikes one reads of is enormous, but nothing ever seems to come of them."

Everybody knows how these reports start and what they amount to. The local editor meets his friend Jim the prospector, and in the usual effort to get an item to help fill his next weekly issue elicits the information that a 12-ft. ledge has been struck over on Sheep Mountain, and is shown a specimen from it, said to be brother to another chunk that assayed 182½ oz. silver and \$24.15 gold. This duly goes into print as the finding of a vein of that width carrying ore of the value stated for the specimen, and in the qualified shape of the report it reads as though it were an average clear across. This sort of thing neither hurts nor helps Jim or anybody else. Long before the local paper has published the news everybody has heard it, has made the proper deductions, and knows exactly what it means. If a 12-ft. body of fair low grade ore or a 6-in. streak of anything like the figure announced had been found, there would have been a stampede. But the boys have all been there before, both in the slang sense and in the sense of having scrambled over Sheep Mountain; and this time they stay in camp—most of them.

It is worse when it comes to a column or two of weekly write-ups of the mines of a busy camp, in which the important ones are usually omitted and the aim seems to be to say something especially nice about all the "prospects," and make them all look specially and equally flourishing. We do not say that this is the universal practice, for many of our mining exchanges have very good local reports; but it is far too common. Why not give the news without superfluous adjectives, and particularly the news about the mines in which outsiders are most interested?

Every year there are a few new camps just coming into prominence or blessed with a "rush" of varying degrees of excitement, and some older ones where fresh developments have been made and new life put into them. Then the nearest dailies and weeklies send in their agents to deliberately "write up" the camp, and they generally do it with a vengeance. But the effect of this is not what it used to be. The real mining men, investors, and the enterprising, restless miners, who are always seeking new fields, and the unemployed, flock in anyhow with little regard to these notices. They would, however, have been glad of honest news before starting.

In the long run it pays to tell the truth. Misstatements at the outset, or in any particular at any time, are bound to be exposed, and then a prejudice is established, even against the most meritorious properties, which it is very hard to overcome. A conservative, honest account of the actual facts, so far as it is possible to ascertain them, is of real value in placing matters before the outside world; and the only people who are likely to invest are quite able to "size up" unreliable printed descriptions.

But besides possible investors, there are a host of people interested in the mines, because they have formerly been in some of the camps and still wish to keep in touch with old surroundings, or because they have friends who have gone there, and from a variety of motives apart from pecuniary ones. It seems a pity that this large class, and all people who are interested in general news, should so often have difficulty in making out just what is going on, simply because some well-meaning, but mistaken, local informants always obscure the picture by the extra color.

NEW PUBLICATIONS.

THE CIVILIZING EFFECTS OF MINING. By G. A. Denny. Klerksdorp, South African Republic; published for the Klerksdorp Literary Club. Pamphlet; pages, 16.

This is a republication of an essay read before the Klerksdorp Literary Club, and is an excellent summary of the historical evidences in favor of the value of mining as a factor in promoting civilization. The author shows how in earlier ages mining determined the progress of the human race, and that civilization advanced as skill in mining supplied the materials for its growth. The passage of the human race from nomadic and pastoral to agricultural and then to settled communities was largely dependent upon the recovery of metals from their ores. As to modern instances, the facts were supplied by the ground upon which the author stood, and further illustrations were hardly needed.

A STATISTICAL ACCOUNT OF THE SEVEN COLONIES OF AUSTRALASIA. SIXTH ISSUE, 1895-96. By T. A. Coghlan. Sydney, New South Wales; Government Printer. Pages 504; with map.

This is the sixth year of publication of this very useful compendium, which has been prepared, like the previous issues, by Mr. T. A. Coghlan, official statistician of New South Wales. It covers very fully the condition and progress of the Australasian colonies, treating of political divisions and governments; population, religion, education and social condition; commerce, shipping and internal transportation; agricultural and mineral resources; manufacturing and other industries. The statistics are brought up to June, 1896, and are generally carefully given and arranged, the official returns of the several colonies being drawn upon for the figures. Mineral production, as one of the chief resources of the colonies, is given considerable space, but the history of mining is very briefly treated in the present volume, having been more fully given in previous issues.

The book is a very convenient hand-book for all who are interested in Australasia, and the compiler seems to have taken care to improve the successive issues.

THE STORY OF THE MINE. By Charles Howard Shinn. New York; D. Appleton & Company. Pages, 272; illustrated. Price, \$1.50.

This is one of the series which the publishers have called the "Story of the West Series," which is intended to present in a popular way the history of the growth and evolution of the United States beyond the Missouri River. The author has, of course, an abundance of material to draw upon for the early romantic history of the Western mines from the Spanish discoveries, and the work of the pioneers of 1849. As a typical illustration of later mining life and history he has chosen the Comstock lode in Nevada, describing its discovery, development and decay. He has been himself thoroughly familiar with mining life, and has told the story simply and yet graphically enough to interest the reader. Incidentally and without any attempt at scientific accuracy, he has described mining machinery and appliances of many kinds, going sufficiently into details to give the reader a general idea of what is required in mine and mill. Mining speculation is also referred to, and two or three chapters tell of the flush times which followed the earlier discoveries.

The book, without being altogether accurate, is fairly correct, and will serve to give the general reader an idea of the mining communities of the West more nearly resembling the truth than most of them can have received from the ordinary literature on the subject. It is also a most interesting story.

BOOKS RECEIVED.

In sending books for notice, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review on another page of the Journal.

Annuaire des le Bureau des Longitudes, pour l'An 1897. Paris, France; Gauthier-Villars et Fils. Pages, 913. Price in New York, 53c.

Bidrag Till Sveriges Officiella Statistik. Handel, Kommerskollegu Underdaniga Berattelse for ar 1895. Stockholm, Sweden; Kungl. Boktryckeriet. Pages, 233.

Annual Report of the Mine Inspector for the Indian Territory to the Secretary of the Interior for the year ended June 30th, 1896. Washington, D. C.; Government Printing Office. Pages, 38.

Einiges über das Goldvorkommen in Bosnien. Monographische Skizze. By Anton Rucker. Wien, Austria; R. Spies & Co., and Frederick Beck. Pages, 101; with maps and illustrations.

United States Geological Survey. Geologic Atlases: Folio 20, Cleveland, Tenn. Folio 21, Pikeville, Tenn. Folio 22, McMinnville, Tenn. Folio 23, Nomini, Maryland-Virginia. Folio 24, Three Forks, Mont. Folio 25, London, Tenn. Folio 26, Pocahontas, Virginia West Virginia. Folio 27, Morristown, Tenn. Folio 29, Nevada City (special), Cal. Charles D. Waicott, Director. Washington, D. C.; engraved and printed by the Survey. Scale of maps, 40 miles to one inch. In colors.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested. Letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

Mineral Resources of Florence, Idaho.

Sir: Florence, situated 45 miles from Grangeville and 120 miles from Lewiston, at an elevation of 6,400 ft. above sea level, is fast being developed and explored by hunters after the yellow metal. This camp, formerly the richest camp in Idaho, has added \$78,000,000 to the mineral wealth of the world from its placer mines, and it is not at all doubtful that it will exceed that amount from its quartz veins. The quartz ledges now being developed here are unquestionably the source of the placer

gold. There is very little wash-gravel to be found in the placers, the only wash being broken quartz, all rich in gold. The value of the gold here is \$18.50 per ounce. Twenty years ago there were no less than eight arrastras and one stamp mill at work crushing the rich auriferous ores exposed by the placer mining operations. The properties on which they were are now being worked with renewed vigor and modern machinery. The Banner mine is the largest body of ore at present exposed, being about 18 ft. between walls; this property recently sold for \$20,000. The ore from the Banner mills about \$40 per ton. The Ozark is another promising piece of property; this mine is equipped with a five-stamp mill of the latest design. The vein is over 3½ ft. wide, and is well defined; the ore runs about \$10 to \$15 per ton. The Waverly is a well-defined vein of free-milling ore, and it has been a big producer. The placer mining industry is not now flourishing, as the most available deposits are worked out.

FLORENCE, Idaho, Dec. 1, 1896.

A. WALKER.

Mining in Mexico.

Sir: Up to within a few years ago the Mexican mines were worked in the crudest fashion; in fact, according to American ideas, it was not mining at all. The people merely worked as long as they could get very high-grade ore, and the minute the ore fell in value they stopped and went elsewhere to seek more rich ore. The ore was all worked in arrastras and in crude smelting furnaces, and as only a low percentage of metal was saved and as it took so long to work a small quantity, ore running under 100 oz. in silver was valueless. Another point was that they only worked when they needed supplies, and then only long enough to obtain enough silver and gold to secure the necessaries of life. Even in the larger mines of an early date it was impossible for them to get below the water level, as they had no pumps, their only means of raising water being with hide sacks, and in the majority of cases these were carried to the surface by the peons.

There are hundreds, yes thousands, of old mines located in all parts of the country that merely have the surface scratched over and were then abandoned because the ore was too low grade for their process of milling. There are mines here, that are not denounced, that exceed in value some of the dividend-paying mines of the United States. These mines can be secured at a low figure from the families owning the ranges on which they are located, and with very little expense could be placed on a paying basis. Of course, it takes a person who talks the language and is familiar with the ways of the people to secure these properties, as bargains cannot be made here as they are in the United States.

What is needed here is capital, and without capital, a man had better keep on the other side of the line, as there are too many poor prospectors here now who find a mine to-day and to-morrow have to abandon it for lack of money to work it.

MILES, KOENIG & SHARPE.

HERMOSILLO, Mexico, Dec. 5, 1896.

The Cyanide Process vs. Chlorination.

Sir: Referring to the editorial in the *Engineering and Mining Journal* of October 24th on the "Cyanide Process in America," I desire to call attention to a few extra facts to be added to your comparison of costs of cyanide vs. chlorine extraction of gold from its ore. You say:

1. "In the abstract the comminution of the ore, which is not as fine, necessarily, for chlorine extraction as for cyanide, is proportionately cheaper for power, a significant item where fuel is dear." You might also have added that for equal capacities it is cheaper in wear of machinery, and also in initial first cost of crushing plant, besides manual attention; all of which are important items in the milling costs.

2. "Cyanide has the advantage, however, in not requiring a preliminary roasting except for telluride ores." This is rather a broad statement, but owing to the limited use of cyanide on ores, other than oxidized surface ores and silicious tailings, it is correct in the main. However, in the application of the process to other ores of greater abundance, experiments indicate that calcination or roasting materially adds to the economic extraction and thus enlarges the utility of the process; but, at the same time, necessitates the use of the same mechanical appliances as in the chlorination process.

3. "The labor involved in leaching in large tanks is less than in comparatively small barrels." This statement, I think, can be successfully challenged, when the best conditions are compared in each case, and is probably due on your part to the mental comparison with the different establishments you have endeavored to avoid in a preceding paragraph.

4. "There remains the consumption of chemicals, which in the cyanide process is an exceedingly variable quality." This factor of the cost is the one usually most favorable to cyanide in a comparison, largely because of the very great reduction that has been made in the price of cyanide of potassium during the last 12 months; also because of the difference in weight of material to be transported, when it is necessary to carry it any considerable distance, and especially when freighting has to be done by wagon.

5. "Given, however, a favorable ore, it is probable that the gold can be extracted by potassium cyanide for a little less than by chlorine water, the salvage of the gold being approximately the same, and the extraction of the silver in the ratio of x : 0 in favor of cyanide." This is rather an indefinite claim, as, in the first place, an ore carrying an appreciable quantity of silver is not a favorable ore for chlorine extraction, and on this account an ore of this kind that is favorable to cyanide is not favorable to chlorine; therefore the comparison is not a fair one to make. Moreover, for reasons stated further on, it is a claim that can be seriously doubted, especially where purely gold ores are to be compared, and local conditions admit of chlorine-generating chemicals being brought in at reasonable cost.

A point of importance which it is necessary to take into consideration in a comparison of this kind, especially in the case of custom mills, such as those at Cripple Creek, is the interest on the amount tied up in large tanks for a considerable time in the case of cyanide, compared with the short time required to realize on the same quantity when handled by chlorination. This is usually about as 10 days is to 2 days respectively, and where high-grade ore is being purchased gives a decided advantage to chlorine extraction.

There is also one item of cost to which I wish to call attention, which

you have omitted to mention and which seldom, if ever, appears in a comparison of costs when made. This is the royalty to be paid the owners of the patents on the use of cyanide, which is nominally 7½% on the bullion produced, and this tax must, necessarily, be added to the cost of the process. In other words, if we suppose that with a certain ore an average extraction of say 90% of the gold is being made, by each method, the relative extraction realizable to the company operating is in the ratio of 82½% to 90%, there being no royalty on the chlorination process. From this it will be seen that there is a decided advantage in chlorine extraction where ores of a grade of 1 oz. or above are treated. This may be in many cases the determining factor in economic treatment, where ores of even lower value are to be worked.

This letter is not written in a spirit of antagonism to the cyanide process, but simply to show that there are other points to be taken into consideration than those you have mentioned, when a comparison of costs is to be made.

DENVER, Colo., Dec. 1, 1896.

JOHN E. ROTHWELL.

The Percentage of Zinc in Slags.

Sir: An editorial in the *Engineering and Mining Journal* of August 29th, under the above heading, caused me to look up a few old note-books which contained some analytical bearing on this particular question. During the summer of 1888 I was called upon to take charge of the smelting operations for the Carlisle Gold Mining Company, Limited, at Carlisle, Grant County, N. Mex. Upon my arrival at Carlisle, I found that the furnace plant consisted of four Bruckner cylinders and one small 36-in. circular water-jacket furnace of the usual Western pattern.

The material to be smelted was made up by Vanner concentrates, the average composition of which is represented by the following analysis: 12.65% SiO₂; 1.85 Al₂O₃; 23.40 Pb; 20.62 Zn; 2.82 Cu; 11.58 Fe; 26.99 S.

The roasted and partially granulated ore contained 6 to 8% sulphur and averaged 1.35 oz. gold and 13 oz. silver per ton. As Carlisle was an isolated mining camp, without any other ore resources, which might have been utilized to assist in the smelting of these concentrates, the proposition *per se* was a rather difficult one. However, the management had decided to give the matter a trial, before availing themselves of the alternative of selling the stuff to the smelting works at Socorro or Pueblo, and it fell then to my lot to superintend the somewhat vexing smelting operations.

In the course of a series of short furnace runs about 1,000 tons of roasted ore were smelted, but as I had to do my own analytical work, besides giving constant attention to the practical working of the furnace, I regret that the analytical data are not quite as complete as I might have wished them to be.

ANALYSIS OF SLAGS.					
	I.	II.	III.	IV.	V.
SiO ₂	22.90	22.80	23.40	31.90	32.30
FeO	35.38	33.20	34.74	31.82	28.77
MnO	.....	.....	.....	.....	1.50
Al ₂ O ₃	6.40	4.80	5.20	8.77	8.34
CaO	9.95	10.60	7.20	6.80	7.20
Pb	1.56	3.20	3.00	0.24 (PbO)	0.33
Cu	0.65	0.50	0.60	trace	not determined
Ag	0.0031	0.0034	0.0044	trace	0.0024
Zn	16.10	17.84	18.65	15.60	13.86
S	2.65	2.86	3.36	2.21	6.71
					not determined
Spec. gravity	.....	.....	4.204	4.120	.....

Nos. I, II, and III. slags, though easily running, are absolutely unsuitable for any blast-furnace work, when the outflow of the lead is effected by means of the Arents system taps, as it proved impossible to keep the furnace open. Their composition is nevertheless noteworthy, as it bears directly upon the question of how much zinc may be taken up by a slag under otherwise abnormal smelting conditions.

No. IV. sample consisted of dark greenish crystals taken from the center of a slag coal and its composition served as type for the greater part of the campaign. It is a fairly free-running slag and I have no doubt that a large blast furnace may run a considerable length of time on it, without causing too much trouble. On the other hand, the small 36-in. circular furnace, which was at my disposal, had only a record run of 25 days, at the end of which the shaft was nearly filled up with wall accretions. The irregularities in the running of the furnace were many, caused partly by the fine ore, partly by annoying slag crusts forming directly under the tuyeres.

As the silver contents of the ore were very low, it is impossible to draw any conclusion regarding the silver losses in the slag if the ore had been richer. The bullion assayed about 16 oz. gold and 63 oz. silver per ton.

Analyses of Matte.

	Pb.	Cu.	Fe.	Zn.	S.	Au.	Ag.
I.....	29.59	13.55	15.53	20.63	21.85	0.0003	0.07
II.....	22.91	22.50	11.15	22.79	21.12	0.0005	0.12

The gold contents of the matte varied a great deal, ranging between 0.1 and 1.6 oz. per ton.

ALDERSHOT, QUEENSLAND, Oct. 22, 1896.

E. A. WEINBERG.

Oceanic Gold.

Sir: Interest in the question of recovering gold from sea water has been awakened by the recent letter of Professor Wurtz, published in your columns. We may take it as proved that gold does exist in the ocean; and if so, let us look at it seriously. Who knows whether there may not be decidedly more than "millions in it"?

The literature of sea-water gold and silver is extensive and rather promiscuous as to reliability, ranging from the records of the most refined analysis to newspaper stories of people selling old ship's copper sheathing for more than it cost new on account of the gold picked up by it. The *a priori* assumption is that the precious metals are there, since in the wear and tear of the rocks not merely the elements and combinations commonly recognized as soluble are constantly going into the ocean, but with them practically everything else, there being no limit to solubility, to say nothing of the fine suspended matters. As to gold, there is plenty of chlorine, iodine and bromine for solvents; and, since nobody seems to be very certain about the actual combinations in any solution (the combina-

tions assumed from ultimate analysis being arbitrary), the gold might be combined with either of these three elements, or all of them, or with others.

Let us assume, then, that the gold is there. It makes no difference whether the ocean is tending toward concentrating or precipitating, gaining or losing from old accumulations. Nor does it make so very much difference what the average tenor is, since the "ore" is inexhaustible. It must be, in all probability, less than a grain a ton, and any enterprising arithmetician may figure out how many tons there are in so many billions of cubic miles of sea water—or whatever the geographers estimate it at. It would be regarded as a soluble salt, so that the problem is not on a par with the catching of finely divided precious metal and amalgam floating in the creeks far below mills, as has been noted occasionally as a matter of curiosity. Nor can the case be laughed out of court by reference to the Calistoga spring hoax. Considering that no matter what fraction (within limits, of course) of a grain per ton is assumed, there would be enough gold in this big body of low-grade ore to satisfy any reasonable person, inflate the world's currency, and break the market—provided a respectable percentage could be gotten out quickly. The silver content may be neglected, so far as the present purpose is concerned. Whatever silver were recovered might be rated as a by-product.

Here seems to be an opportunity for a very interesting series of experiments, with the same alluring and limitless possibilities as are conceivable in the rival field of alchemy. The suggestion is offered—free, gratis, for nothing—that a careful test be made as to the practicability of extracting any of this sea-water gold by amalgamation. It looks easy enough to try it, the apparatus required being of the simplest; but to carry out such tests in a way to prove anything will be found to demand the most refined methods of assay or wet analysis, joined to the practical experience of the millman. I may have occasion to recur in the future to this interesting and possibly fruitful subject, and to offer some suggestions as to methods of carrying out investigations in this direction.

Every once in a while some process man with a hopeful temperament bobs up with a patent or a claim for a patent on some method of extracting gold from sea water. No results are reported thus far, and while not informed as to what has been attempted by these sanguine inventors it is pretty safe to infer from the history of similar metallurgical efforts in other lines, that the patentees do not understand the conditions or the difficulties of the problem with which they are grappling.

What would be the outcome of such an experiment? Well, several things. For one, it should tend to confirm or oppose results obtained by purely chemical methods. If skilfully conducted the result ought to show some gold, no matter how little, in the amalgam, or else a shade of doubt would be cast upon the whole scientific as well as popular belief in sea-water gold. For another, something might be learned about plates, concerning whose treatment amalgamators still hold such diverse opinions. And there is even the possibility that something positive might be gained toward a commercially successful method of mining the ocean—if such a thing is possible at all.

The case stands thus: If it can be positively proved that a certain amount of gold, however minute, can be retained by plates or other amalgamating devices, and that if in obtaining it there is a net profit (which will be, of course, far smaller than the yield) per unit of apparatus, after taking into account all costs of installation, maintenance, labor, interest, etc., then it would evidently be only a question of extent of plant. This would merely be repeating the policy of the low-grade quartz and hydraulic mines on a far more radical scale. Think of inexhaustible "ore," with no need for prospecting for or developing it, no cost for mining and bringing it to mill—and an invariable clean-up! There might be spring tides, tidal waves, squalls, blows, gales, hurricanes, cyclones, tornadoes, typhoons; but at least there would be no caves, no fires, no choke-damp, no fire-damp, nothing but plain sea-water damp in this mine!

But before "locating" the whole ocean with all its dips, spurs and angles and flatting the Mighty Deep Consolidated Gold Extraction Company, Limited, in London, it might be just as well for somebody who has the time (and the capacity) to look into the matter. The experiment need not cost much.

NEW YORK, Dec. 1, 1896.

A. W., JR.

Calcium Carbide.—A company has lately been formed at Solothurn in Switzerland, to be known as the Schweizerische Calcium-Carbid Fabrik. The company has established works at Lauterbach, near Solothurn, for the manufacture of calcium carbide, under the direction of Dr. Rossel.

Utilizing Blast Furnace Slag.—At the Hickman furnaces in South Staffordshire, England, machinery is being put in to pulverize the slag; the object being to utilize the phosphoric acid which it contains in the manufacture of fertilizers, as Thomas slags are now used in Germany and Belgium.

Lead and Zinc Ores in Norway.—Until a comparatively recent period the mineral production of the island of Hitteren, Norway, was almost confined to lead ore, and the production of this ore was only small. The discovery of rich ore veins yielding zinc and lead ores has just been made by Mr. Robert Minto Black and Herr Meland on the latter's estate on Hitteren; also veins of copper and iron ores. The vein has been traced for more than a mile. The deposit of zinc and lead ore shows itself above ground, but mixed with rock quartz galena.

A Portable Steel Hospital.—The Pottsville, Pa., Iron and Steel Company has sent to New York, for shipment to Havana, a sample of a portable steel structure, of which it is proposed that the Spanish troops shall use on the Cuban battlefields for hospital purposes. The building is constructed entirely of light steel beams, channels and angles, with corrugated iron covering on roof and sides. It is bolted together and may be taken apart easily and transferred from one scene of operations to another. The building is of plain design. It is 35 ft. long, 20 ft. wide and 15 ft. high under the eaves. The doors and windows are made of wood. There are four large windows on either side of the building. About forty patients can be cared for in each structure.

ABSTRACTS OF OFFICIAL REPORTS.

Consolidated Gold Fields of South Africa, Limited.

This company's report, covering the year ending June 30th, shows that the capital stock of the company consists of £1,250,000 in 6% preference shares and £725,000 in ordinary shares; it has outstanding also £600,000 in 5% debentures. The company is an investment or trust company, operating no mines itself, but holding interests in a large number of mining companies in the Transvaal. The schedule of stocks owned shows the following list of the company's principal holdings on June 30th, 1896: Apex Mines, Limited, 20,000 shares; Banket Gold Mining Company, 26,000; Belgian Trust, preferred shares, 5,500; Belgian Trust, dividend shares, 21,500; Consolidated Bellingwe Development Company, 9,000; Central Nigel Deep, 72,000; East Rietfontein Syndicate, 7,000; Fraser & Chalmers, Limited (£3 shares), 15,000; Glen Deep, 62,000; Rand Klipfontein Company, 6,500; Knights Central, 77,500; Klipfontein Estate Company, 25,500; Knights Deep, 113,500; Middelvlei Estate and Gold Mining Company, 41,000; Midas Deep, 65,000; Nigel Gold Mining Company, 2,000; Nigel Deep, Limited, 115,000; South Rand Mines, Limited, 70,000; Gold Fields Deep, Limited, 350,000; Simmer & Jack Gold Proprietary Mines, Limited (£5 shares), 715,000; Simmer & Jack, East, 52,500; Simmer & Jack, West, 28,000; Sub Nigel, 176,500; Trust Francais, preference shares, 55,000; Trust Francais, ordinary shares, 48,000; Western Transvaal Mines, 12,000; Bramfontein Estate Syndicate, 6,000; Elandsfontein Estate and Gold Mining Company, 6,500 shares.

The directors' report says that the realized net profit on the year's working, after deducting debenture interest and all outgoings, shows a balance to credit of £1,119,726, out of which the dividend on the preference shares has been paid, together with an interim dividend of 10s. per share on the ordinary shares, leaving together with the amount brought forward from last year a balance still available of £1,946,053. The directors recommend that a final dividend of 15s. per share be declared, free of income tax, making with the interim dividend 25s. per share for the year, and that £200,000 be added to reserve fund, leaving a balance of £1,202,303 to be carried forward to the credit of the current year. The reserve account now stands at £387,727, and to this the directors propose to add the amount of £200,000, referred to above. During the year, under the agreement with the managing directors, confirmed by the shareholders April 22d, 1896, the ordinary share capital of the company has been increased to £726,000 by the creation and issue of 100,000 additional ordinary shares of £1 each, ranking with the existing shares.

One of the company's most important holdings is in the Simmer & Jack Proprietary Mines, Limited. The registration of the new company, to which reference was made in the last report, has been completed, and shares have been issued to the shareholders in the Simmer & Jack Gold Mining Company, Limited, at the rate of 3½ new shares for each old share. The 65,000 working capital shares have also been fully subscribed and issued, 60,000 shares being held in reserve for future issue.

In March, 1896, Mr. C. D. Rudd and the Right Hon. C. J. Rhodes ceased to act as managing directors of the company and surrendered their right in perpetuity to a proportion of the profits of the company in consideration of the issue to them at par of 100,000 ordinary shares of the company—new capital—which are not transferable until June 30th, 1899, in which shares Mr. H. E. M. Davies, as their representative in London, and Capt. E. F. Rhodes, as their representative in Johannesburg, participated. Mr. C. D. Rudd and the Right Hon. C. J. Rhodes, and also Mr. H. E. M. Davies have undertaken to continue to act as directors of the company for a minimum period of four years from July 1st, 1895. The business management in Africa has been placed in the hands of Mr. E. S. Birkenruth and Major H. L. Sapte, as joint-managers. Arrangements have been made with Mr. John Hays Hammond, who has previously acted as consulting engineer to the company in Johannesburg, to remain as the company's consulting engineer in London for a period of three years from July 1st, 1896, making periodical visits to Johannesburg. Mr. Hammond's services and experience are placed solely at the disposal of the company for this period, his remuneration being covered by 1½% of the net realized profits of the company. Mr. H. H. Webb has been appointed resident superintending engineer at Johannesburg, to take control of the engineering staff there.

Perhaps the most interesting part of the report is found in Mr. John Hays Hammond's estimate of the future prospects of the company. Mr. Hammond says: "The future of the Witwatersrand depends upon the successful mining of the deep level areas, and that those best qualified to judge share our confidence in the future of the district, is evidenced by the extraordinary commercial and industrial expansion now taking place. With the exception of the Simmer & Jack Proprietary mine, which is an outcrop property, the principal holdings of our company consist of deep level mining properties, and especially of properties situated upon the Central, and unquestionably the most valuable portion of the Rand. The developments upon the deep level ground during the past year have further confirmed our opinion of the great value of these properties. The predicted tendency of the reefs to flatten as they get deeper, compared with the dips in the upper horizons, has been proved by the ascertained dips of the reefs where penetrated by the deep level shafts, as well as by the dip established by the Bezuidenville borehole. The regularity of the reef formation, and of its gold tenure has likewise been proved as far as developments extend, and that the mining of deep level areas will be carried on at no greater cost than now obtains upon the outcrop companies, we are fully satisfied, so that we are more than ever convinced of the practicability of profitable mining upon these areas. Upon this point the opinion held by your engineers is corroborated by Dr. George F. Becker, the eminent mining geologist."

He then quotes from Dr. Becker's report as follows: "It is manifest that mining will continue on the Witwatersrand at least as long as the mines continue to yield a fair margin of profit. The amount of margin will depend in part on the economy and efficiency of operation and in part on the natural conditions. I do not propose to deal at length with the expenses of a purely operative character, but it may be observed that economy and efficiency will certainly increase with time. The costly experience of the outcrop companies has shown what style of headgear, shaft and mill is best suited to the mines of this locality; the quality and systematization of labor are sure to improve, and it is probable that the expense of dynamite and of coal will diminish. There is to my mind no

doubt that if dynamite and freight charges on coal were at reasonable rates, and if the labor were better and better economized, the Rand mines could now mine and mill ore for 18s. per ton, the present expense being approximately 26s.

"The increase of expense in working very deep mines as compared with those of small depth is due, *ceteris paribus*, to longer hoist, additional pumping, increase of temperature and increased cost of plant. The additional hoisting is mainly a matter of fuel. The increase of expense with temperature is not serious until the air of the mine is heated above 90° Fahr. The additional cost of plant is due chiefly to more powerful pumping machinery and the length of the shafts. The outlay on the deep mines of the Rand may be, and ought to be, economized by sinking relatively few but capacious shafts. To sink and equip a shaft 3,000 ft. deep will cost about £100,000 more than to sink and equip a shaft 1,000 ft., an estimate founded on actual experience in the Robinson Deep, which has reached 1,600 ft. Amortization at the rate of 5% on the extra outlay would require £5,000 annually, which is equivalent to a charge of 3-6d. per ton on the quantity of ore requisite to supply a 200-stamp mill. It is clear, therefore, that for mines operated on a large scale the increase of expense due to depth alone, in the absence of unfavorable conditions, is of little consequence. It will take some years to sink shafts 3,000 ft. or more, and in the interval it is unreasonable to doubt that some or all of the economic reforms suggested above will be effected. When they are accomplished, I believe that the saving will fully compensate for the additional expenditure which will be incurred at this locality in mining at a depth of at least 3,500 ft.

"The natural obstacles to deep mining may be classified as impoverishment of the ore, troubled ground or dykes, influx of water and high temperature. Neither the experience in the working mines nor the results of borings indicate any falling off of the tenor of the reefs with depths below the croppings. The tenor varies indeed, but sometimes improves and sometimes diminishes, exactly as it does along the strike of the reefs. The gold is not distributed in chutes as it usually is in auriferous veins, but in patches; the rich areas and the poor ones being irregularly interspersed. This accords with the geological conditions as they present themselves to me.

"In brief, then, it is very improbable that the ore of the deep mines in the region through which the main reef has been traced with certainty will show any general tendency to impoverishment; dykes and faults will probably give less trouble in the deep mines than in the outcrop mines, there is no ground for fearing unmanageable quantities of water, or even very serious pumping expenses; and the temperature will increase more slowly than in most regions. There are, in my opinion, no insuperable natural obstacles to mining on the Witwatersrand at a depth of 4,000 ft., and no known reason why, under favorable industrial conditions, the expense should exceed the present cost at 500 ft."

A Chemical Plant at Niagara.—The new plant of the Mathieson Alkali Company, to be erected at Niagara Falls, will consist of several buildings covering two acres. The first section is to be completed by January 15th, 1897. The company, which, as is well known, manufactures caustic soda by the Castner process, will employ 150 men and use 2,000 E. H. P. at its new works. It already has large plants in England and at Saltville, in Virginia. At the latter plant no water power is available. A very complete electric plant for the chemical process and for lighting is installed, Westinghouse apparatus being used.

Aluminum as a Conductor of Electricity.—The new plant of the Pittsburg Reduction Company, at Niagara Falls, known as the "Lower Works," located on the high bank of the river below the Falls, has been started up. The starting up of this new plant inaugurates the first use in an extended way of aluminum rods as conductors of electricity. The Pittsburg Reduction Company resolved to use aluminum rods or cables instead of copper for conducting the current from the generators in the powerhouse down in the gorge, some 200 ft. to the plant on top of the bank. These rods are each ¾ in. in diameter and 350 ft. long from the generators to the main line in the furnace room. These main line conductors which traverse the pot room are from 12 to 16 in. wide and 1 in. thick, and are also of aluminum.

Prices for Railroad Coal in England.—Recently, says *Engineering*, the Yorkshire coal owners have responded to the invitation of the North-Eastern Railway Company, and have sent in tenders for supplies of locomotive and other coal for next year. Acting on a decision come to by the Coal Owners' Association, the tenders sent in are at the rate of 7s. (\$1.68) per long ton for the first six months, commencing January next; and 7s. 6d. (\$1.80) for the second half of the year. The company, in issuing its tenders, asked coal owners to tender for six or twelve months. The price quoted for the first six months is the same as the company is now paying for its fuel. The contract terms for supplies in 1888-89 ranged from 6s. to 6s. 6d. per ton; 1889-90, 8s. 6d.; 1890-91, 10s. to 10s. 6d., and for part of the latter year, 11s. per ton was demanded, being the highest price ever paid by the company.

Electric Railroads in Europe.—There are now 560 miles of electric railway in Europe, an increase of 125 miles in one year, says *London Engineering*. The number of electric cars has increased from 1,236 to 1,747 in the same time. Germany has 250 miles of electric railway and 857 motor cars. France has 82 miles and 225 motor cars. Great Britain has 65 miles with 168 cars, and Austria-Hungary has 45 miles with 157 cars. Next come Switzerland, Italy, Spain and Belgium in the order given, while Russia has but one electric line, with six miles of track and 32 motor cars. Portugal ends the list with 1¼ miles. Of the 111 European lines 91 are overhead trolleys, of which there are 35 in Germany, 12 in Switzerland, 10 in France, 7 each in England and Italy, and 6 in Austria-Hungary, etc. Of electric railways with underground current there were but three at the beginning of this year, one each in England, Germany and Hungary. Nine lines are provided with an insulated central track, through which the current is conducted, eight of these lines being in Great Britain and one in France. The remaining eight lines are provided with accumulators. Of these, four are in France, two in Austria, and one each in England and the Netherlands.

THE RIFE HYDRAULIC ENGINE.

The principle of the hydraulic ram is, next to gravity, the most attractive system applicable to a water supply, the original cost of installment being low, there being no expense for operation, and only a nominal cost of maintenance. When the supply of water is abundant it can be readily applied. The work to be performed by a machine of this character is to receive the impact caused by the sudden arrest of a flowing column of water and carry this power to an air cushion with the least amount of friction and a minimum transmission of the shock to the machine itself, maintaining a constant supply of air in the chamber. This must be done with the simplest possible mechanism, and with the fewest wearing parts.

The Rife hydraulic engine was designed to accomplish this result. It has been in use for about five years, and there are about 1,300 in operation at the present time. It has been shown to have a high mechanical efficiency by tests recently run at the Stevens Institute of Technology, in Hoboken, N. J., where an efficiency of 77.4% is claimed to have been developed with a driving head of 6 ft., and a pumping head of 60 ft. The Stevens' tests showed that the machine is capable of pumping against a head 47 times the power head, so that it can be used under a ratio of 30 to 1, with good practical results.

The construction is very simple, having only two wearing parts: the two valves, which are of rubber, are easily renewed at small cost, lasting on an average about two years. The positive air feed maintains a full air cushion, which insures an uninterrupted action. On account of the ease of action, it is possible to build the Rife engines of large size, which makes it commercially practicable to use them for the handling of large quantities of water, so that they are now in use for town water supply, irrigation, etc. This engine is constructed with a special view to making all the water passages of sufficient size to reduce friction to the lowest point. The escape valve is a heavy rubber disc with an easy upward seating, hung on a counter-balance lever with an adjustable sliding weight, by which it may be counter-balanced, according to the work in hand. This lever rests on an adjustable plate, by which the length of the stroke of the valve may be changed at pleasure, thus controlling the amount of power water delivered to the machine. The



THE RIFE HYDRAULIC ENGINE.

check valve which admits the water to the air chamber is a rubber disc seating on a gridiron port, opening by flexion, and regulated for lift by a saucer. This valve permits of the sudden passage of water, and returns to its seat with a minimum amount of friction, and without any jar. The air chamber is of ample capacity, and is fed with air by means of a valve in the elevated base of the machine, which is operated by the reaction of the water at each stroke.

The double-acting engine, for the delivery of pure water by the power of impure water, is constructed with a secondary delivery pipe, with a check valve opening inward by means of which the base of the machine is kept constantly full of pure water by the counterhead or same, so that the force of the power water is expended in driving a portion of it through the check valve into the air chamber; the counter-head preventing the delivery of any of the impure power water into the air chamber.

These engines, one of which is shown in the accompanying illustration, are manufactured by the Power Specialty Company, of New York.

Utilization of Blast Furnace Gases.—A new departure is about to be made at the works of the Hörde Union, at Hörde, Germany, where a plant is about to be put in to utilize the waste gases from the blast furnaces for driving gas engines, which will drive dynamos, so supplying electrical energy for lighting the works and for the necessary motive power. The contract for the necessary electrical plant has been placed with Messrs. Schucker & Company, of Nuremberg.

Settling Floating Coal Dust.—For getting rid of the floating dust issuing from the flues of briquette works, the following contrivance has been adopted in the West Kottbus district. In the newly-erected briquette factory of the Mariannensglück colliery, near Kausche, Germany, the speed of the air, loaded with dust, issuing from the drying apparatus, is to be reduced by passing it through roomy brick chambers, giving the dust time to settle; and with this object, for each pair of pipe-drying apparatus, there is a chamber between the ovens and the off-takes, so built with partitions that the steam passing from the drying ovens is made to take a zig-zag course, thus depositing most of the floating dust in the lower and narrower portion of the chamber, from which it is removed at intervals, and added to the undried coal.

THE MINE FIRES AT NEW STRAITSVILLE, OHIO.

Written for the Engineering and Mining Journal by our Special Correspondent.

During the miners' strike of 1884, the village of New Straitsville, in the southern part of Perry County, O., was the scene of many disturbances. Several of the slopes and tipples in the vicinity were set on fire, and the fire communicated to the mine workings. These mine fires have been burning for the last 12 years and one of them is now spreading to the solid coal. Efforts are being made to extinguish or isolate the fire.

The seam is No. 6 of the Ohio Survey, is all above water level, and is mined entirely by slopes or drifts, so that the workings are very easily fired. When the pillars are once ignited, it is almost impossible to quench the fire, the only alternative being to allow the fire to burn to the outcrop and die out for want of fuel. Where the vein is found in an isolated hill this is satisfactory, but where the fire is under several adjoining hills, or under a ridge, the flames may be communicated to the unworked coal.

The vein varies from 6 to 8 ft. in thickness and is covered by 4 ft. of soft slate, and 20 ft. of sand rock. The coal thus lies at an average depth of 30 ft.

Jets of steam issue from the surface immediately above the coal beds. The mine workings can be traced on the surface by the course of the fire, the flames following the entries and the strata over the rooms caving as the fire progresses. As the coal burns the heat is communicated to the strata of clay and sand-rock, the surface sinks gradually and finally breaks away from the surrounding earth and falls to a distance of 10 or 12 ft., smoke and steam issuing from the depression. Upon looking into these holes, which are usually about 30 ft. in diameter and 12 ft. deep, the rock can be seen, heated to a cherry red. In other places the flames can be observed, as they leap up from the burning coal.

The rocks upon the surface are seamed and cracked by the heat, and at one point boiling water issues from the rock strata. Surface land, which is underlaid by burnt coal seams, presents a peculiar appearance being broken up by great cracks and seams, and having many basin-shaped depressions.

THE VELNA BRIQUETTE PROCESS.

In a recent issue *l'Industrie* describes a process devised by the chemist Velna, who uses petroleum or mineral tar only for enriching culm and other inferior, formerly worthless, combustibles, and produces briquettes from this material, the heating power of which is claimed to be 30% higher than that of good coal. He first prepares a mixture consisting of petroleum or bituminous shale tar, oleine and soda in suitable proportions, and by this means the culm, slack or coal dust is cemented together. Three kinds of briquettes are produced in this way: Industrial briquettes for general firing purposes, gas briquettes for the manufacture of illuminating gas, and metallurgical coke.

The industrial briquettes make a very economical fuel. There is little ash, and the ignition takes place much quicker than with coal, which means a considerable saving of time and fuel in getting up steam. The briquettes are solid, keep for any length of time, and there is no smell or oozing. By employing this mixture on peat a fuel equal to coal is said to be obtained, with the further advantage that it will produce no slag.

In order to make the use of petroleum residue which is very rich in gaseous hydrocarbons practicable for the manufacture of gas, it is necessary to make the gas briquettes in explosive and of handy shape. This has been attained by Velna in the preparation of this mixture. In the gasworks at Brussels 24 lbs. of it were put into a retort, and, although the temperature was brought up to 1,500° C., the gasification took place without explosion or any accident whatever. Such briquettes will produce gas which, in spite of the inferior and cheaper material used, possesses a stronger illuminating power than ordinary illuminating gas. No alteration of the mechanical apparatus or the system of distribution is necessary. As regards the by-products, tar and ammoniacal liquor, they are better and more abundant than in the distillation of coal alone.

In coking the coal dust is mixed with the tar and is not formed into briquettes, but charged into the ovens in lumps. It is claimed that good coke can be made from any coal which does not contain too much sulphur.

In France mineral tar, *goudron de petrole*, is used for preparing the mixture, either by itself or mixed with tar produced by the distillation of brown coal or bituminous shale. This mineral tar is produced by numerous pits in Auvergne in large quantities. It combines easily with fat bodies of the animal order only, and for this reason oleine is employed for accomplishing a partial saponification, which furnishes the emulsion constituting the mixture. The manufacture of briquettes does not offer any more difficulties than that of other agglomerates. The proportion of the mixture to be added varies between 100 and 200 lbs. per ton of culm or coal dust, according to the quality of the latter. For dust from good coal 5 to 6% of the mixture is sufficient; for poor coal as much as 10% is needed.

German Iron Ore Trade.—The imports of iron ore into Germany for the nine months ending September 30th were 2,067,520 metric tons, an increase of 496,015 tons, or 31.6%, over last year. Exports were 1,908,822 tons, an increase of 13,999 tons, or 0.7%. The exports are chiefly of the minette ores of Elsass-Lothringen, which are sent to furnaces in the adjoining districts of France and Belgium.

German Iron Production.—For October the output of the German blast furnaces reached a total of 554,402 metric tons, as against 534,173 tons in September. For the ten months ending October 31st the production was 5,263,596 tons, showing an increase of 475,022 tons or 9.9% over the corresponding period in 1895, and of 684,416 tons, or 14.9% over 1894. The output this year included 748,291 tons of foundry iron, 1,406,973 tons of forge iron, 426,598 tons of Bessemer pig, 2,681,724 tons of Thomas pig. Thus, of the whole production of pig iron there was 59.1% intended for conversion into steel, and in this the material for the basic process was over six times as great in quantity as that for the Bessemer process.

THE LIMONITES OF ALABAMA GEOLOGICALLY CONSIDERED.

Written for the Engineering and Mining Journal by Henry McCalley, Alabama Geological Survey.

While the limonite deposits of Alabama are mostly in very irregular pockets of boulders, nodules and pebbles in residual loams with clay horses, many of them are in regular stratified seams, and many of the pocket deposits are of ore that has come from the outcrops of stratified seams. The pocket deposits are most common along lines of major faults and badly broken-up strata, and are hence most numerous in Alabama along the southeast edge of the Palæozoic region, where the strata are most faulted and broken up. The matrix, loam, etc., is often so deep as to completely hide the underlying bedded strata, and so it is frequently a difficult matter to say for certain what the immediate underlying formation is. Many of the deposits are evidently of much younger age than the underlying rocks, as is the case with the deposit illustrated in the accompanying Plates 1 and 2, though in most cases their ores have been derived from the disintegration of those rocks. There is no doubt but that some of the pocket deposits are now in process of formation.

The most numerous and important limonite deposits of Alabama are either in or over Lower Sub-carboniferous, Lower Silurian, and Lower Cambrian strata, though there are many such deposits, and some of them large ones, in and over other formations.

To make plain the different geological horizons at which the principal

at which the limonite deposits are much the most numerous, and, as a general thing, are much the largest or most often workable, are, commencing with the lowest or oldest, geologically speaking: (1) At and near the top of the Weisner Quartzite (Chilhowee); (2) at and near the bottom of the Silicious (Knox) Dolomite and Chert Group, and (3) at and near the bottom of the Lauderdale (Keokuk) Chert Group.

1. *Limonite Deposits at and Near the Top of the Weisner Quartzite (Chilhowee).*—These deposits are very numerous and extensive. They are the outcrops of a stratified seam, in place of two stratified seams, and pocket ore. The stratified seams crop out either along the tops of the mountains or just to the southeast of the crests of the mountains, and the pocket deposits occur usually along the foot of the mountains and most commonly along faults. These Weisner Quartzite mountains occur near the southeast edge of the Palæozoic region, or near where this region borders on the Crystalline Belt. The stratified limonite deposits of this horizon begin and end suddenly, though they take the place locally of other continuous strata, as quartzite, quartzitic conglomerate, etc. They are sometimes very extensive, being several hundred yards in length and 40 to 50 ft. thick. The pocket ore is mostly boulder ore. It is commonly in a deep red loam, with loose quartzites, etc., along faults, and frequently overlies strata of the overlying groups, as the Aldrich Limestones and Montevallo Shales. These pocket deposits comprise some of the most extensively worked banks in the State. In some of them the ore is partly in irregular stratified strings, etc.

The ore of this horizon is mostly a black waxy ore that is high in silica, iron and phosphorus. It is very often what is termed a "rough" or



PLATE 1.—VIEW OF THE TANNEHILL BROWN ORE DEPOSIT (GOETHITE), TUSCALOOSA COUNTY, ALABAMA, AT THE BEGINNING OF MINING IN 1887.

and most of the Alabama limonite deposits occur, it will be necessary to give a table of the older geological formations in the State.

OLDER GEOLOGICAL FORMATIONS OF ALABAMA.		
(8) Carboniferous.....	(m) Coal measures	200-5,000 ft.
(7) Upper Sub-carboniferous. (l)	1. Bangor Limestone and Hart- selle Sandstone (Mountain Limestone) phase.	Contem- porane- ous. 200-2,000 ft.
	2. Oxmoor (Floyd) Shale and Sandstone phase.	
(6) Lower Sub-carboniferous.	(k) Tusculmbia (St. Louis) limestone.	Fort Payne.... 0-300 ft.
	(j) Lauderdale (Keokuk) Chert.	
(5) Devonian.....	(i) Black (Chatanooga) Shale.....	0-100 ft.
(4) Upper Silurian.....	(h) Red Mountain (Clinton etc.)	0-700 ft.
	(g) Pelham (Trenton and Chazy, Rockmart and Chickamauga).....	250-1,800 ft.
(3) Lower Silurian.....	(f) Silicious (Knox) Dolomite and Chert (including Hayes' Upper Connasauga).....	2,000-5,000 ft.
	(e) Coosa or Flatwood Shales (Con- nasauga).....	800-1,400 ft.
	(d) Montevallo or Variegated Shales and Sandstones and Aldrich Limestones (Hayes' bottom Connasauga, Rome formation and Beaver Limestone).....	800-1,800 ft.
(2) Cambrian.....	(c) Weisner Quartzite (Chilhowee).....	2,500 ft. +
	(b) Talladega (Ocoee).....	
(1) Crystalline.....	(a) Crystalline schists.....	

Limonite deposits occur in nearly all of the above geological formations and at several different horizons in each; but in most of them the deposits are usually too rare and too small to be of much economic value. The three principal limonite horizons, or the horizons

"rocky" ore or a boulder ore that is made up of partly pure ore and partly quartzites, in irregular masses, streaks, etc. The pocket ore is usually of better quality than the stratified ore, and the nodular ore than the boulder ore. This is because the ore and silicious matter, being in masses and streaks to themselves, are more or less separated on disintegration and weathering. This rough or rocky ore is a much better ore for magnetic concentration than the silicious red ores or hematites. It will doubtless be utilized in this way some of these days. This same geological horizon carries the gray iron ore of Alabama, some of the largest of the manganese deposits, and some of the bauxite deposits.

2. *Limonite Deposits at and Near the Bottom of the Silicious (Knox) Dolomite and Chert Group.*—This horizon, as a general thing, carries the best grade of limonite and hence most of the worked limonite deposits in Alabama. It has, therefore, furnished most of the limonite output of the State. These deposits are much more numerous than those of any other horizon and many of them are very extensive, some having been worked to a depth of nearly 100 ft., with ore still in the floors of the banks. The ore, though mostly of good quality, comparatively low in silica and phosphorus, is sometimes rough or cherty and sometimes a black waxy ore that is high in phosphorus. This rough or cherty ore is usually in large boulders that sometimes occur in rows, as outcrops of stratified ledges. The good ore is always, strictly speaking, in pockets. The most extensive bauxite deposits of the State are to be found at this horizon. Limonite deposits occur at other horizons higher up in this group, but they are comparatively few and rarely of workable size.

The accompanying views, Plates 1 and 2, from the advance sheets of the Valley Region Report, Alabama Geological Survey, are of one of these pocket deposits at the beginning of the work on it some 10 years ago, and of one of its banks as it now is. This deposit is along a fault. Plate 2 shows underlying thin bedded Cambrian limestone (Coosa

Shales), though the ore of this deposit has been derived from Lower Silurian strata (Silicious (Knox) Dolomite and Chert). Plate 2 also shows clay horses between the ore pockets.

3. *Limonite Deposits at and Near the Bottom of the Lauderdale (Keokuk) Chert Group.*—This is the least important of the three principal limonite horizons in Alabama. The ore deposits are the outcrops of a stratified seam, in places two stratified seams, and pocket ore. The pocket ore is believed to have been derived principally from the outcrops of the stratified seams. The deposits are not so numerous and, as a general thing, are not so large as those of either of the above horizons, though a few of them are very extensive. The stratified seams in certain localities can be traced for miles, but they are usually too thin to be of much economic worth. They have never been seen over a few feet in thickness. The ore, as a rule, is not so good as that of the last horizon, and it is much oftener rough or cherty, and much oftener high in phosphorus. None of these deposits have been extensively worked. Limonite deposits occur also along a horizon near the top of this group, but they are comparatively few and usually of small size. Manganese deposits occur along both of the limonite horizons of this group. Perhaps the largest manganese deposit in the State is at the bottom of this group.

Limonite beds occur also at two horizons in and on the Upper Sub-carboniferous formation or in the bottom strata of the Bangor limestones and over their upper strata. The limonite of the lower or first of these two horizons, in one or two stratified seams, is too silicious, so far as known, to be of any commercial value. It occurs in only a few places. That of the latter or upper of these two horizons is strictly speaking a pocket ore. It has some extensive deposits of good ore, though its ore is an altered ore that has been derived from the weathered outcrops of a stratified seam, near the bottom of the coal measures, that is doubtless a carbonate within or beyond the point of weathering. There are usually only one of these seams, though in places there are two of them. They are merely local in their occurrence. They sometimes reach a thickness of some 4 ft. The pocket ore has mixed with it residual matter of the coal measures, though sometimes removed from the outcrops of the stratified seam or from the edge of the coal measures fully one-half mile.

The Crystalline or Talladega slates carry some few extensive beds of limonite, though the ore of most of these beds is silicious. These slates are partly, at least, metamorphosed Cambrian strata.

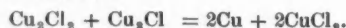
The newer formations, Cretaceous and Tertiary, in Alabama also carry some limonite deposits. Those of the Cretaceous age are more or less stratified, and are in very large quantity, though they are too silicious, so far as known, to be of any commercial value. The Tertiary limonites form some very extensive beds of fine ore. The most important limonite horizon in Alabama after the three principal ones mentioned above occurs at the bottom of the Lafayette formation, uppermost Tertiary or lowermost Pleistocene. The limonite beds of this horizon have been worked extensively. The ores of some of the other mentioned horizons or of some of the deposits overlying the older rocks are in places of Tertiary age, as is shown by imbedded and embodied Tertiary material.

HOEPFNER'S ELECTROLYTIC PROCESS FOR THE PRODUCTION OF COPPER SILVER AND OTHER METALS DIRECTLY FROM THE ORES.

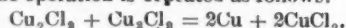
The Hoepfner patented process, which has recently been much improved, consists in leaching the powdered ores with a warm solution of per-chloride of copper containing also chloride of sodium or of calcium. The chloride of copper extracts the silver, copper, lead, bismuth and some iron and arsenic. The solution containing cuprous chloride is first freed from its silver by metallic copper; from its chloride of lead by cooling and from its antimony bismuth and arsenic simply by powdered limestone. Finally the iron, when in excess in the solutions, is separated simply by the action of air to which the solution is exposed in a suitable way. This latter possibility is quite an essential and important feature of this cuprous chloride process, enabling the latter to do away with those disturbances arising from the presence of iron in the ores. The action is as follows:



The solution of cuprous chloride thus purified is then conveyed to the electrolytic baths, which contain cells with anodes of artificial carbon and cells with cathodes of sheet copper, separated from each other by diaphragms consisting of linen, cotton or the like. This solution is divided into two separate currents, of which one brought in contact with the cathodes loses all or part of its copper contents, while the other brought in contact with the anodes is reconverted into a solution of cupric chloride. The action is as follows:



After leaving the bath the currents are reunited, thus forming a solution of cupric chloride similar to that originally used for the extraction of the ores, and the operation is repeated as follows:



Thus the process is a perfect circular one which does away with all difficulties arising from the presence of any impurities contained in the ores. If zinc or nickel be contained in the ores, all or part of it will be extracted also, and when abundant it can then be electrolytically deposited from the purified solutions. In a series of baths first the copper, then the lead, nickel and the zinc will be deposited, each in a pure state.

Another essential feature of this process is the fact that a current of 1,000 amperes precipitates 2,360 g. of copper per hour from cuprous chloride solutions, while only half as much is deposited from solutions of sulphate of copper, which hitherto have been exclusively used for the electrolysis of copper. It is evident that both the cost of installation and of work are consequently greatly reduced. Considering further that the electrolytic decomposition requires only 0.5 to 0.7 volt, and the electrical conductivity of chloride solutions is much better than that of sulphate solutions, it is a fact that the cuprous chloride process can practically per day and per horse-power produce more than 100 lbs. of copper directly from the ores, requiring for this not more than 100 lbs. of coal for driving the engines and heating the solutions.*

By the Hoepfner process pure electrolytic copper can be obtained

*See for this *The Mineral Industry*, Vol. IV., 1895, p. 807.

directly from ores containing any amount of impurities and the silver contained in the ores is also turned to profit. The calculation shows that the cost of extracting one ton of pure electrolytic copper per day from ores containing not more than 5 to 10% copper is not more than £7 12s. Now, since the price of electrolytic copper is about £5 higher than that of ordinary refined copper, it may be said that £2 12s. is the cost of producing electrolytically one ton of ordinary copper directly from the ores. Further, since the Hoepfner process utilizes also small quantities of silver contained in the ores, say 7 to 8 oz. of silver in a 10% copper ore (which would hardly be paid by smelters), the recovery of this silver would be quite sufficient to cover the total cost of extracting both the electrolytic copper and the silver.

A sample of copper produced from impure mattes containing 25% of iron, 13% of lead, arsenic, antimony, etc., and analyzed by a Professor Fresenius, gave the following analysis: Sulphur, 0.0004%; iron, a trace; arsenic, slight trace; antimony, slight trace; lead, slight trace; nickel and cobalt, 0.0012; molybdenum, 0.0023.

Another sample of copper produced from Anaconda matte gave the following results as to impurities: Bismuth, 0.0041%; antimony, traces; iron, 0.0056%; manganese, 0.0004%; zinc, traces; nickel; calcium, 0.0145%.

This process extracts neither gold nor the whole of the zinc in the ore. If such metals be present in payable quantities, the ores, or the residue of the ores, subjected to the preliminary extraction of copper and lead, are roasted in an ordinary furnace so as to convert the sulphides into oxides, and the gold is then extracted by chlorine. The oxide of zinc is converted into chloride of zinc and then electrolytically decomposed into pure zinc and free chlorine or bleaching powder.

This transformation of oxide of zinc into chloride of zinc can be done in various ways, according to circumstances. Where chloride of calcium is cheap it may profitably be used for the production of ZnCl_2 , according to the Hoepfner patent. In this process 100 H. P. produce daily 1,000 lbs. of pure zinc and 3,000 lbs. of bleach, the price of the electrolytic baths being for this £1,000.

From chloride of lead, as may be produced by these processes, 25 H. P. will produce 1,000 lbs. of metallic lead, the price of the necessary baths being £250.

IRON-ORE MINING IN SWEDEN.

The Grängesberg mining district in Sweden has, of late years, attracted an increasing attention. The percentage of iron in the export ore varies between 61 and 63%, and is guaranteed not to be less than 60%. About 200 car-loads per day are dispatched to Oxelösund, the shipping port, and the traffic is continuously increasing, as will appear from the following table, showing in the first instance the output of iron ore from the whole Grängesberg District, and in the second the annual shipments for export by the Grängesberg Mining Company in long tons:

Year.	District.	Grängesberg Co.	Year.	District.	Grängesberg Co.
1885.....	41,856	22,376	1893.....	284,223	227,441
1890.....	175,694	97,644	1894.....	423,503	132,422
1891.....	223,402	128,328	1895.....	469,049	258,547
1892.....	268,715	136,900	1896.....	.....	400,000

Of the ore shipped by the Grängesberg Company in 1896, 302,386 tons went to Holland, and 78,630 tons to Germany. The total annual output of iron ore in the whole of Sweden has risen to about 2,000,000 tons, and the exports last year amounted to close upon 800,000 tons.

Most of the machinery in the mines is worked by electric power, and the installation at Grängesberg is the first long-distance transmission of electric power in Sweden, the distance from the Hellsjön Lake to Grängesberg being some 7½ miles. At Hellsjön, where the turbines are placed, there are three dynamos, one of 150 H. P., and two of 100 H. P. each, direct-coupled to a turbine making 600 revolutions. The three-phase current, of 150 volts pressure, is subsequently transformed into one of 5,500 volts. In addition to the above three generators there are two more 100-H. P. dynamos, each in connection with a turbine; the one supplies a single-phase current for lighting purposes while the other can give either a three or a single-phase current and is held in reserve. There are altogether 12 motors, varying in capacity from 45 H. P. downwards. Dynamite is used for blasting purposes, and is manufactured on the spot; the annual production is about 80 tons, of which half is used in the Grängesberg mines. The largest mine is the Skärningen. Hitherto the ore has been put direct on to the tracks, but it is now broken at a lower level than that of the railway. The ore is separated from the rock in the mine; an electric ore separator is being installed. The bore-holes are now larger (22 mm.), and deeper than used to be the case, whereby less dynamite is required. The work is carried on night and day, electric light being used.

Peat in Hungary.—The marsh country in Hungary is divided into two sections, the upper and the lower marshes. The former occur only over a small extent of the kingdom, and are entirely restricted to the sandy country around the Carpathians near the sources of the Arva, one of the rivers flowing to the south, and a few other places of still less importance. The turf is brown, contains but little ash, and has a low specific gravity. The lower marshes occur in the plains generally over a substratum of grayish-blue porous clay, and more rarely over loosely agglomerated quartz sand. Nearly always their beds are of recent or at least of quaternary age. Their depth is small, being as a rule not more than 6 to 8 ft.; and only one, the Marcazal marsh, near Hegyes, attains a thickness of 16 ft. Peat diggings are generally opened in these lower marshes, and a brown or black turf with little ash and rather more dense than that from the higher marshes, is obtained. These marshes occur in old lake beds or at the bottoms of gently sloping valleys. Occasionally they are found in the depressions in undulating sandy country. Lacustrine marshes as a rule are the most important in respect of the area covered, and included with them is the one in the county of Pesth, which occupies what is apparently an old bed of the Danube, extending from the north of Pusztá-Gubacs to St. Ivan, alongside the present course of the stream. At the present time turf diggings are restricted to a very few localities, and the production is small.

THE WESTPHALIAN COAL-FIELD IN GERMANY.

Written for the Engineering and Mining Journal by A. Kowatsch.

The Westphalian coal-field extends from the Rhine eastward to Osnabruck, in the province of Hanover. The coal is found in seams in the productive formation; the thickness of the strata covering the coal banks varies from 600 to 2,100 ft. The bearing formation is folded several times, and there are four principal seams. These foldings are of much importance in mining as influencing the costs. To the north of the Westphalian coal-field proper is another small field, near Osnabruck, including the Piesberg and Ibbenburen mines. The question of the geological connection of this Osnabruck field with the Westphalian is not yet settled, but it may be mentioned that in it there is found a true anthracite, the analysis of which is as follows: C, 94.00; H, 1.62; O and N, 4.38. The output of the two mines named in 1891 was: Ibbenburen, 107,484 tons; Piesberg, 129,546 tons; total, 237,010 tons. It varies but little from year to year.

In the Westphalian district there are about 100 mines or coal banks, which are divided into banks of the so-called Lowest group, containing some 20 mines; Middle group, about 40 mines; Upper group, about 40 mines. The banks of the lowest group have about 35 ft. in thickness of

the expenses for hoisting and pumping. The pumping costs are of such importance that a project has been under consideration to centralize the work for whole districts and lessen the expense.

A look at the map shows that there is one principal waterway for the Westphalian coal, that is the Rhine. This is used extensively to Holland, Belgium, France and part of Germany. In all other directions there are only the railroads, and there is a constant fight for cheap rates.

To do away with competition among the mines a combination was formed some years ago, comprising 80% of the producers, and having a central office for selling. The opening of the Dortmund-Ems Canal has helped to give the operators low rates to a new market in the north of Germany. The mining costs in Westphalia average 7 marks (about \$1.70) per ton of coal sold. Of this 60% is for wages and 40% for other expenses, including State and local taxes, compensation for ground, for damages, interest, accidents, contributions and insurance, etc.

The figures, of course, vary at different mines, depending chiefly upon the output of the miner. For the whole Westphalian field the average output of a working man is 278 tons a year, against 341 tons in Upper Silesia and 221 in Saarbruck. There are in Westphalia some 32 large mines with an average output of more than 300 tons per miner, and 5.60 marks average expenses per ton; some 43 mines average at 260 to 300 tons output per man, and 7 marks expenses per ton; in 100 smaller mines

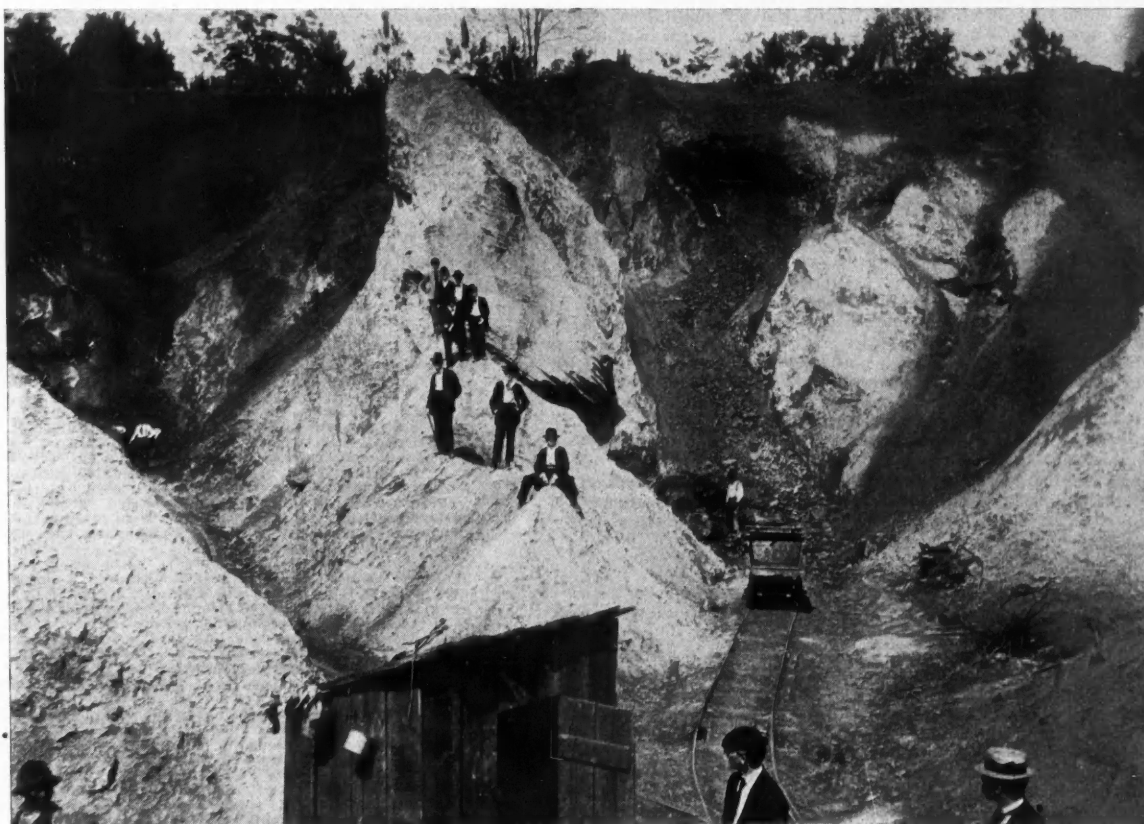


PLATE 2.—VIEW OF ONE OF THE BANKS OF THE TANNEHILL BROWN CRE MINES (GOETHITE), TUSCALOOSA COUNTY, ALABAMA, IN 1895.

coal worth taking out; those of the middle group about 96 ft.; those of the upper group about 97 ft.

The coal obtained in this field varies very much in its value, chemical and technical quality. There are five different kinds of coal, the names and qualities of which are as follows: 1. Dry coal burning with long flame; has 75 to 80% carbon and makes a powdery coke. 2. Gas coal, long flame, 80 to 85% carbon; makes a porous coke. 3. Fat coal, 84 to 89% carbon; makes a coke of medium firmness. 4. Short flame, fat coal, 88 to 91% carbon; makes a strong, compact coke. 5. Semi-anthracite, 90 to 93% carbon; does not coke well.

Two qualities form the basis upon which the different kinds of Westphalian coal are classified, the flame with which they burn and the kind of coke that they furnish. Of course, the differences are not exactly defined and there are many intermediate grades. In scientific papers, for coal containing the highest amount of carbon the expression "anthracitic"—similar to anthracite—is used. Real anthracite, however, is found only in the Piesberg mine, mentioned above; but the trade uses the name anthracite for certain coals of Class 5 above.

To give an idea of the relations of the above-named five different sorts of coal, the general output of the Westphalian mines may be arranged after the different groups, is about as follows: No. 1, about 10%; No. 2, 18%; No. 3, 29%; No. 4, 28%; No. 5, 15%.

In selling coal there are five grades usual, the sizes being approximately as follows: Lump, say, 3.2 in. diameter or over; No. 1 nut, 1.6 to 3.2 in.; No. 2 nut, 1 to 1.6 in.; No. 3 nut, 0.6 to 1 in.; No. 4 nut, 0.3 to 0.6 in. All below the last is culm or waste.

The general outlook of the Westphalian mining industry at present is not favorable. The expenses of winning coal become higher, owing to the increasing depth of the mines; the careful refilling of chambers from which the coal has been taken is expensive and the government authorities enforce strictly the laws requiring first-class ventilation required by the great quantity of gas contained in most of the coals; also full arrangements for the security of the miners. The increasing depth augments

having 260 tons per man average output, the average cost is 8.40 marks per ton, which hardly indicates a profitable business.

In preparing coal for market the first separation begins in the mine by picking out the larger pieces of slate which are left in the mine. In some mines the lump coal is drawn up the shaft in separate wagons and brought directly to the railroad cars. Generally the coal is raised as free as possible from slate, but without regard to the size of the pieces. Some run-of-mine coal is sold to customers who do not care to have dressed coal.

All coal not sold as run-of-mine passes over a bar screen, the lump coal being discharged on one side, while the smaller coal drops through upon a conveyor belt. The slate is picked out by hand from this belt, boys and girls being employed, and the belt delivers the picked coal into bins.

There are three kinds of screens used, as follows: 1. The Briart bar-screen, a set of parallel and slightly tapered bars moved by an eccentric which raises and lowers alternate bars. 2. A horizontal movable screen, with round holes, having 8° to 10° inclination. 3. The Borgman & Em-deshler bars, which are much approved, consist of an iron frame containing 14 flat bars set with the thin edge up. At a right angle to these flat bars are 18 round bars or rollers moved by a chain passing over gears mounted on one side of the frame on each bar.

The small coal having passed through the first bars is further separated by means of revolving screens into the four classes of nut mentioned above.

From the screens the different sizes are carried by gravity or water to the washers. Some larger sizes are shipped directly, but others are crushed and separated again, according to the cleanness of the coal and the purpose for which it is to be used. After washing the different sizes pass over drying screens to the respective bins. Generally the nut is washed, as the cleaner the coal the higher is the trade value. All slate containing coal is crushed, separated and washed.

The waste and culm are sometimes thrown aside, but efforts are made in some mines to utilize them. One method is to separate the fine parti-

cles by an air blast, the dust being used in the manufacture of briquettes, or mixed with wet coal from the washers, which is to be used in making coke.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

Specially Reported for the Engineering and Mining Journal.

JOINT LIABILITY FOR DAMAGES.—A party alleged that while employed on a steamboat, he was injured by the falling of a coal bucket operated by one C., and that the latter was negligent in using defective machinery, and in operating it negligently, and that the steamboat owner was negligent in not providing him a safe place to work, and in not warning him of the danger. The court held that as the alleged acts of negligence of C. and the steamboat owner, though distinct in themselves, concurred in producing the injury, their liability was joint as well as several, without regard to the questions of primary wrongdoing or comparative culpability or of co-operation.—*Brown vs. Cox* Brothers & Company (75 Federal Reporter, 689); United States Circuit Court, Eastern District of Wisconsin.

MINING LEASE: RIGHTS OF LANDLORD ON INSOLVENCY OF TENANT.—A mining lease provided that on violation of any of the covenants on the part of the lessee, among which was a covenant not to assign without the consent of the lessor, the latter should have the right to declare the lease forfeited. The lease also provided that on the expiration of the lease the lessor should have the right to take the improvements placed on the land by the lessee, at their appraised value. The court held that on the insolvency of the lessee, and an assignment by him of the lease for the benefit of his creditors, the lessors, on declaring a forfeiture of the lease for default of the lessee preceding the assignment, were entitled to take the improvements at their appraised value, in satisfaction of rent due.—*Potter vs. Gilbert* (35 Atlantic Reporter, 597); Supreme Court of Pennsylvania.

EXPERT TESTIMONY.—1. Books of science are generally inadmissible as evidence to prove the opinions contained in them; but if a witness refers to them as an authority for his own opinions, they may be received for the purpose of contradicting him.

2. Who is entitled to be considered as an expert in regard to any matter of science or skill, is a question which must be left very much to the discretion of the trial court, and its decision is conclusive unless clearly shown to be erroneous in matter of law.

3. The interest of an expert witness affects the weight, not the legality, of his testimony.

4. A copy of an English patent is not legal evidence to prove the practicability of the process described in it.—*New Jersey Zinc & Iron Company vs. Lehigh Zinc and Iron Company*; New Jersey Court of Errors and Appeals.

Graphite in Ceylon.—During the three months ending September 30th 99,614 cwt. of graphite were exported from Ceylon, as compared with 66,670 cwt. in the preceding quarter.

A Portable Asphalt Plant.—A plant of this kind, which is described by *Engineering News*, has lately been built by the Hetherington & Berner Company, of Indianapolis, for the purpose of preparing asphalt for paving work in small cities where it would not pay to erect a stationary plant. The apparatus consists of two cars having steel frames and corrugated iron sheathing. Packed in one of these is a frame made of tubing and light steel beams, which forms the framework for the machinery when the plant is in use. The cars are run on a side-track and have the wheels blocked, the framework is erected and the mixer mounted in position on a tower between the cars. One car carries the power plant, consisting of a locomotive boiler and a steam engine. The car also contains the sand dryer and screens, while the other contains the asphalt kettles.

PATENTS RELATING TO MINING AND METALLURGY.

United States.

The following is a list of the patents relating to mining, metallurgy and kindred subjects issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the Scientific Publishing Company upon receipt of 25 cents.

WEEK ENDING DECEMBER 1ST, 1896.

- 572,372. **AIR-COMPRESSOR.** John H. Reynolds, New London, Conn. Assignor of one-half to Charles H. Klinck and Frank H. Burfee, same place. The combination of the two superimposed cylinders, a piston for each of the cylinders mounted upon a single piston rod as set forth, a rotary valve mounted on a stem within the piston rod, and means for rocking the stem to open and close the valve.
- 572,383. **AIR COMPRESSOR AND BLOWER.** Oscar L. Smith, Edgewater, N. Y. A casing having a central enlarged compartment and an upper and lower contracted compartment communicating therewith, a feed-pipe leading to the lower compartment, and incasements opening into the upper compartment, combined with a shaft, a set of fans or blades carried by the shaft in the central compartment, and a set of smaller air-compressing fans or blades carried by the shaft in the upper compartment of the casing.
- 572,393. **METALLURGICAL FURNACE AND PROCESS.** André Wronski, Philadelphia, Pa. Assignor of one-third to Joseph James de Kinton, same place. The process consists in effecting a mixture of naphtha and air in desired proportions and injecting the mixture in the form of vapor into the receiving compartment of a gas generator, then effecting a mixture of the injection with a current of heated air in desired proportions and conducting this product through a regenerator, thus decomposing the vapor into gases, then conducting these gases and a determined quantity of air from a hot-air apparatus into the reducing compartment of the furnace and thus effecting the complete combustion of the gases, then conducting the burned gases through a second similar gas-generating apparatus and hot-air apparatus and utilizing their energy in heating the second apparatus.
- 572,472. **ANODE FOR ELECTROLYTIC PROCESSES.** Hamilton Y. Castner, London, England. Filed July 26th, 1895. The process consists in submitting a shaped electrode of gas-retort or like carbon while protected from con-

tact with air to the intense heat produced by passing an electric current therethrough.

- 572,491. **CABLEWAY FOR CONVEYING AND DUMPING ROCK, ETC.** Charles H. Locher, Glasgow, Va. The combination of a main supporting cable or track, a carriage traveling thereon, a drive-rope for moving the carriage, two independent ropes hanging from the carriage and connected to the front and rear ends of the bucket, two drums of the same diameter for operating the two independent ropes, a drum of different diameter therefrom, a frame extending across the drum formed of two shafts connected at their ends, and a rope guide sliding on the two shafts and through which the rope runs, the frame being pivoted in bearings and adjustable so as to hold the rope-guide at proper angle to the rope.

WEEK ENDING DECEMBER 8TH, 1896.

- 572,512. **PROCESS OF MANUFACTURING PHOSPHATES OF ALKALIES.** Heinrich Albert, Biebrich, Germany. Assignor to the Chemische Werke, vormals H. & E. Albert, same place. The process consists in forming a bath of phosphoric acid and a bath of one or more of the soluble salts of the alkali metals, associating the two baths together in an electrical circuit, the baths being separated by a porous diaphragm and thereupon electrolyzing the combined baths by passing a current of electricity therethrough, whereby a phosphate of the alkali employed is produced at the cathode.
- 572,548. **APPARATUS FOR SEPARATING SULPHUR FROM COAL.** Isaac M. Kelley, Clarksburg, W. Va. Assignor of one-fourth to Lloyd Reed, same place. The combination with the rotatable screen, composed of sections having different-sized meshes, of the water distributing pipe, the conductor leading from a point below the juncture of the sections, the hopper located below the screens and a chute provided with a series of screens one below and projecting beyond another, of different lengths and sizes of mesh, and the gates at the lower ends of the screens provided with weighted levers.
- 572,583. **PROCESS OF MAKING METAL TUBES.** Peter Swanger, Washington, Pa. The process consists in producing a blank thicker at its transverse center than at its edges and gradually tapering in thickness from its center to its edges, bending the blank into tubular form with its edges overlapping, heating and welding the edges and then reducing the walls of the tube to uniform thickness.
- 572,590. **APPARATUS FOR MANUFACTURING ARMOR-PLATES.** Alexander Wilson and Frederic Stubbs, Snefield, England. The combination of a furnace having an opening at one end, rails on the floor of the furnace, a car running on the rails, a platform on the trolley dividing the furnace into two chambers, an opening in the platform of suitable size to receive an armor-plate and jets arranged to supply water to the under side of the plate.
- 572,636. **ELECTRIC FURNACE.** James E. Hewes, Philadelphia, Pa. The combination of a furnace-chamber having an inclined hearth, and electrode movable parallel and close to the hearth, a normally stationary electrode arranged at an angle to the lower part of the hearth, and electric circuits for supplying current to the movable and stationary electrodes.
- 572,631. **SLATE-PICKER.** David E. Phillips, Mahanoy City, Pa. The combination of an inclined chute for the coal, with a movable retarding-surface interposed in the chute, means to move the same at an angle transversely to the chute, and an apron in the bottom of the chute and extending over a portion of the retarding-surface, substantially as described.
- 572,676. **TREATMENT OF PETROLEUM FOR REMOVING SULPHUR COMPOUNDS.** Herman Frasch, Cleveland, O. Assignor to the Solar Refining Company, of Ohio. The improvement consists in eliminating the sulphur by subjecting the oil during the process of distillation either in a liquid or vaporous condition to roasted and pulverized copper matte.
- 572,703. **MANUFACTURE OF ILLUMINATING GAS.** Charles D. Hawk, Chicago, Ill. The process consists in heating and expanding natural gas, generating gas from coal, and superheating the same, and intermingling and combining the natural gas with the coal gas so obtained, and passing the combined gases through a body of heated carbon, introducing hydrocarbons into the combined gases, and then passing the gases and vapors through another body of heated carbon and then through a mass of heated refractory fixing material.
- 572,797. **GAS-GENERATOR.** Jesse E. Hathaway, Santa Fe Springs, Cal. A gas-generator comprising an exhaust-pipe through which pass the hot products of combustion from a gas-engine, a coil of pipe arranged in the exhaust-pipe and connected at one end with an oil-supply and adapted to discharge at its other end the generated gas, a gas reservoir surrounding the exhaust-pipe and into which discharges the gas-discharge end of the coil of pipe, and a safety-valve arranged in the upper end of the coil of pipe and opening into the reservoir.
- 572,808. **TOOL FOR MINERS AND BLASTERS' USE.** Martin Killian, Central City, Colo. A tool comprising the pivoted jaws and handles, the jaws being provided with longitudinal grooves in their meeting faces and knives secured to the jaws and having their cutting edges in the same plane as the meeting faces of the jaws, whereby the edges contact when the jaws are closed, the jaws being further provided with transverse recesses or openings across which the knives extend.
- 572,862. **COMPOSITION OF MATTER FOR ABRADING ARTICLES.** Edward G. Acheson, Monongahela City, Pa. A composition composed of silicic acid of carbon bonded with a bond containing a flux and clay substantially free from alkali.
- 572,855. **ROCK DRILL.** Jos. F. Balesley and Frank C. Priestly, Denver, Colo. The combination of a drill-holder, a swinging hammer, a tilting walking beam, a rocking arm connected with the shank of the hammer, a link connection between the rocking arm and one end of the walking beam, the link carrying the hammer shank, a tilting lever connected with the opposite end of the walking beam, and means for turning the drill holder by the tilting of the lever.
- 572,856. **PICK.** Charles E. Barker, St. David, Ill. Assignor to the What Cheer Drill and Miners' Tool Company. The combination of a pick having a central, oblong eye provided at the sides with opposite notches, a metallic handle socket having at one end projecting studs which enter the pick eye, a longitudinal bolt hole, and a transverse nut-receiving slot intersecting the bolt hole, a rotary nut arranged in the slot between the inner and outer edges, and a separate bolt passing into the bolt hole through the nut and provided at its outer end with a rigidly-fixed oblong head which in one position is adapted to pass through the pick-eye and in another position to span the pick eye and enter the opposite notches thereof.
- 572,867. **MEANS FOR CLEANING OIL WELLS.** William Connelly, Toledo, O. The combination of a polished rod, sucker-rod sections, each provided with a longitudinal bore, a steam-pipe in communication with a suitable supply of steam and the bore of the polished rod, coupling devices between the same provided with a longitudinal bore, and an opening communicating with the bore and the exterior of the sucker-rod within the well.
- 572,891. **METHOD OF TOUGHENING MANGANESE STEEL CASTINGS.** Robert A. Hadfield, Sheffield, England. The process consists in heating the castings, beginning with the furnace in a cold state, applying the heat very gradually until the casting is visibly red, then continuing the heat to an orange heat and finally plunging in cold water.
- 572,900. **MECHANISM FOR UNLOADING, STORING AND RELOADING COAL.** William A. Lathrop, Wilkes-Barre, Pa. The combination of a storage building or enclosure, a conveyor on the outside of the latter, and a series of chutes or passages communicating with the inclosure at different heights and extending to the conveyor.

Great Britain.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

WEEK ENDING NOVEMBER 7TH.

- 20,522 of 1895. W. Davies, Glamorgan. Extinguisher for miner's safety lamps.
- 22,812 of 1895. H. S. Maxim, London. Treating refractory gold ores with molten lead in presence of a reducing atmosphere.
- 1,185 of 1896. E. J. Baldwin, Cardiff. Improvements in rock drills.
- 9,388 of 1896. C. A. Burghard and G. Rigg, Manchester. Wet process for extracting copper from ores.
- 14,988 of 1896. A. J. Brown, Boston, Mass., U. S. A. Electrolytic manufacture of white lead.

PERSONAL.

COLONEL BOURKE has returned to Rossland, B. C., after an extended trip through the Eastern provinces.

MR. FRANK MOBERLY, civil and mining engineer, has been visiting the Boundary country in British Columbia, reporting on mines.

MR. O. B. HARDY, president and manager of the Bingham (Utah) copper mines, has left for the East to promote a mining deal.

PROF. JOHN A. CHURCH, mining engineer of New York, is now in Victor, San Bernardino County, Cal., where he will remain for an indefinite period.

MR. MICHAEL F. TARPEY, the well-known mining superintendent and mine operator of Alameda, Cal., has gone to lower Mexico, where he is engaged in logwood planting.

HON. A. G. BLAIR, Canadian Minister of Railways, is now in the Kootenay country making a thorough investigation of the proposed railroads through the British Columbia gold fields.

SUPERINTENDENT MORGAN, of the Brunswick, and SUPERINTENDENT WALKER, of the Empire mines, in the Grass Valley District, Nevada County, Cal., are reported to have resigned their positions.

HON. GEO. E. FOSTER, of Ottawa, Can., ex-Minister of Finance, who has for some time a large stockholder in the British-Canadian Gold Fields Company, has joined the directorate of that enterprise.

MR. JOHN SIMPSON, formerly superintendent for the Morris Coal Company, at Forest Lawn Mine, Sutersville, Pa., has been placed in charge of the large mine of the above-named company, at Jobs, on the Hocking Valley R. R., near Nelsonville, O.

CAPT. OLE LUND, chief engineer of the Department of Public Works of Norway, has been making an examination of the iron mines of the Lake Superior region and the transportation facilities, and has started for home with ideas that are to be put into practice at once in Norway.

MR. A. B. ADAMS, president of the Chewelah Mining Company, has returned to Chicago from a business trip to the mines of British Columbia, where he has interests. The Chewelah Mining Company's properties are situated one and a half miles from Chewelah, Wash., and comprise a group of seven mines.

MR. WILLIAM THOMPSON, of London, England, consulting mining engineer, for some time government mineralogist of Queensland, and recently president of the Chamber of Mines, Coolgardie, Australia, who has been on an extended trip to the Trail Creek country, British Columbia, has left Rossland for England.

MR. MILTON E. MOSS, mining engineer, representing Prof. J. Dunraven Young, of Chicago, recently returned from a three weeks' trip to Tuolumne County, Cal., where he had been examining gold properties on the Mother Lode for Chicago capitalists. Mr. Moss will soon go west again in the interest of Professor Young.

MR. NATHAN P. DANIELS, the local transfer agent at Boston of the Quincy Mining Company, has resigned his position on account of poor health. Mr. Daniels has been the Boston representative of the company for 16 years. Although severing his connection with the company as its transfer agent, he will still retain his place on the Board of Directors.

MR. HERMANN THOFERN, consulting engineer in electrolysis and formerly superintendent of the Anaconda Copper Mining Company's refinery at Anaconda, Mont., returned to New York on December 13th. Mr. Thofern, during his visit, inspected several gold properties, and examined some large refining plants, besides attending to his regular professional duties.

OBITUARY.

GEORGE COLTON, foreman of the Zelnora mine, at Bingham, Utah, was killed by an explosion of powder about two weeks ago.

JAMES L. SALLEE died suddenly at Colorado Springs, Colo., on December 7th. Mr. Sallee went West about twenty years ago and became identified with the mining interests. At the time of his death he was stockholder in and manager of several important gold mines in the Cripple Creek District. He was 45 years old.

WILLIAM H. OSGOOD died in New York on December 12th. At one time he was a member of the firm of Fowler, Osgood & Company, and was a member of the Stock Exchange since 1870. Latterly he was interested in zinc mines in the South, and had a valuable contract to furnish this metal to the Russian government.

ANDROS B. STONE, who died in New York December 15th, was born in this State, but went West at an early age, and was engaged in engineering work on different railroads. When still young he turned his attention to bridge work, in which he was remarkably successful, and about 1856 organized the bridge building firm of Stone & Boomer, which became well known throughout the West. Among

the contracts held by this firm were the Rock Island bridge over the Mississippi, a bridge across the Illinois River, which had the longest draw-span built up to that date; the roof of the Union Passenger Depot in Chicago, and many other important works. Later Mr. Stone went to Cleveland, where he engaged in the iron business and was connected with a number of companies. He was at one time president of the Cleveland Rolling Mill Company, and also of the Union Rolling Mill Company of Chicago. While in Cleveland he became interested in the Bessemer steel process and was largely instrumental in its first introduction into this country. He was also connected with the Poughkeepsie Bridge Company and took a prominent part in securing the construction of the great bridge over the Hudson. For a number of years past Mr. Stone had lived in New York, and lately had withdrawn largely from active business, although retaining considerable interest in various manufacturing enterprises.

DAVID LEONARD BARNES, who died in New York, December 14th, aged 38 years, was born near Providence, R. I. He graduated from Brown University at Providence, and from the Massachusetts Institute of Technology, and was for some time connected with the Rhode Island Locomotive Works, a part of the time as chief draftsman. After leaving those works he went to Chicago and opened an office as consulting mechanical engineer, and was very successful, as his talents and capabilities became known. Besides his work as an engineer Mr. Barnes was an industrious writer, and contributed many papers to technical journals and societies. After the retirement of Mr. Neale from the *Railroad Gazette* Mr. Barnes became connected with that paper, at first as Chicago representative, and afterwards as mechanical editor, and that connection was maintained until very recently. A few years ago he began to turn his attention to electrical developments, and became known as an authority on electric traction. When the Baldwin Locomotive Works and the Westinghouse Electric Company formed a combination to build electric locomotives Mr. Barnes was appointed their engineer, and designed the work which has already been completed and is now in progress of construction by those companies. He was a firm believer in the future of electric traction, and considered that the field was by far the most promising one for a mechanical engineer to enter at the present time. Mr. Barnes was a member of the American Society of Mechanical Engineers and the American Society of Civil Engineers in this country, of the Institution of Civil Engineers in Great Britain, and of a number of local societies. He was a man of great industry, of very quick perception, and a most excellent judge and critic of mechanical devices. He was also a clear and fluent writer, and many of his papers and monographs are worthy of preservation. He made many friends who will deeply regret his death at an age when he should still have had many years of successful work before him.

SOCIETIES AND TECHNICAL SCHOOLS.

OHIO STATE UNIVERSITY.—The School of Mines department of this institution, at Columbus, is in a flourishing condition. The School of Ceramics, a department of the School of Mines, the only school of the kind in the United States, now has 12 students.

CHICAGO SCHOOL OF ASSAYING.—This school, of which Prof. J. Dunraven Young is director, is now in its third year and is constantly growing. Recent improvements have been made to the laboratories and additional room has been secured in the Monadnock Building. The school is attracting wide attention, as is evident from the fact that at the present time there are students from California, Colorado and New Mexico.

CIVIL ENGINEERS' CLUB OF CLEVELAND, O.—A meeting was held in the club-rooms, Case Library, December 8th. The paper of the evening was read by Mr. Jos. W. Willard, on explosives; "A Brief History; their adaptation to the arts and engineering; possible future use in warfare of so-called high explosives." At 10 p. m., Mr. Willard not having finished, it was agreed to postpone the reading and the discussion until the semi-monthly meeting on December 22d.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL, MINN.—A regular meeting was held December 7th. County Surveyors Wm. Danforth, of Goodhue County, and C. A. Forbes, of Dakota County, asked the co-operation of the society with the Minnesota Association of Surveyors and Engineers, the Minneapolis Engineers' Club, and the Engineering Department of the State University, in an endeavor to secure legislation in the matter of licensing measurers of land. Messrs. G. L. Wilson, C. F. Loweth and J. N. Armstrong will serve as a committee in this affair. Mr. Max Toltz then read a paper on "Paint Tests at the Great Northern Railway Laboratory." The result of the experiments pointed to graphite paints as best adapted for preservation of iron and steel structures.

INDUSTRIAL NOTES.

The Delaware Iron Works, at New Castle, Del., is erecting a new furnace that will be completed about January 1st, and will then be put in operation.

The Bellaire (O.) Steel Company's blast furnace, which has been idle for three months, has been put in blast. More than 175 people were given employment.

The United Window Glass factory at Orestes, Ind., resumed operations December 12th, furnishing employment to 500 hands. It has been idle six months.

The Pacific Rolling Mill strike at San Francisco, Cal., is at an end, the men having agreed to a 10% reduction of their wages. Half of the working force resumed work on December 12th.

The Wellsville Plate and Sheet Iron Company, of Wellsville, O., has begun the erection of a new sheet mill, which, when completed, will give employment to a largely increased force of men.

The Rhode Island Tool Company, of Providence, R. I., has placed the contract for its new galvanizing-room with the Berlin Iron Bridge Company, of East Berlin, Conn. The building will be a fireproof structure throughout, no woodwork being used.

The National Galvanizing Works' steam plant near McKeesport, Pa., has been thoroughly tested and found satisfactory. All the machinery is now in place. The entire plant will be lighted by electricity, and will be put in operation about the first of the new year.

The Lehigh Zinc Company, of South Bethlehem, Pa., has started every fire in the oxide department, most of the furnaces having been idle. All the departments of the works are now in operation except the spiegel furnaces, which are being lined and prepared for relighting.

The American Wire Nail Works at Anderson, Ind., was put to its fullest capacity on December 14th by extra forces being added to the galvanizing department. The Union Steel Works at Alexandria and the Anderson Window Glass Works also resumed on the same date.

The Central Trust Company, of New York, has been granted the decree of foreclosure against the West Superior Iron and Steel Company by Judge Vinje at Superior, allowing the Rockefellers to take possession under the trust deed of \$1,600,000. The Central Trust Company holds a mortgage on the plant of \$1,300,000.

Messrs. Fraser & Chalmers, of Chicago, have recovered a judgment for \$17,000 against L. C. Trent. Mr. Trent was agent for the company at Salt Lake in 1893, and on November 3d of that year appropriated to his own use something over \$17,000 of the firm's money, claiming the firm owed him this amount. The case has been in court ever since.

The Stearns-Roger Manufacturing Co., of Denver, Colo., is building a 50-ton chlorination plant at Boulder, Colo.; also cyanide works at Florence, Colo., and has just made a contract with the Dickson Manufacturing Company, of Scranton, Pa., for the manufacture of the Roger crushing rolls, which are reported to be giving satisfaction where now used.

The Bristol (Tenn.) iron furnace, which has been idle for five years on account of being involved in litigation, was sold at auction last week for \$55,000. The property was bought by J. J. Gordon and J. H. Caldwell, trustees for the benefit of the Home Iron Company. The furnace has a capacity of 150 tons daily. If the sale is confirmed the furnace will be put in blast.

The Union Gas Engine Company, San Francisco, Cal., has received an order for two 20-H. P. gasoline engines, to be shipped with two air compressors to Mexico, to be used in mines owned by Boston parties. They also received an order for six engines for Japan and are now placing two 25-H. P. duplex gasoline engines in a 75-ton schooner for Central American coasting trade.

The Ludlow Valve Manufacturing Company, of Troy, N. Y., is erecting several new buildings, in one of which the Berlin Iron Bridge Company, of East Berlin, Conn., is erecting a runway for a 20-ton electric traveling crane. The crane has a clear span of 55 ft., and the length of the runway is 160 ft. The track on which the crane runs is supported by heavy columns and girders of steel.

The Goodsell Packing Company, of Chicago, manufacturers of the Goodsell packings, reports an exceedingly heavy trade. At no time has there been a more active demand for their packing specialties than at present, and their factory capacity is crowded with an extra force to turn out the product. They have appointed Speck, Marshall & Company, of Pittsburg, agents for the sale of their Rubber-Back Flax, Dollar and Hydraulic packings in Pittsburg and vicinity.

The Risdon Iron Works, of San Francisco, Cal., commenced suit December 9th in the United States Circuit Court against L. C. Trent, of Salt Lake, Utah, for infringement of patent 538,584, granted May 7th, 1895. The action is brought to obtain an injunction against Trent and to stop him from further infringing, and to obtain an accounting of profit made by defendant on past infringement, and for damages done to the Risdon Iron and Locomotive Works by interfering with its sales of the patented mill which has become known on the market as the Bryan Roller Quartz Mill.

The Wheatland (Pa.) Iron Works, owned by the

estate of James and Hannah Woods, deceased, and of which the Safe Deposit and Trust Company, of Pittsburg, is trustee and treasurer, is to be purchased by T. S. B. Wood, of Pittsburg. The works have been idle for a number of years, and the property is now in the hands of the orphans court. All the interested heirs have filed a petition asking that Mr. Wood be allowed to open the mill, and later on, if he so desired, purchase the property. The plant was built in 1872, and contains 13 double puddling furnaces, 12 heating furnaces and three trains of 24 in. rolls. The annual capacity is estimated at 27,000 gross tons of plate iron.

TRADE CATALOGUES.

The Denver Engineering Works Company, of Denver, Colo., has issued catalogue No. 3, illustrating and describing various apparatus needed at mines. They manufacture ore cars of all descriptions, hoisting cages for vertical and inclined shafts, skips and skip tanks for hoisting water, ore and water buckets, wheels and axles, and all other appliances of this kind, which the catalogue gives in detail.

The Joseph Dixon Crucible Company, Jersey City, N. J., has sent us a catalogue whose nicely colored lithographed cover is as attractive to the eye as the contents must attract the attention of the users of graphite in its many forms. As a lubricant, graphite has made great inroads upon the use of oil, and the Dixon company is able to supply it in a great many forms to suit the particular application. Silica-graphite paint is another use to which graphite has been put during the last 25 years. Blacklead crucibles, plumbago facings, stove polish, belt dressing and leather preservative, lead pencils, etc., etc., are other forms and preparations of graphite described in the catalogue.

The Clayton Air Compressor Works, New York City, have sent out a pamphlet devoted to the subject of compressed-air tools and appliances. To those already using compressed air, little need be said regarding the saving in time and labor accomplished by the use of pneumatic tools, drills, hoists or other appliances. Those who have no air-compressor will find it to their advantage to give the system a thorough investigation and compare its merits with other systems. The pneumatic tools first described in the pamphlet are for calking boilers, beading flues, riveting staybolts, cutting boiler plate, cleaning and chipping castings, etc., and for cutting, carving and dressing stone. Following this are descriptions of the Phoenix portable rotary air-drill, the Manning portable piston air-drill, the Phoenix pneumatic breast drill, the Pittsburg bridge riveter and the Pittsburg column riveter. Following these is the subject of straight-lift air hoists. Among other appliances given are the Manning sand papering machine and counterbalance, the pneumatic sand sifter, pneumatic car seat and furniture cleaner, compressed air nozzles, compressed air engine, fuel oil burners and self closing air hose couplings.

MACHINERY AND SUPPLIES WANTED.

If any one wanting machinery or supplies of any kind will notify the *Engineering and Mining Journal* of what he needs he will be put in communication with the best manufacturers of the same.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning goods of any kind, and forward them catalogues and discounts of manufacturers in each line.

All these services are rendered gratuitously in the interest of our subscribers and advertisers; the proprietors of the *Engineering and Mining Journal* are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

GENERAL MINING NEWS.

OIL EXPORTS.—Mineral oils to the amount of 71,297,467 gals. were exported from the United States during the month of November. The shipments for the eleven months ending November 30th, 1896, were divided as follows: Crude, 106,041,614 gals.; naphthas, 11,578,494 gals.; illuminating oils, 680,941,468 gals.; lubricating and paraffin, 46,063,091 gals.; residuum, 507,192 gals.; a total of 845,431,859 gals., against 772,540,884 gals. in the same period last year.

ALABAMA.

DEKALB COUNTY.

SAND MOUNTAIN COAL AND COKE COMPANY.—This company has been awarded the contract by the government for all the coal used on the Tennessee River improvements from Chattanooga to the Mississippi.

ARIZONA.

YAVAPAI COUNTY.

COPPER MATTE.—In sinking the old shaft in this mine a vein of copper ore was opened up which is improving as depth is attained.

UNITED VERDE COPPER COMPANY.—On the Iron King claim this company is extending the tunnel with two shifts and working in high-grade ore. This claim lies alongside of the Equator. The company is extending its new smelter building another 75 ft. The engine-room will also be enlarged 18 ft.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

BLUE LAKES WATER COMPANY.—Work on the power plant at Blue Lakes City on the Mokelumne River is progressing rapidly, and the company will soon be able to furnish the power contracted for by the California Exploration Company in Calaveras County.

CALIFORNIA EXPLORATION COMPANY.—This company has commenced work on the Gold Hill mine, near Spring Gulch.

LIVE OAK.—This old mine, in Clapboard Gulch, near Volcano, is being reopened by John McVeigh, of Alameda, who is preparing to erect a 20-stamp mill and have it in operation in a few weeks.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

LONE STAR.—At this mine, at West Point, a 6-ft. ledge is reported to have been struck. The 20-stamp mill is in operation, and about 20 men are employed.

MITCHELL.—At this mine, near Railroad, a 10-stamp mill has been erected. A tunnel is being run along the vein, and it is the intention to sink a shaft at its mouth. The ledge is 3 ft. wide.

ROANOKE MINING COMPANY.—This company's mine, the Maser & Lamphear, located $1\frac{1}{2}$ miles from Mokelumne Hill, recently made a clean-up, on a 20-days' run, amounting to \$11,000. Sinking has been resumed.

SANTA ANA.—The shaft at this mine, in Angel's Camp District, near Carson Hill, is down 300 ft. The ore yields \$12 per ton in free gold and is rich in sulphurets. This mine is being worked by a Utah Company.

EL DORADO COUNTY.

ORO FINO.—This mine, 3 miles from El Dorado, at Big Canyon, is running the 40-stamp mill on good ore.

(From Our Special Correspondent.)

Permission to construct dams has been given to the Bell & Doosey mine and the Blue Eyes mine by the Debris Commission.

GRAND VICTORY.—This mine, 5 miles southeast from Placerville, on Squaw Creek, has been under bond for some time. A few weeks ago the third payment was made. This is a promising property.

INYO COUNTY.

(From Our Special Correspondent.)

BEVERIDGE DISTRICT.—It is reported that H. S. Gillette and Calvin L. Brown, of Chicago, have purchased five mining claims in this district, near Independence. Price, \$250,000. The ore heretofore has been crushed by an arrastra and then packed out at an expense of \$12 per ton. A mill is to be erected.

MONO COUNTY.

STANDARD CONSOLIDATED MINING COMPANY.—A special meeting of the stockholders was held December 12th, at which they voted to accept the proposition looking toward the consolidation of the Bulwer, Summit, Mono and Bodie mines under the agreement published in the issue of the *Journal* of October 24th, page 404.

NEVADA COUNTY.

REWARD GOLD MINING COMPANY.—An encouraging strike was made recently in this company's mine in Nevada City. The mine is being reopened by Col. Stone, of San Francisco, R. C. Walrath, of Nevada City and others. A long drain tunnel has been run, draining the mine into Wolf creek.

(From Our Special Correspondent.)

ROCKLAND MINING COMPANY.—This company has been incorporated with Joseph Rosenthal, president; Theo. Fox, vice-president, and Jabez Howe, secretary; Geo. F. Davidson, F. Suamon and E. A. Farrish, Directors. The Alpha and Kentucky mines in the Grass Valley district have been acquired by the new company, and the best modern machinery is being put up by the Union Iron Works and the Parke & Lacy Company. White & Rodgers have contracted to erect the building. Development work will commence at once. These mines were good producers, but have lain idle for several years. The shaft is now down 300 ft., and assays of the ore in sight show from \$5 to \$30 per ton.

PLACER COUNTY.

(From Our Special Correspondent.)

GOLD RUN.—This hydraulic mine at Dutch Flat has been granted a working permit by the Debris Commission.

RIVERSIDE COUNTY.

(From Our Special Correspondent.)

JUMBO.—This mine, near Perris, is ready to start up. The Gavilon, Santa Rosa and Santa Fe, in the same district, are all doing well.

SIERRA COUNTY.

(From Our Special Correspondent.)

ALASKA.—This mine, one quarter mile north-east of Pike City, comprises four claims, making about 53 acres. The Scotch Company, which is now working it, expects to spend about \$200,000 in running a tunnel to cut the vein below the old tunnel.

GOLD BLUFF.—This mine, $1\frac{1}{2}$ miles north-east of Downsville, has been bonded by Hayward & Lane, who are putting the electric plant in order, preparatory to pumping out the mine. The mine is well equipped with machinery.

NORTH FORK GRAVEL MINING COMPANY.—A

the Lucky Dog mine, $1\frac{1}{2}$ miles west of Forest City, a very rich strike of gravel has been made. J. O. Jones is superintendent.

SISKIYOU COUNTY.

(From Our Special Correspondent.)

KATIE MAY.—This mine, on the Greenhorn, is being worked by the owners, Bailey & Carrick, who have realized about \$80 per ton for the ore crushed for them at the Lamb mill, at Yreka.

SALMON RIVER MINING COMPANY.—The hydraulic mine of this company, near Sawyers Bar, is going to start up. This is one of the best equipped mines in the country.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

BLACK OAK.—These mines, near Sonora, have been sold to a Franco-Belgian company, represented by Leopold Meyer, of Belgium, for about \$400,000. There is one of the finest cyanide plants in the State on this property.

THOMPSON HILL.—This mine, near Tuttle town, has been sold to San Francisco men for \$5,000. The property was worked by Jim Gillis, the partner of Sam Clements, in the early sixties.

COLORADO.

BOULDER COUNTY.

BOULDER CHLORINATION PLANT.—A 50-ton chlorination mill is being constructed at Boulder by the Stearns Roger Manufacturing Company, of Denver, under the superintendency of John E. Rothwell. The plant will include a Pearce turret furnace of 40 ft. diameter, and four sets of the Roger improved crushing rolls.

IRON GOLD MINING COMPANY.—The annual meeting of the company was held recently and the following board of directors was elected for the ensuing year: F. E. Busby, C. A. Vandever, F. C. L. Sergeant, John T. Bottom and W. A. McIntyre. The officers were re-elected. The property of the company is in Ward district, and consists of the Maud S., Indian Chief, Spokane, Silver Leaf and Denver City. A tunnel 600 ft. in depth has been run on the Indian Chief and Spokane and has cut two veins. A drift is now being run on a 4-in. streak of smelting ore with about 8 in. of pay dirt. As the drift is at right angles to the tunnel trouble has been experienced from foul air, and the company has arranged to put in a rotary fan.

CLEAR CREEK COUNTY.

(From Our Special Correspondent.)

ALBRO.—It is understood that the owner of this mine, at Dumont, was offered \$150,000 for the property by New York people, but refused it. While the mine has produced heavily of good ore, it is pretty well stoned and will require a large outlay to do development work. A streak recently opened by lessees measures 12 in. wide and runs \$70 per ton. Its extent can be ascertained only by extending the levels in the 400-ft. shaft.

ARGO MINING, DRAINAGE AND TRANSPORTATION COMPANY.—Important strikes have recently been made at Idaho Springs, in this tunnel, better known as the Newhouse, but full information is not obtainable. The tunnel has been driven into Seaton Mountain for $1\frac{1}{2}$ miles and is going forward at 10 ft. per day. Mr. T. R. Henahan of the San Juan country, is in complete charge and from comparison it is found that he is breaking all records in the amount of rock removed. The tunnel is 12 ft. x 12 ft. in size and is completed with drainage and double track as drifting proceeds.

BADGER BOY MINING COMPANY.—The new Beam process for treating all classes of ore has been put in by this company at Empire. By laboratory tests A. M. Beam has perfected a roaster for driving off the refractory elements in the ores in 30 minutes time. The ore is reduced to 60 mesh, and stirred with quicksilver, which is supposed to catch the free gold. The new mill has a capacity of about 25 tons of ore per day, but it looks to me to be still in the experimental stage. Mr. Beam claims to have signed contracts for mills at Phoenix, Ariz.; Los Angeles, Cal., and Denver, Colo.

CARDIGAN.—In extending an adit level in this property, at Idaho Springs, a fault was found at 700 ft.; however, the level was continued in the same course and at 900 ft. the vein came in place, with much richer mineral; that now showing carries 7 oz. gold per ton and must run 20% copper.

CONSOLIDATED-STANLEY MINING COMPANY.—Rumors have been afloat for some time that a deal was on for the entire holdings of this company, at Idaho Springs. Offers are said to have been made ranging from \$250,000 to \$2,000,000. Manager Gehrmann informs me that he has had many offers, but that there are no deals pending, and none are being considered. His partners, like himself, prefer to hold on to the big group and they are actively developing and shipping ore.

HECLA GROUP.—A Boston pool recently put in steam drills at this Empire property, and a crosscut tunnel is now being driven to reach a number of lodes.

LINCOLN.—Ohio parties owning this property at Idaho Springs are figuring on the consolidation of other claims adjoining. These would be worked through the Lincoln ground, which has now been under development for fully two years. It has some large bodies of concentrating ore blocked out, ready for breaking down.

LOMBARD TUNNEL.—This proposition, at Yankee, is receiving more general attention because of a

good ore body encountered at 500 ft. It yields lead and iron and Dr. Ashbaugh, the owner, is reported to have ordered the mill started up to treat this mineral.

WILCOX TUNNEL COMPANY.—After a year's inaction this tunnel, at Idaho Springs, is to be continued toward the mines of Gilpin County. It was driven something over 1,500 ft., when the finances gave out. Now it is claimed new financial blood has been infused into the company and the air compressors and drills will be working within 30 days. The lodes had not been reached when operations ceased.

EAGLE COUNTY.

HOLY CROSS GOLD MINING COMPANY.—An accident by which six men are believed to have lost their lives occurred on the afternoon of December 16th in the tunnel of the Holy Cross mine, near Red Cliffe. A blast caused a fall of earth, and it is believed the men are buried under it, though they may be simply imprisoned, in which case there is hope of their rescue.

EL PASO COUNTY.

E. F. C.—This mine, south of Gillett, has commenced making shipments to the Summit mill. It is said that this will supply ore enough to keep the mill running all winter, and means an increase of \$3,500 in the pay-rolls of Gillett.

EL PASO COUNTY—CRIPPLE CREEK DISTRICT.

BUFFALO, N. Y.—CRIPPLE CREEK GOLD MINING AND MILLING COMPANY.—This company held its annual meeting recently and elected the following board of directors: George W. Drake, G. G. Newcomb, F. E. Dubois, L. H. Abbee and F. A. Bailey. At a meeting of the newly elected board the following officers were elected: George W. Drake, president; C. H. Peters, secretary, and G. G. Newcomb, treasurer.

(From Our Special Correspondent.)

ANACONDA.—During the first few days of the month 50 tons of ore were shipped per day. During November the gross output was \$63,000, and the freight and treatment charges were about \$15,000, making the net returns \$58,000, leaving a nice profit to the mine, as only some 120 miners are employed, most of whom are on development. Last month was the banner month for this mine. Its first shipment was made in February, 1892.

BLUE BIRD MINING COMPANY.—This company, owning the Blue Bird claim on Bull Hill, recently leased and bonded the claim to a Mr. Mason, of Cripple Creek. The bonded price is \$250,000 and the lease 12 months. The lessee has shipped three cars to the El Paso reduction works averaging a trifle over 1 oz. per ton, while the smelting ore samples \$50 per ton. Mr. Mason is working the same shaft that Dr. Burdick and D. Hyman, of Aspen, worked in 1892, and which has been spasmodically worked by lessees ever since, and always at a loss.

BOGART.—This mine makes a shipment twice a week to the local smelters. The ore varies from 2 oz. to 6 oz. In my notes of December 5th a statement was made which gave the impression that the values to-day were found in the cross-vein, but subsequent developments demonstrate that the values are found in the main vein; the former lessees and also the company now working following the cross-vein.

CITY VIEW.—This fractional patented claim, on Gold Hill, has been leased again, after a suspension of two months. A shaft has been sunk 350 ft., and several cars of ore have been shipped from time to time, but not enough to pay.

ELKHORN.—This mine, directly north of Cripple Creek, is fast developing into a mine in the hands of lessees. A shaft has been sunk 132 ft. In the bottom of the shaft is a well defined east and west vein 18 in. wide, largely composed of iron pyrites and quartz, assaying from \$20 to \$80 per ton. The iron pyrites near the surface assayed only a few dollars per ton. Considerable stoping has been done on the east and west vein on the 85-ft. level west, and a sample from the north and south vein, taken from the 5-ft. breast of the north drift, assayed \$12.

ELKTON CONSOLIDATED.—An important strike has been made at the 4th level, north of the Elkton shaft, which will add much to the value of the mine.

GRANITE HILL MINING COMPANY.—This company, owning the Granite Hill fractional claim located in Poverty Gulch, which is being worked under lease, has a shaft sunk 150 ft., and preparations are being made to resume working for another level. The first-class ore samples about 8 oz., and the mill ore over 1 oz. per ton.

HALETT & HAMBURG MINING COMPANY.—This company, owning two fractional claims on Battle Mountain, at its recent annual meeting decided to push the work on a large scale. A two-compartment shaft is to be sunk at once.

JACK POT MINING COMPANY.—This company, having several claims on Gold Hill, on Raven Hill and Blue Bell Hill, has been at work since 1891 and has not shipped any ore. The many sets of lessees have from time to time spent \$60,000 in searching for mineral, but up to date unsuccessfully. It is now reported that the lessees on the Jack Pot claim on Raven Hill have discovered a small but rich vein at the depth of 6 ft. The fortunate lessees have been at work over six months in another part of the claim driving a tunnel.

LITTLE MAY.—This property is tied down, a

seeming or a real difference between the owners and the lessee being the cause. The lessee was shipping about 15 tons of \$16 ore daily, when the owners stated he had forfeited the lease, and served notice of ejectment. The lessee, on the other hand, contends he did not, and thus at present the matter stands. Attempts have been made at compromises, but thus far have been futile. The mine is considered a valuable one when opened up.

MARINETTE MINING COMPANY.—This company, owning the Abe Lincoln, a fractional claim of nearly 4 acres in Poverty Gulch, has sunk its main shaft 275 ft., and will continue sinking until 300 ft. or the 3d level is reached. From present appearances it looks as if the shaft is sunk between two ore chutes, one coming from the west or the De Witt lease, and the other from the east. The vein at the present depth is leaving the shaft and dipping to the south. The smelter returns gave \$20.96 per ton, but the assays of late average over \$40 per ton. This company is largely owned by one family. Geo. R. Arnold, president; J. R. Arnold, vice-president; E. S. Arnold, treasurer and manager; A. L. Arnold, secretary; and R. R. Arnold, director. The company is stocked for \$1,000,000, of which the Arnold family represents 750,000. In the treasury there are 50,000 shares of Marinette stock, and 395,000 of Arcadie Consolidated.

MOON-ANCHOR MINING COMPANY.—This company owns the mine of the same name on Gold Hill, which shows a steady improvement and a steadily increasing output. The recent improvement was made in the bottom level south, and shows every sign of permanency. While the ore is not high grade—about \$30 per ton—yet the quantity is such as to admit of a good profit.

NIGHTINGALE.—This claim, on the west slope of Bull Hill, has been under lease to a Mr. Brown, of Denver, since last January. He drove a tunnel 300 ft. and did prospecting work which cost nearly \$6,000, and recently struck an ore chute caused by the junction of two small veins. The vein in the winze is telluride ore 3½ ft. wide, which is all sent to the mills and returns \$30 per ton. It is the intention of the lessee to sink the winze 30 ft. Should the vein maintain its size and value a shaft will be sunk 40 ft. on the winze, a steam hoist will be erected and the mine be actively worked.

SNOWSTORM.—This fractional claim on the west slope of Bull Hill has been worked under lease for two years by Pueblo parties, but without meeting much encouragement in the way of shipment. The deepest shaft has been sunk 116 ft. Several veins were discovered, but without finding an ore chute.

GILPIN COUNTY.

(From Our Special Correspondent.)

CONCRETE.—It is stated that a large body of good ore has been opened up in the bottom of this mine. Sufficient mill dirt is being shipped to keep the Penn Mill, at Black Hawk, running night and day. The ore is said to be of good grade, about 7 oz. to the cord.

FORFAR.—At this mine, in Russell District, the shaft has been sunk to a depth of 150 ft., and levels driven east and west at 70 ft. and 140 ft., respectively, from the surface, opening up a strong vein of good appearance, but rather low value. In the last 20 ft. of drifting at the 140-ft. level east, good ore has been struck, assaying about an ounce to the ton, with an average width of over 2 ft.

GOLD COIN MINING AND MILLING COMPANY.—It is reported that this New York company has taken up the Buell group, in Mountain City; the Barker, on Quartz Hill, and the Wood & Buckley, in Eureka Gulch. The Buell is one of the most important and has near surface been one of the most productive veins in the county; if well handled it will probably prove a good mine.

GREGORY-BOBTAIL.—Apprehensions are felt that, owing to difficulties with the Sleepy Hollow, one of the mines which have been contributing toward the pumping charges, it may again become necessary to shut down the pumps in the Gregory incline; which would involve the closing of the Fisk, Americus, Sleepy Hollow, and in fact practically all the deep mines in Black Hawk.

LOTUS.—Work has been recommenced at this mine, in Russell District, owned by Messrs. Sternberger, of Philadelphia, and the water is being hoisted out preparatory to sinking the shaft below its present depth of 435 ft. Meantime the levels 330 ft. from surface are being continued, the ore from both drifts looking well.

GUNNISON COUNTY.

OLD LOT MINING COMPANY.—The Tom Boy, adjoining the Boston, in Goose Creek District, has been purchased by this company for \$2,000 cash. The company has completed its 10-stamp mill and has it in operation, furnishing the ore from its mine.

LAKE COUNTY.

(From Our Special Correspondent.)

LEADVILLE STRIKE.—There is no change in the strike situation. Despite the fact that the miners here see new miners come in every month and take their jobs they are still holding on. Another test of their endurance is sure to come when the Down-town mines are ready to start and about 300 men will be wanted. Trouble can then be looked for. The mine managers have sent a lengthy address to the governor setting forth all the incidents of the strike and showing the necessity of still keeping protection here. It will be just six months on December 20th that this strike was inaugurated. It

will take that many years to recover from the damage which has been done. The mine managers are gaining ground every day, and a steady increase of shipments is noted from the properties which are operating with non-union men.

EMPIRE GULCH.—But little snow having fallen in this camp so far, enables the properties lying in the gulches to continue operations. In Empire Gulch Hurm Bros. have their tunnel on the Columbia in nearly 300 ft., and the contact has already been cut, showing some very good ore. Quite an amount of new ground has recently been patented in this vicinity, and a large amount of new work is mapped out for next spring.

FANNY RAWLINGS.—This property, on Breece Hill, which has been operated since February last by Aspen parties, has closed down. A great deal of important work has been carried on, and a strenuous effort has been made to locate the ore chute of the Big Four. It is evident, however, that the shaft is not deep enough, and after expending over \$15,000 in development work the lessees have closed down.

INVERNESS MINING COMPANY.—This company, which is an Eastern concern, has been having considerable trouble in the courts of late, and several suits have been brought against it by miners who claim that they have not been paid for their work. The company some months ago purchased the Belle of Granite property for \$20,000, and paid down as a guarantee of good faith \$7,000. The other payments have not been made, and the former owners have filed suit for possession of the mine. Meantime the workmen for the company have garnished the smelter returns, but the original owners have entered a counter-plea, claiming that the ore is theirs since the property has not been paid for. In the County Court this week the court held that the garnishee placed on the smelter receipts by the workmen was valid and ordered the workmen paid.

MONTAGUE GOLD MINING COMPANY.—Articles of incorporation of this company have been filed at Leadville. The incorporators are E. G. Scott, W. L. James and F. R. Turtle. Capital stock, \$1,250,000.

OLATHE PLACER.—This ground and adjoining property, the O. K. lode, were involved in litigation this week. The suit is between two sets of lessees, both claiming the right to work. Yesterday Thos. Owens secured a temporary injunction restraining the other lessees from operating the property until the matter is straightened out.

OURAY COUNTY.

YANKEE BOY.—A rich strike is reported in this mine. The pay streak is nearly 20 in. wide, running very high in ruby and native silver. On the dump is a car of the ore awaiting shipment. The Yankee Boy is surrounded by valuable mines, of which the Virginian is one.

SAN JUAN COUNTY.

IOWA GOLD MINING AND MILLING COMPANY.—This company, of Silver Lake basin, reports \$27,000 as the output for November, resulting from the treatment of 700 tons of dry concentrates, which represents 2,800 tons of crude ore, an average of about \$9.64 per ton, as the ore comes from the mine. The mine and mill now employ 125 men, and the daily product is 125 tons of ore, of which 80 tons is treated at the mill, more than 33% of the output being stacked up as a reserve for the mill. The 3d level is now being run with air drills, and the connections will be made before January 1st, 1897. This level will open up new stoping ground and increase the reserve ore bodies of the mine. The new cable for the tramway is on the ground and will be put in place as soon as possible.

NORTH STAR.—A 14-in. streak of ore has been found on the hanging wall of this mine on Solomon Mountain, in the old third level workings. Several assays made show good silver values, 6% to 8% copper, and from 15% to 18% lead. Twenty men are at work on the property, eight being engaged in development.

SILVERTON SMELTING AND MINING COMPANY.—The smelter owned by this company at Silverton has been closed down. The cause for closing, given by the managers, is that there is a scarcity of iron ore for fluxing. This smelter is a 100-ton matte process plant. About 50 men will be thrown out of employment temporarily.

IDAHO.

ELMORE COUNTY.

GOLDEN KING MINING AND MILLING COMPANY.—A strike is reported on the 150-ft. level of this mine at Mountain Home. The ore is leaching mineral and carries values of about \$15 in gold to the ton. A 50-H. P. steam hoist and pump has been purchased for the mine, it being the intention to sink the working shaft 300 ft. below the present depth. It is said the company will put up a mill, probably with a capacity of 50 tons daily, in spring.

IDAHO COUNTY.

BLUE DRAGON.—A force of 25 men is employed on this mine, near Elk City. The old shaft sunk to a depth of 75 ft. is full of water and a whim is being erected to keep it dry, when it will be sunk to the 100-ft. level and then drifts will be run on the vein both ways. Buildings are also being erected. The mine is located on American River, south of the Buster mill. The only croppings were found on the meadow bottom, but there they show a strong vein of iron sulphurets giving good gold values as far as the shaft was sunk.

OWYHEE COUNTY.

DE LAMAR MINING COMPANY, LIMITED.—Mr. D.

B. Huntley, the manager of these properties at De Lamar, reports as follows for the month ending October 31st: Crushed (wet), 4,238 tons; crushed (dry), 3,823 tons; assay value of pulp, \$20.54, of which \$15.83 was gold and \$5.01 silver; assay value of tailings, \$5.93, of which \$4.69 was gold and \$1.24 silver; percentage saved, total, 71.13%; Doré bars produced, 15; number ounces pure gold produced, 1,873; number ounces fine silver produced, 29,395; value of gold produced, \$37,458; value of silver produced, \$19,107; Pelatin-Clerici process produced one bar valued at \$1,498; ore sales, \$4,000; miscellaneous revenue, \$316; total receipts, \$62,379; expenses, \$44,891; estimated profit for the month, \$17,488.

SHOSHONE COUNTY.

STEMWINDER.—The sale of this mine to the Bunker Hill Company, which has been pending for several weeks, has been consummated. The purchase does not affect Mr. Branscombe's lease on the Stemwinder, which expires next April. Therefore work on the property will continue as usual until that time.

INDIANA.

MADISON COUNTY.

OIL WELL.—Reports received from the southern part of the county state that consumers on the Farmers' gas line who went to light their fires on December 14th turned on their valves, and, instead of getting gas, a gush of oil came out. Outside it was found that oil was gushing from the regulators and from seams in the pipes. Investigation showed that one of the biggest wells which has been used on the line had suddenly turned into an oil gusher. It is in a territory where there have been only few traces of oil found.

KANSAS.

KANSAS COMMERCIAL COAL COMPANY.—It is reported from a source, said to be authoritative, that a combination has been formed to have absolute control of the output of the coal mines of southern Kansas, which aggregates 500,000 tons annually. The members of the combine are the Central Coal and Coke Company, the Kansas and Texas Coal Company, the Fuel Departments of the Atchison, Topeka & Santa Fé and the Missouri Pacific Railways, and the Southern Kansas Coal Company. The combine is to be known as the Kansas Commercial Coal Company. Capt. W. S. Kniffen, formerly manager of the fuel properties of the Missouri, Kansas and Texas, has been made general manager of the concern.

MARYLAND.

ALLEGANY COUNTY.

CONSOLIDATION COAL COMPANY.—At a special meeting of the stockholders of this company this week the proposed issue of \$750,000 of new first-mortgage 4 1/2% bonds was approved. Of the whole issue of stock, amounting to \$10,250,000, about \$7,000,000 was represented at the meeting. A sum of \$600,000 in the new bonds and \$500,000 in cash out of the company's surplus will be used to redeem \$1,100,000 of 6% first-mortgage bonds, which will be due on January 1st. The remaining \$150,000 of the bonds will be retained in the treasury of the company.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

JOPLIN ORE MARKET.—The weather of the past week was all that could be asked for mining, and the result was a large output of ore. The shipment of zinc ore was an increase of 12 carloads over the week before, and but 1 carload less than the corresponding period in 1895. The sale of lead ore increased 2 carloads over the previous week, but was 6 carloads less than the same period last year. Three carloads of Joplin zinc ore brought \$26 per ton, 4 carloads \$25.50, and the price on the other grades ranged down to \$20 per ton. At Webb City the highest price paid was \$25. The Oronogo, Alba and Stotts City zinc ores sold at \$25 per ton. Very little ore in Galena, Kan., brought over \$24, and most of it sold from \$21 to \$18, considerable low-grade ore being marketed. The same week last year the top price was \$22 per ton. Lead ore brought \$16.50 per 1,000 lbs. delivered all week. The corresponding week last year lead sold \$17.50. The following was turned in from the different camps: Joplin zinc, 1,195,300 lbs.; lead, 250,970 lbs.; value, \$19,082. Carterville zinc, 1,061,120 lbs.; lead, 194,780 lbs.; value, \$14,875. Webb City zinc, 692,840 lbs.; lead, 59,210 lbs.; value, \$8,576. Galena, Kan., zinc, 3,191,000 lbs.; lead, 525,000 lbs.; value, \$40,300. Aurora zinc, 453,000 lbs.; lead, 33,600 lbs.; value, \$3,696. Stotts City zinc, 79,880 lbs.; value, \$998. Alba zinc 74,000 lbs.; value, \$925. Oronogo zinc, 40,890 lbs.; lead, 17,650 lbs.; value, \$734. District totals for last week: Zinc, 6,758,610 lbs.; lead, 1,081,250 lbs.; value, \$89,086. District totals for 50 weeks: Zinc, 293,564,640 lbs.; lead, 53,773,670 lbs.; value, \$3,659,732.

BOWEN & COMPANY.—The company has opened up a rich deposit of ore in the bottom of the pump shaft and will sink through it before drifting on the surface. Twenty-five tubs sent out made only one wheelbarrow of waste and 10 tubs of dirt made one ton of high-grade zinc ore. The mine has been a good producer for three years.

BROWN, FERRICK & COMPANY.—They have a 10-acre lease of the Leonard land in Chitwood Hollow, and are having a shaft sunk to develop an ore body shown up by a drill. At 115 ft. in the shaft they struck lead-bearing dirt which was not shown in

drilling. The drill showed zinc ore from 120 ft. to 133 ft.

BURKE, MALONE & COMPANY.—This company has the biggest mine on the Kobinoor lease. It is a new mine and has been producing only 4 weeks, yet they are making from 20 tons to 25 tons of high-grade zinc ore each week. This shaft was first sunk to 72 ft. about 18 years ago and abandoned. The present owners began to clean out the shaft last July and to sink deeper. Lead was struck at 90 ft., but was not drifted on. The run of zinc ore was struck at 115 ft. and they are now drifting at 135 ft. on a 20-ft. face of zinc-bearing dirt. They have a steam hoister and clean the ore on hand jigs.

VAUGHN & COMPANY.—They are drifting at 84 ft. and are driving a 36-ft. face of ore with steam drills. They have very hard rich dirt, and run it through a breaker and rolls and clean it on hand jigs. They are going to put up a new 60-H. P. boiler.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

STOTT CITY MINES.—There is a general resumption of work in the mines at Stott City. For a long time only the Mount Vernon Mining Company has been concentrating ore on its large steam jig plant, but General Hamer has restarted his big steam plant, and the Spring River Mining Company's steam plant will be started at once. General Hamer has doubled the capacity of his plant, having two sets of concentrators, two 12-in. crushers and three sets of rolls. A snow duplex pump drains the ground. The ore is being cut at the 169-ft. level. The Mount Vernon Mining Company is cutting ore on the 185-ft. level. The company recently placed a new 80-H. P. boiler, and has a complete steam concentrating plant that is producing a carload of zinc ore each week. The Spring River Mining Company has been shut down some time for repairs. The ore is on the same level as the Mount Vernon and the drifts are 35 ft. wide and 60 ft. high.

The formation of ore deposits is different from that in Jasper County mines. There are marked strata varying in thickness between which are layers of limestone with zinc ore beneath each. The Mt. Vernon and Spry River companies have cut parallel drifts 700 ft. in length between which is a lime bar 60 ft. in width, and these drifts are 35 ft. wide and 60 ft. high. The Mount Vernon shaft is 200 ft. deep and has ore in the bottom. The ore is completely disseminated through the rock, but by carefully crushing and rolling the ore it is not chatty. After cutting on a straight line for 780 ft., the Mt. Vernon company came upon a dead wall, but it was cut through and they are getting richer dirt on the other side than they did before.

MONTANA.

JEFFERSON COUNTY.

LIVERPOOL.—This mine is being worked under lease in its upper levels by Mr. Ely and the Merrill Bros. While prospecting on one of the stringers recently it suddenly widened out to between 6 and 8 in. They then went into the lower levels, put in a few blasts in a crosscut, driving it in 2 or 3 ft. further and discovered the ore body.

LINCOLN COUNTY.

MAGNOLIA.—The owners of this claim, after months of drifting through barren rock, recently cut into a rich chute of ore about 6 in. wide, but which widened to 2 ft. The present chute was cut directly under the whim shaft and at about 48 ft. below the bottom of the shaft. The tunnel in which it was cut runs from the south end of the claim and has been driven a distance of 824 ft.

MADISON COUNTY.

KNOX.—This mine has closed down because the snow is so deep in the Revenue country that it is impossible to haul ore to Norris, a distance of six miles. Mr. Knox has gone to his home in Independence, Mo. Operations will be resumed March 1st.

MONTANA MINING AND MILLING COMPANY.—This company, whose properties are near the head of Wisconsin Creek, has resumed operations. O. F. Wright is superintendent. The veins are strong, well defined, and the ore is free-milling gold quartz. They have a complete mill with rock breaker, 10 stamps, plates and vanners. The main office of the company is in Chicago, Ill.

NOBLE.—Messrs. Bloom & Snyder, who have a lease on this mine, near Sheridan, shipped a car of ore to the East Helena smelter recently which netted \$2,300 after paying all expenses. The ore was taken out in 6 weeks, and there is said to be a good body of mineral in sight.

SULTANA GROUP.—This group of mines, on South Boulder, four miles above the old town of Mammoth, consists of the Sultana, Clara, Mary and L. C. McKnight claims, owned by L. C. McKnight of California. C. H. Saunders, the superintendent, reports that 10 ft. of ore has been struck recently in the Sultana.

SILVER BOW COUNTY.

(From Our Special Correspondent.)

ALICE GOLD AND SILVER MINING COMPANY.—This company's mines are producing large quantities of medium and high-grade ore, mostly from leased ground. The Blue Wing has so improved that there are rumors of sinking another shaft further west to work the ore body.

ANACONDA COPPER MINING COMPANY.—At the Green Mountain they are hoisting over 1,200 tons of ore daily, with two 4-decked cages, the bottom level

being 1,400 ft. deep. About 400 men are employed. At the Mountain Consolidated the shaft is completed to the 1,300-ft. level, and about 900 tons of ore are hoisted per day, with a force numbering 400. The mammoth hoisting engine, called the Aztec, was started a few days ago, and worked with remarkable smoothness. Skips with a capacity of nine tons are being constructed at the Tuttle foundry, Anaconda. The Modoc, on the Never Sweat, an exact counterpart of the Aztec, is also ready for business. These engines are a combination of the best features of several styles of hoisting engines. They weigh approximately 400 tons each, and are expected to hoist a total load of 16 tons from a depth of 3,600 ft. at the rate of 2,000 ft. per minute. At the St. Lawrence a new hoisting engine is also being put in place; it is a duplex high-pressure 32-in. cylinder by 6-ft. stroke, made by the Union Iron Works, of San Francisco, Cal.

BOSION & MONTANA MINING COMPANY.—At the Mountain View the shaft is down 1,200 ft., and about 180 men are employed. The daily output is about 400 tons. At the West Colusa additions are being made to the plant, consisting of new boilers, new 20-drill air compressor, manufactured by the Risdon Iron Works, and new hoisting engine. Some of the miners have been laid off until the improvements are completed.

BUTTE & BOSTON MINING COMPANY.—It looks as if the affairs of this company were being satisfactorily arranged, as all the lessees working through their main shafts have been notified to clean up their ore, and in consequence some of them are working their men 8-hour shifts in order to get out as much as possible by January 1st. Perhaps the most important discovery made on this company's ground by lessees, was that on the east of the Glengarry, in ground that had not been developed.

COLORADO SMELTING AND MINING COMPANY.—This company is building a switch from the Butte, Anaconda and Pacific tracks into the mine yard to bring in supplies. Great economy is practiced in handling supplies and ore in all the mines; with few exceptions the producers have a switch for supplies above the shaft house, which is very important, as there are enormous quantities of timber, etc., used. Then the ore chutes are connected with the railroads, street car roads, etc. It is safe to say that 80% of the ore is shovelled only once from the time it is broken in the mine until it leaves the smelter in the shape of matte or copper.

DENVER.—This mine, operated by lessees, is close to the Green Mountain mine. The shaft is down 300 ft., and crosscutting will soon commence.

OLD GLORY.—This is another mine located close to a large producer, the Mountain Consolidated. The shaft is down 500 ft., and good silver ore was taken out from the 300-ft. level to surface.

NEVADA.

EUREKA COUNTY.

(From an Occasional Correspondent.)

ALEXANDRIA.—A shipment of ore has reached the Mackintosh sampler from this mine at Eureka. The ore shows gold of the value of \$20, 20% lead and 30 oz. silver.

ALTOONA.—Some very nice shipments have recently been made from this mine, on Adams' Hill, the ore running pretty high in gold.

DIAMOND.—This mine is looking pretty well and has recently yielded better ore for shipment than for some time past.

MADRID.—A good strike was made in this mine, on Prospect Mountain, about two months ago, from which over 4,000 sacks of ore have been shipped to Salt Lake, Utah. I understand it yields over an ounce of gold and about 13 oz. silver to the ton. A party of miners located on the ground, believing it to be vacant, but on learning it was patented abandoned the location and leased the mine.

WASHOE COUNTY.

(From Our Special Correspondent.)

OLD PYRAMID MINING DISTRICT.—This camp, 30 miles north of Reno, was abandoned in 1883. There seems to be a revival at the old camp since Hank Miller and Antone Dragovich discovered two new ledges near the old Pyramid mine. The ore when treated at the Reno Reduction Works showed \$60 in gold. There is quite a rush of prospectors to the scene of the new discovery. Hank Miller was the discoverer of the Sierra Nevada claim on the Comstock Lode, which he afterward sold to the Bonanza people for \$6,000.

WHITE PINE COUNTY.

BEN HUR & BELMONT.—The purchase of these and two other mines in Granite district, Steptoe Valley, the property of W. D. Campbell, is reported. The purchasers, of whom Mr. Otto Liefer of Green River, Wyo., and H. H. Mears, of Salt Lake City, are the principals or represent them, entered into an agreement on December 2d, the conditions of which are that the company is to pay \$25,000 for the property, including Mr. Campbell's ranch, water rights, etc.; \$750 having been paid down, \$4,250 to be paid August 1st, 1897; \$5,000 January 1st, 1898, and the balance on July 1st following. The development of the mines must also be continued during the time in which the payments are to be made. The Ben Hur was a paying proposition from the start.

NEW MEXICO.

SANTA FE COUNTY.

AMERICAN TURQUOISE COMPANY.—J. G. Doty, of New York, manager of this company, has been inspecting the company's mines, 15 miles south of Santa Fe. Five claims are being worked. This company is also developing several claims in Southern New Mexico.

NORTH CAROLINA.

TRANSYLVANIA COUNTY.

(From an Occasional Correspondent.)

M. C. Toms, Chas. F. Toms and Dr. Levi Jones, of Hendersonville, have been conducting prospecting work in this section for the past year. They have an area of 100 acres underlaid with ore, granitic in character, which runs from \$1 to \$8 in gold and 50c. to \$1.25 in silver. On other parts of the property the ore is high in copper and lead. Four shafts have been sunk which indicate the presence of unlimited quantities of ore averaging \$2 to \$4 per ton, all in sulphurets. The veins are blanket and sinking to them still continues. The wages paid are 75c. @ \$1 per day to drillmen and 75c. to common hands. These same parties have for years partly owned and operated the Green River Zircon mines in Henderson County, which have produced large quantities of this mineral.

OHIO.

FRANKLIN COUNTY.

COLUMBUS COAL COMPANY.—This company has leased its mine, located 4 miles north of Columbus, to the Kansas Commercial Coal Company of Kansas City for a period of 5 years, and the lease took effect December 1st.

PERRY COUNTY.

(From Our Special Correspondent.)

CONGO COAL MINING COMPANY.—This company is preparing to increase its daily capacity to 2,000 tons. They are planning to sink another shaft, and use electric hoists.

OREGON.

BAKER COUNTY.

IBEX.—It is reported that Mr. William White, Jr., of Pittsburg, Pa., a representative of the Hearst estate, has secured an option for the purchase of this mine, in Sumpter District, owned by Messrs. Mikel, Dewar, Fain and Mahan.

(From Our Special Correspondent.)

VIRTUE MINING DISTRICT.—A union mill is to be erected by the Del Norte mine, F. J. Kerr, superintendent; the Perry mine, J. W. McCoy, superintendent, and the Red Jacket mine, B. B. Sheperd, superintendent, all located in this district, six miles east of Baker City. The ore is free milling, but water is scarce at the mines. The mill will be located about five miles from the mines, which are owned by Chicago parties.

PENNSYLVANIA.

ANTHRACITE COAL.

CANAVAN & STOKES.—This firm's coal breaker, near Nay Aug Park, Scranton, has been completed, and began operations December 14th.

BITUMINOUS COAL.

MANSFIELD COAL AND COKE COMPANY.—This company, of Pittsburg, is making an important addition to its equipment in the shape of a new steel tiple. The plans are now in the hands of the engineer and superintendent, and the contract for it will be given immediately upon their completion. The tiple will be of steel, and will be constructed to embrace all of the latest improvements, with a capacity from 2,500 to 3,000 tons daily. The tiple now in use, although in good condition, is not sufficient for the requirements.

TIPTON.—After being idle for over a year, these coal mines, three miles north of Bellwood, have opened up again. The daily output is about 10 cars.

NORTHAMPTON COUNTY.

ACME SLATE COMPANY.—This company, of Bangor, has made an assignment to John W. Underhill for the benefit of creditors without any preference.

SOUTH DAKOTA.

LAWRENCE COUNTY.

BUXTON MINING COMPANY.—Owing to the demand for a higher price for treating its ores this company, of Iowa, has closed its Bonanza and Clinton mines in the Bald Mountain District, throwing out 60 men. It has been paying from \$6,000 to \$8,000 a month in dividends for about two years, mining 60 tons a day. It is said the mines will soon resume.

GOLDEN REWARD MINING COMPANY.—This company has decided to build a matte smelter of 200 tons daily capacity, and is now getting plans. It will be in Spruce Gulch, near Deadwood.

TENNESSEE.

FENTRESS COUNTY.

BOB'S BAR WELL.—Advices from Little Crab are to the effect that this well, on the Obey River, near the West Fork, is being pumped day and night and yields steadily 7 bbls. an hour, and the oil keeps the same height in the well all the time.

UTAH.

IRON COUNTY.

BURRO.—The latest from the State Line District

is that this mine has made a shipment of 4 tons of high-grade ore. It is stated that considerable work is now being done on claims in the immediate vicinity of the Burro.

SALT LAKE COUNTY.

REGULATOR.—For the past few months work has been pushed in the development of this group of claims in Little Cottonwood Canyon, owned by J. S. Johnson, of Salt Lake City. Mr. Johnson has been in possession of the group for a number of years, and has made ore shipments amounting to several hundred tons. At the present a tunnel is being run on the Harris lode, embraced in the Regulator group, and in the face at a distance of 170 ft., is a 3-ft. breast of ore that assays from 10% to 12% lead, 23 oz. to 27 oz. in silver and \$3 to \$3.50 in gold to the ton.

TOOELE COUNTY.

GRANITE MOUNTAIN MINING AND MILLING COMPANY.—This newly organized company has a capital stock of 300,000 shares of the par value of \$1 each, 50,000 shares of which are set aside as working capital. The principal place of business is Lehi. The officers and incorporators are as follows, each with 25,000 shares of stock: Thomas Austin, president and director; Alva M. Murdock, vice-president and director; Andrew Austin, Thomas Webb, David M. Murdock, Leonard J. Coleman, O. J. Call, Frank Knight, William Buys and W. B. White, directors. The company owns the Leonore, Flirt, Joe, Brightness, Multiple, Rising, Aurora, Emma, May Flower, Sidney and Saul mining claims, all on Granite mountain.

UTAH COUNTY.

COPPER KING.—George H. Pulley and Mr. Cunningham, who have been doing some work on this mine, in American Fork Canyon, have opened a 4-ft. vein of ore that is said to assay 43% lead, 3.45 oz. silver and \$18 in gold to the ton. In another place they uncovered a body of ore that carries values of 12% lead, 3.83 oz. silver and \$23 in gold.

WASHINGTON.

PIERCE COUNTY.

TACOMA SMELTING AND REFINING COMPANY.—This company's product for November, 1896, was: 4,600 bars bullion, weighing 472,557 lbs., and copper matte weighing 190,300 lbs.; total, 662,857 lbs., containing 2,065.28 oz. gold, valued at \$42,689; 51,106.22 oz. silver at 65c. per oz., valued at \$33,219; 497,887 lbs. lead at \$2.70 per cwt., valued at \$13,443; 52,566 lbs. copper at 10% c. per lb., valued at \$5,454; total, \$94,805. The number of men employed was 62, and the pay roll was \$4,875, and for wood choppers and teams, \$390, a total of \$5,265.

STEVENS COUNTY.

BROMIDE MOUNTAIN MINING COMPANY.—This company owns a group of four claims, 9 miles north of Chewelah. It is working a double shift in driving a tunnel which is expected to strike the ledge at a depth of 125 ft. The tunnel is now in 130 ft., and it will require 10 ft. more to reach the ledge. There has been considerable work done on the claims, an aggregate of 400 ft. in tunnel and shaft. The ledge is 12 ft. across, and can be traced on the surface for 1,600 ft.

STANDARD.—A. A. Brann, in connection with other Spokane parties, has bonded this mine, located 4 1/2 miles southwest of Chewelah, and will commence development work immediately.

WEST VIRGINIA.

WOOD COUNTY.

UNITED PIPE LINE COMPANY.—The leases on the Louis Ogden and R. P. Ingraham farms in the Ogden pool were sold last week to this company. They contain about 70 acres of land on which there are 28 producing wells with a daily production of 375 bbls. The price paid was \$500 per bbl., on which basis the aggregated amount paid would be \$187,500.

WYOMING.

CARBON COUNTY.

PEGGIE D. MINING COMPANY.—This company was incorporated recently with a capital stock of \$250,000. The head office will be at Rawlins.

FOREIGN MINING NEWS.

BRITISH COLUMBIA.

TRAIL CREEK DISTRICT.

(From Our Special Correspondent.)

BIG CHIEF.—Development work on this property, on O. K. Mountain, adjoining the O. K. mine, will continue all winter under the management of Superintendent McCraney. The management is now cross cutting from the main shaft to catch the dip of the ledge.

BRITISH COLUMBIA GOLD MINING COMPANY.—This property is located on Lookout Mountain. It is low grade on the surface. Assays so far made show a value of \$11 per ton, but the pyrite is giving place to pyrrhotite. The character of the rock is diorite. The officials are Colonel Ray, of Port Arthur, president; Mr. Dannison, vice-president; Messrs. Weeks and Kennedy, secretary; consulting mining engineer and superintendent, Mr. J. L. Parker. The capitalization, \$1,000,000.

KOHOOR.—This comprises six mineral claims on Lookout Mountain. These are known as the British Lion, Surprise No. 6, Golden Bar, Wonderful, Silver Chord and Lily of the Mountains. The

development work consists of a shaft 35 ft. deep and a tunnel 25 ft. in length on the British Lion. The expenditure so far amounts to \$1,000. The showing is a fine grade of quartz, assaying as high as \$17 per ton in gold, silver and copper. The extent of the property is 300 acres. It has been incorporated under the laws of the State of Washington and is registered under the laws of British Columbia. The capital stock is \$1,000,000, par value \$10 per share, the shares being fully paid up and non-assessable. The treasury stock comprises 250,000 shares and is being sold for development purposes only. The par value is \$1 per share. The president of the company is Samuel R. Stern, of Spokane, Wash.

LE ROI MINING AND SMELTING COMPANY.—On December 1st, in Spokane, this company declared a dividend of 5c. per share, or \$25,000. This makes a total of \$250,000 in 13 months. The affairs of the company are now managed by three trustees, Col. W. W. D. Turner, Judge George Turner and Col. L. N. Peyton.

TAMARAC.—This is a group of four claims, northwest of Wild Horse Creek, between the Elise and Noonday, about two miles from the Nelson and Fort Shepherd Railway. Several assays recently taken from a depth of 5 ft. show from \$8 to \$120 per ton. Messrs. J. St. Clair Blackett, mining broker of Rossland, and R. Dalby Makill, of the California and Big Three Mining companies, have bonded the Tamarac for \$60,000. They have set a force of men at work to ascertain the extent of the lead.

YALE DISTRICT.

(From Our Special Correspondent.)

CARIBOO MINING, MILLING AND SMELTING COMPANY.—This company, owning the Cariboo and Amelia mineral claims at Camp McKinney, East Yale, have declared the 13th dividend, amounting to \$16,000, being 2c. per share. This makes a total of \$112,000 declared by this company. The development work on the properties up to the present time represents 2,500 ft. of tunneling, besides considerable other work.

TASMANIA.

MOUNT LYELL MINING COMPANY.—During the four weeks ending November 19th with two furnaces running this company reports 5,484 tons of ore treated, the assay value being 0.2 oz. gold, 2.6 oz. silver, and 5.1% copper to the ton. The furnace product was 572 tons of matte, the contents being 301 tons of copper, 15,188 oz. silver, and 1,140 oz. gold. The average obtained was therefore 0.2 oz. gold, 2.8 oz. silver and 5.5% copper to the ton of ore.

UNITED KINGDOM.

ENGLAND.

KENT COAL MINES.—The owners of the property near Dover on which drill borings have showed coal at depths ranging from 2,400 to 3,000 ft., are spending a large amount of money. Two shafts are being sunk, both fully equipped with hoisting and pumping machinery. The first of these is now down 660 ft. In the borings the coal measures were actually struck at a depth of 1,113 ft. At 2,117 ft. down, a 4-ft. seam was discovered, and, in the opinion of leading authorities, additional valuable coal seams will be found at much greater depths. Samples taken from the boring, and analyzed by experts, were found to be of very good quality.

SCOTLAND.

CRAWFORD MOOR GOLD MINES.—For 400 years it has been known that gold could be obtained in Crawford Moor, in which Leadhills and Wanlockhead, the two highest villages in Scotland, and the site of the lead-mining industry, are situated. The gold for more than 300 years has not been got in paying quantities, and has been procured, for special purposes only, from beds of streams and alluvial deposits. According to an old record and to tradition, nearly 400 years ago a stamping-machine was used to crush quartz containing gold, and it is known that mines were sunk. But for several generations it has been a moot question whether quartz-yielding gold existed in the district. Geologists and mineralogists carried on a keen dispute upon the point. The fact that detached pieces of quartz with gold grains were not infrequently found strengthened the belief that the precious metal existed in the rock. That belief has now been verified by the discovery of veins of gold in the quartz rock. Mr. Paull, the manager of the mines, states that two veins of gold-bearing quartz had been discovered. The precious metal has not as yet been found in sufficient quantity to pay for working, but full investigation is being carried on, and it is the hope of Mr. Paull that a paying lode may be found.

WALES.

H. H. VIVIAN & COMPANY, LIMITED.—At the recent annual meeting of this branch of the Vivian concern—which deals only with nickel and cobalt—the report for the year ending June 30th, states that the continued fall in prices has been arrested, but that while the price of cobalt was considerably enhanced, and the price of nickel also slightly raised in the latter part of the year, the full benefit of such enhancement has not been felt in consequence of standing contracts at old prices, and the late period of the year at which the improvement took place; such improvement, however, rendered it unnecessary to make further reductions in the prices of stocks, as were previously considered necessary. At Birmingham trade has also im-

proved, and on the company's works there a profit was made of £4,014, while the Hafod Isha Works, Murray and Evje mines taken together, show a loss of £3,554, there being a net profit on the practical working of the whole concern of £460. Taking into account the interest charges and London expenses, the balance sheet shows a loss of £6,946. The improvement has been maintained to the present time, and the directors believe it will be still further enhanced as old contracts are completed, and when increasing demands and better prices are fully realized. Arrangements have been made to cancel £45,000 in shares to balance the loss in operations up to 1894. The works at Swansea and Birmingham have been maintained in the usual state of efficiency, and negotiations are still pending for the sale of the Murray mine.

WESTERN AUSTRALIA.

LAKE VIEW CONSOLS—It is interesting to note that telluride ores carrying a high proportion of gold have been found in this mine. These ores were struck on the 200-ft. level, and the extent of the vein is still unsettled. The company's present intention is to ship these telluride ores to Swansea for treatment.

LATE NEWS.

DE LAMAR MINING COMPANY, LIMITED.—This company reports for its mines in Owyhee County, Idaho, the following return for the month of November: Ore crushed during the month, 4,910 tons; bullion produced in the mill, \$46,800; estimated value of ore shipped to smelters, \$5,800; miscellaneous revenue, \$125; total produce, \$52,725. The total expenses were \$40,490, leaving as profit for the month of November the sum of \$12,235. The total revenue was \$13.15, the cost \$10.00, and the profit \$3.06 per ton of ore crushed during the month.

The old mining town of Jamestown, Tuolumne County, Cal., famous in California literature as "Jimtown," was almost completely destroyed by fire on December 17th. All the buildings were of wood and the fire was unchecked until all but a few isolated dwellings were consumed. Jimtown was the supply station for an important group of mines, including the well-known Rawhide mine. One thousand people are homeless as a result of the fire. The town possessed no fire department and before assistance could be sent from Sonora the town had been obliterated.

OLIVER IRON MINING COMPANY.—Cleveland despatches announce that a lease has been effected by the Oliver Mining Company, in which the Carnegie Steel Company and the Oliver Iron and Steel Company are the principal stockholders of the Mountain Iron mine, on the Mesabi Range, in Minnesota. The lease is for 50 years, which is practically equivalent to a direct purchase. The annual capacity of the mine is said to be about 500,000 tons. The mine was Rockefeller property and has been worked by the Lake Superior Consolidated Iron Mines. The Oliver Mining Company also operates the Oliver Mine, on the Mesabi Range. This mine the past season shipped about 800,000 tons of ore and it is believed that the Carnegie Steel Company's interest in the deal will result in increasing the output to 1,000,000 tons. It is understood also that the deal covers the Rathbun and some minor undeveloped properties.

ERNST ENGEL, the well-known German statistician, we learn from mail advices just received, died recently at Lossnitz, in Prussia. Herr Engel was born at Dresden in 1831. After going through his studies in that city he devoted himself to mining affairs at Freiberg from 1842 to 1845, and subsequently made tours through Germany, Belgium and France. In 1848 he was appointed Secretary of the Commission then existing for the discussion of trade and labor affairs in the Kingdom of Saxony, and two years later was sent by the government to Leipzig, to organize the general German Industrial Exhibition there. In the same year he entered the civil service in the capacity of president of the statistical bureau, but resigned that post in 1858 and founded a mortgage insurance company at Dresden. In 1860 he was appointed director of the statistical bureau at Berlin, with the rank of privy councillor, and in 1863, immediately after the International Statistical Congress in the German capital, the success of which was chiefly due to his efforts, was raised to the rank of chief privy councillor. His adherence to the principles of free economic development, and his opposition to state socialism, as well as considerations of health, compelled him in 1882 to retire into private life. Herr Engel published numerous statistical works, including one of the losses of the German armies in officers and men during the Franco-Prussian war of 1870 and 1871.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Dec. 18.
Statement of shipments of anthracite coal (approximately) in tons of 2,240 lbs., for the week ending December 12th, 1896, compared with the corresponding period last year:

	1896.		1895.
	Week.	Year.	Year.
Pennsylvania Railroad.....	80,331	3,559,755	3,631,920

PRODUCTION OF BITUMINOUS COAL, in tons of 2,000 lbs. for week ending December 12th, and for years from January 1st, 1896 and 1895:

	1896.		1895.
	Week.	Year.	Year.
Shipped East and North:			
Allegheny, Pa.....	43,459	3,599,216	2,657,250
Barclay, Pa.....	1,161	41,553	39,352
Beech Creek, Pa.....	76,388	2,925,845	2,828,509
Broad Top, Pa.....	78,999	3,345,630	3,385,966
Clearfield, Pa.....	84,461	3,399,172	4,864,881
Cumberland, Md.....	116,682	3,522,984	2,865,579
Kanawha, W. Va.....	1,381	88,211	49,875
Phila. & Erie.....	2,853,904		2,385,022
Pocahontas Flat Top.....			
Totals.....	402,112	20,743,134	18,602,667

* For year ending October 31.
† For 9 days, ending November 30th.

	1896.		1895.
	Week.	Year.	Year.
Shipped West:			
Monongahela, Pa.....	21,536	1,180,040	749,295
Pittsburg, Pa.....	36,266	1,783,544	1,574,710
Westmoreland, Pa.....	52,609	1,831,000	1,642,970
Totals.....	110,411	4,794,584	3,966,905
Grand totals.....	512,523	25,537,718	22,569,572

PRODUCTION OF COKE ON LINE OF PENNSYLVANIA RAILROAD for the week ending December 12th, 1896, and year from January 1st, 1896, in tons of 2,000 lbs.: Week, 74,545 tons; year, 3,657,866; to corresponding date in 1895, 5,710,739 tons.

Anthracite.

The condition of the hard coal trade is no better now than it was a week ago, and probably no worse. The same perplexities which troubled it then exist now; hence the inability to improve. The question of tonnage for the month seems to be settled, not by agreement, but by the obstinacy of one of the producers. It seems that the general recommendation was that the mining in December should be on a 3,000,000-ton basis, to which all of the interests agreed but two. One of these was finally won over, but the other held out for 3,500,000 tons, and this figure seems to have carried the day. It is said some of the companies are mining on a 3,000,000-ton basis; only so long, probably, as they cannot find room for an output figured on the higher tonnage. The reason some of the producers wanted the largest possible tonnage this month was to make a good showing at the end of their fiscal year, which closes December 31st. The extraordinary output in November was due to the same cause, two of the companies ending their fiscal years on November 30th. Luckily most of the companies run their years with the calendar year, otherwise this incentive to do a big business would revert from one to the other the whole year round.

The storm of two days ago has resulted in a more active business for the retailers, who reported a lamentably slack trade during the first half of the month. Severe as the storm was in New York, it did not extend to the coal regions in Pennsylvania, so that there was no interference with work at the mines, and no curtailment of the output. The more the pity. However, it is not necessary that the miners should be made idle in this way, as it is reported that orders have already been given to stop all work at some of the collieries from two days before Christmas until the first Monday in January.

The affairs of the Reading people are in a very unsettled condition at present, owing to the question which has been raised as to the validity of their reorganization under the old National Company's charter. The recent sale of the Reading properties under foreclosure made it necessary for them to reorganize under the laws of Pennsylvania, but the new constitution of that State does not permit a railroad company to be also a coal mining company. To overcome this point the charter of the old National Company was obtained and the Reading property transferred to it in exchange, nominally for stocks and bonds to be issued under the reorganization agreement. Attorney-General McCormick of Pennsylvania is now investigating the matter and will render his decision shortly, the claim being that the use of the National Company charter is an evasion of the provisions of the new constitution.

Bituminous.

In the Atlantic seaboard, soft coal trade this month, there is little to report that is new. Most of the producers are shipping fair tonnages, though there is a general complaint of dullness in the trade. This comes probably from the hand-to-mouth way in which business has been done this year. There have been quite a number of cases where people have in previous years contracted for their entire wants for the year; these have this year bought in single cargo lots.

Business in the far East is quiet, though improved from a few weeks ago. There is still quite a demand from the Sound district, which will probably last until ocean freights from the lower ports advance sufficiently to forbid of shipments from there. New York harbor trade is steady.

All-rail business is unchanged, and tonnages going forward on this line of trade vary but little. Transportation from mines to tide is fairly good, although it is anticipated that the snow of Wednesday will interfere somewhat, which will be felt later. Car supply is up to all demands.

The coastwise vessel market is very little changed; the demand exceeds the supply slightly and keeps freight rates steady at the current quotations.

We quote current rates of freight from Philadelphia

as follows: To Boston, Salem, Portsmouth and Portland, 75c.; Providence, New Bedford and other Sound Ports, 65c.; Wareham, 80c.; Lynn, 85c. @ \$1; Newburyport, 90c. Ten cents above these rates are asked from Norfolk, Newport News and Baltimore.

The association prices remain as follows: F. o. b. Philadelphia, Norfolk and Newport News, \$2.35; Baltimore, \$2.28; New York Harbor shipping ports, \$2.80, alongside; New York Harbor, \$3. There is a 2c. differential in favor of Clearfield and Beech Creek coals.

Buffalo. Dec. 17.

(From Our Special Correspondent.)

Trade in anthracite coal is quiet; the comparatively mild weather decreases consumption. No changes in quotations. Navigation nearly over; occasionally a vessel comes in with grain or flour and others leave light for the ports where they will lay up for the winter.

Bituminous coal is quiet; demand for vessels' fuel now very light. The season has passed for the use of steam coals in any quantity. Stocks of all kinds are good. Quotations nominally unchanged, but the sales are in buyers' favor as compared with asking prices.

In consequence of the death of Mr. Thomas Hodgson, Mr. Franklin Selleck, who took the place of Mr. Hodgson in Buffalo, has been appointed the general sales agent of the Pennsylvania Coal Company, with headquarters in New York. Mr. Francis A. Board, for many years with the company in this city, takes Mr. Selleck's place as the Buffalo superintendent. Both of these men have excellent records and their promotion is a matter for congratulation.

The shipments of coal westward by lake from this port from December 6th to 14th, both days inclusive, aggregated 30,000 net tons, viz.: 27,300 net tons to Chicago and 2,700 net tons to Milwaukee. The rates of freight were 60c. This finishes the season's business in coal, although very mild weather prevails over the lake regions.

From Buffalo there were shipped 41 cargoes of coal during December, nearly all of them of large size. The season has been remarkably light on cargo insurance losses on coal, only two having been entirely lost, aggregating about 1,300 net tons.

The Polish people of East Buffalo are famous for coal stealing from cars on the railroad tracks and the cold weather has brought many of them to grief through their pilfering habits.

The receipts of late at Lake Erie ports of iron ore during 1896 were 8,026,432 gross tons as compared with 8,112,228 gross tons in 1895 and 6,350,825 gross tons in 1894. The shipments of iron ore from Upper Lake ports by water during 1896 aggregate 9,657,921 gross tons as compared with 10,233,910 gross tons in 1895 and 7,629,829 gross tons in 1894. The stocks of iron ore at Lake Erie ports on December 1st were 4,954,984 gross tons in 1896, 4,415,712 gross tons in 1895 and 4,834,247 gross tons in 1894. There were shipped through the Sault Ste. Marie Canals during 1894 526,460 net tons of anthracite coal as compared with 445,279 net tons in 1895 and 394,210 net tons in 1896; of bituminous coal, 2,264,314 net tons in 1894, 2,107,801 net tons in 1895 and 2,605,172 net tons in 1896.

Chicago. Dec. 18.

(From Our Special Correspondent.)

Anthracite.—The situation in the anthracite coal trade of Chicago is even duller than during the preceding week, chiefly because of the continued mild weather and the fact that consumers are holding off until industrial conditions are better. Trade during the week was small and sales of over a couple of carloads were scarce. Dealers are looking anxiously for colder weather, for they now more than ever recognize the fact that the only thing that can produce an increased amount of business to them is the climate, and it must be very cold for it to make any great impression. The prices obtained on hard coal are not, as a rule, absolutely circular ones, as the great competition for the limited amount of business going prohibits any firmness. Retailers have much reason to complain, as their business is quite flat on account of the retail price of coal, \$6.50@7. Circular rates are, per ton, carload lots, grate, \$5.60; egg, stove and chestnut, \$5.85.

Bituminous Coal.—Trade has fallen off considerably from the preceding week, but there is still quite a respectable trade. Many manufacturing institutions are buying soft coal in quantities that are considered small, but there is more tendency to make contracts beyond immediate requirements. Prices of soft coal are inclined to firmness, though some cutting is noticed in the clearing up of stocks.

Coke is in but limited demand, prices obtained being but fair.

Pittsburg. Dec. 17.

(From Our Special Correspondent.)

Coal.—Congratulations are now due the miners of the Pittsburg District for the prudence which they have exhibited in avoiding a rupture with their employers, although their demands failed. The times are unpropitious for breaches between capital and labor, and this circumstance, we take it, went a long way to prevent trouble. Whatever the cause, the miners have acted wisely, and they will be glad of their own foresight when, as seems probable, it is found that the tardy return of good times makes the coming season a precarious one.

the Bank of Russia, October 16th-28th. The New York banks do not report silver separately, but the specie carried is chiefly gold coin.

The statement of the New York banks—including the three banks represented in the Clearing House—for the week ending December 12th, gives the following totals, comparisons being made with the corresponding weeks in 1895 and 1894:

Table comparing financial data for 1894, 1895, and 1896, including Loans and discounts, Deposits, and Surplus reserve.

Changes for the week this year were increases of \$11,061,700 in loans and discounts; \$14,559,000 in deposits; \$971,200 in specie, and \$1,810,500 in legal tenders; decreases were \$156,400 in circulation and \$558,050 in surplus reserve.

Shipments of silver from London to the East for the year up to December 3rd are reported by Messrs. Pixley & Abell's circular as below:

Table showing silver shipments from India, China, and The Straits for 1895 and 1896.

Arrivals for the week this year were £166,000 in bar silver from New York and £18,000 from Chile, also £33,000 in Mexican dollars from Vera Cruz, and £17,000 from New York;

But little change has been shown in the rate of Indian exchange, the average price obtained for Council bills in London having been 15-19d. per rupee.

Domestic and Foreign Coins.

The following are the latest market quotations for the leading foreign coins:

Table of market quotations for various foreign coins like Mexican dollars, Peruvian soles, etc.

Other Metals.

Copper.—The market is quite lifeless, and consumers do not show any disposition to buy. Foreign orders are also missing and it is reported from the other side that American copper is being dealt in by second hands cheaper than it can be procured from this side.

In London the market has again given way somewhat. The opening quotations for g. m. b. were 48 10s. @ 48 12s. 6d.; afterwards the market eased off and closes steady at 48 5s. @ 48 7s. 6d. for spot and 48 17s. 6d. @ 49 for three months prompt.

very good sign. Stocks of pig copper in warehouses at Liverpool, Swansea and Havre are lower than ever before.

The following figures give the production (in tons of 2,240 lbs.) of copper in the United States and also by the chief foreign mines, with the exports from the United States, for November, and the 11 months ending November 30th:

Table showing copper production and exports from U.S. and foreign mines for November and 11-month periods.

The United States production shows a total this year of 186,275 tons for the 11 months, an increase of 29,753 tons, or 19% over last year. The United States exports show an increase this year of no less than 55,857 tons, or 98.4%. The increase in exports exceeds that in production by 26,098 tons, indicating a corresponding decrease in consumption.

Tin.—There has not been much business doing, and every order has been eagerly competed for. Prices are again somewhat lower in sympathy with London, but so far they have not tempted consumers to any great extent, and the market throughout was rather dull and heavy.

In London the market opened at 45 7/8 17s. 6d. and was flat all through the week with only moderate transactions, closing at 45 7/8 10s. @ 45 7/8 12s. 6d. for spot and 45 17s. 6d. @ 45 8 10s. for three months prompt.

Lead has ruled rather firm, and producers being reluctant sellers, prices have advanced. We quote 3'05@3'10c. In St. Louis quite an active business has been doing at from 2'75@2'80c.

The foreign market is somewhat firmer, Spanish lead being quoted £11 10s. @ £11 11s. 3d. and English lead 5s. higher.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is strong and fairly active at the advance. Latest sales were on a basis of 2'75c. for chemical, and 2'60c. for soft Missouri, and 2'82 1/2c. for argentiferous corrodng.

Spelter has become very flat. The good demand which was noticeable a few weeks ago, mostly for galvanizing purposes, has for the moment entirely fallen off and production having in the meantime somewhat increased prices have been unfavorably affected.

It is reported that an option has been given by the Granby Mining & Smelting Company on its spelter plant, and lands, etc., to representatives of some large Eastern capitalists who have expressed a desire to share with the trust in the profits now to be made in the zinc smelting industry.

Nickel.—Sales have been fair, and prices are unchanged. We quote for ton lots 33@36c. per lb., with 37@39c. for smaller orders.

Antimony is quiet, but steady; Cookson's, 7 1/2c.; United Star, 7c., and Hallet's, 6 1/2c.

Platinum.—Demand is steady and prices are firm at \$14.50@15.50 per oz., New York. London quotations are 57s. 6d. @ 59s. per oz.

For chemical ware, best hammered metal, Messrs. Eimer & Amend, New York, furnish the following quotations, the prices given being respectively for orders of over 250 grams, for orders of over 100 grams and less than 250 grams, and for orders of less than 100 grams.

Quicksilver.—The New York quotation is unchanged at \$36.75 per flask. The London price is 48 12s. 6d. per flask, with 48 10s. @ 48 10s. 6d. named from second hand.

The Minor Metals.—Quotations for these metals are given in the table below, the prices being for New York delivery:

Table of prices for minor metals: Aluminum, Iron, Lead, Limestone, Manganese, Spiegeleisen, Steel, Tin, Tungsten, Zinc.

Variations in prices are chiefly on size of order.

Average Monthly Prices of Metals

In New York since January 1st, 1896, and for the year 1895, 1894, 1893 and 1892; in cents per pound.

Large table showing average monthly prices for Copper, Tin, Lead, and Spelter from 1892 to 1896.

Imports and Exports of Metals.

Table showing imports and exports of various metals in New York for the week of Dec. 10 and for the year 1896.

* Metal Exchange Reports. † Week ending Dec. 17.

Table showing imports and exports of various metals in Baltimore for the week of Dec. 17 and for the year 1896.

**From our special correspondent.

ment. Little business was done in the stock. Daly-West was good in demand, although quotations were slightly shaded. Dalton & Lark did nothing. Four Aces was somewhat stronger on reported improvement in the ore showing. Gaena is making a good record of production. The December dividend of 5c. per share was paid yesterday. Horn Silver did nothing. Lucky Bill continued strong, with an upward tendency. The Mercur directors have declared the December dividend of 12 1/2c. per share, payable on the usual date. There was little change in the quotation on the stock. Mammoth was slightly stronger. Northern Light was much stronger, after the treasury stock sale closed, and the quotations showed a considerable advance. Ontario was without activity. Overland is pushing development work. Rover was in good demand, with little of the stock offered. South Swansea has entered the list of dividend payers, and on December 25th will pay 5c. per share. The stock was very much stronger. Silver King yesterday paid its December dividend of 25c. per share, operations at the properties having been resumed. In order to make repairs on its ore elevator, the Sunshine mill has closed down for a week or 10 days. Swansea was slightly weaker.

San Francisco. Dec. 12.

(From Our Special Correspondent.)

At the opening on Monday prices were low and there was more business than for a number of weeks past. The fall seemed to bring in buyers and the brokers were really quite lively for a time. The buying naturally helped quotations, and on Tuesday there was a reaction from the low prices, business continuing quite active.

On Wednesday the bear attack on the Brunswick shares reached its height and there was a general break in prices exceeding considerably that of Monday. Some buyers were again drawn in, but after all there was very little outside trading. A slight rally was worked up on Thursday, but it did not last long and prices went down again.

The excitement subsided toward the close of the week, though prices continued very low. Sales fell off and interest in the market again drooped. The developments of the last week or two show that the Brunswick lode may as well be dropped altogether as a factor in the market or a support for the falling fortunes of the Comstock companies.

Some closing quotations are: Consolidated California & Virginia, \$1.05@\$1.10; Hale & Norcross, 91 @94c.; Ophir, 90@93c.; Chollar, 79@83c.; Confidence, 72c.; Potosi, 46@48c.; Mexican, 40c.; Gould & Curry, 30@31c. A little business was done in the Bodies this week, Bodie Consolidated closing at 53c.; Mono, 17c.

The Gold Mining Exchange continues to do a light business, but very few stocks are quoted. Savannah sold this week at 43@45c.; Lockwood, 26 @27c.

The Hale & Norcross Mining Company has suspended underground work, not only in its claim on the Brunswick lode, but in the old mine on the Comstock lode.

The annual meeting of the Gould & Curry Mining Company has been called for December 21st.

Mining assessments falling delinquent in December amount to \$83,540, of which Nevada mines call for \$41,520, California mines \$18,000, and an Arizona mine \$25,000.

The Troy Mining Company, of Alaska, has levied an assessment of 10c. per share, delinquent January 6th.

The Orleans Mining Company, of Grass Valley District, California, has levied an assessment of 10c. per share, delinquent December 11th.

The mining, milling and other corporations on and around the Comstock lode paid out a total of \$67,054 as wages to employees for the month of November. The total was some \$20,000 less than that for October on account of the reduction of the working forces in some of the Gold Hill mines.

The monthly sworn statements of the financial condition of the mining companies have been filed this week in compliance with the law. The following companies report having had balances on hand December 1st, 1896: Alta, \$3,761; Andes, \$4,252; Alpha Consolidated, \$5,874; Best & Belcher, \$7,138; Bullion, \$5,109; Belcher, \$8,102; Bulwer Consolidated, \$3,480; Bodie Consolidated, \$326; Caledonia, \$3,468; Consolidated Imperial, \$1,911; Consolidated New York, \$930; Challenge Consolidated, \$3,208; Confidence, \$4,306; Crown Point, \$2,486; Chollar, \$814; Exchequer, \$686; Gould & Curry, \$2,992; Kentuck Consolidated, \$1,432; Mexican, \$14,221; Mono, \$1,125; Ophir, \$11,759; Overman, \$1,723; Potosi, \$14,174; Savage, \$4,590; Sierra Nevada, \$15,250; Syndicate, \$641; Silver Hill, \$211; Standard Consolidated, \$32,179; Union Consolidated, \$14,165; Utah Consolidated, \$2,840.

The following mining companies report having had an indebtedness December 1st 1896: Consolidated California & Virginia, \$376 with November expenses to be paid, and bullion to be received, amounts unknown; Hale & Norcross, \$12,083 with November expenses, amount unknown, to be paid; Julia Consolidated, \$12; Lady Washington, \$691; Occidental Consolidated, \$3,700, balance due on note at bank and November expenses, amount unknown, to be paid; Silver King, \$1,536.

British Columbia.

(From Our Special Correspondent.)

ROSSLAND, B. C., Dec. 10.

The present week is closing with a more cheerful outlook for local mining stocks than was noted

last week. Another Chinook is making a protracted stay, and the snow is fast melting from the effects of the April-like weather. While there is an upward tendency in the figures for choice mining stocks, the characteristic activity of this camp has been temporarily transferred from the mines to railway extension and the booming of town property. The arrival of the first train over the Spokane & Red Mountain Railway is now reduced to a question of a few hours, while Mr. Henze is seriously credited with a project to extend his narrow-gauge railway to Robson, a distance of 30 miles up the Columbia. This project has, it is stated on good authority, been advanced to the stage of the receipt of tenders for the work of construction.

The last issue of the British Columbia Official Gazette contains notices of the incorporation of no fewer than nine gold-mining and milling companies, as follows: Queen Victoria, capital \$1,000,000, head office Rossland; Iron Hope, capital \$600,000, head office Seattle; Victory-Triumph, \$1,300,000, head office Rossland; Yale-Kootenay, \$1,000,000, Rossland; Red Eagle Gold, \$1,200,000, Rossland; Occidental, \$600,000, Vancouver; Germania, \$1,000,000, Vancouver; Great West Gold Fields, \$2,000,000, Vancouver; Gold Mountain, \$1,000,000, Vancouver. This is a total of \$8,000,000 nominal capital.

London. Dec. 5.

The London mining stock market is sinking into a very lifeless state. There appear to be no efforts made to sustain it, and quotations sink lower and lower. Chartered stocks have sunk to £2, and a further fall may be expected. Since the new issue went off successfully, there has been no particular reason for supporting the market. Among the gold shares all sorts of adverse rumors have been circulated. The stoppage of Langlaage Royal has been used for all it is worth to depress the Barnato group. Rumors of a closing down of Croesus, one of the group, have been persistently circulated, but the reason for the temporary stoppage is really shortness of water, a serious enough affair, though, of course, a difficulty that can be overcome. Primrose is also suffering from short water supply, and part of the stamps are idle. The bears then started on Wemmer and announced its closing down, but an official statement was made accounting for this stoppage also by the short water supply. The water question is increasing in seriousness, and the attention of the chief magnates is directed toward solving it.

The other sections of the market have been dull and without business. West Australians, New Zealanders, Indians and Americans are all included in the general quiet.

Paris. Dec. 6.

(From Our Special Correspondent.)

While the November settlement has just passed over very successfully, and in a manner gratifying to our *coulissiers*, speculation is somewhat checked by the much higher rate prevailing for money. For the last two or three years we have been so accustomed to borrowing at a very low rate that 4 or 5% on short loans, which is now asked, seems to us too high to leave a margin for profit in operating on the Bourse. In one respect this is a good sign, since it shows that money is finding much more employment in legitimate business.

As to the individual groups there has been a check in the advance of the metallurgical shares. This was not unexpected, however, since it would seem that at present quotations the prospect of two or three years of active business has been very fully discounted. Some of the companies have to make up the losses of bad years which will prevent them from increasing their dividends largely. In general, however, our iron and steel companies are in good financial condition.

There has also been some reaction in the copper stocks. While the consumption of copper continues very large, it is apparent that the companies on your side can meet all the demands, and that they probably will, according to their usual practice, continue to increase their exports to a point which will make lower prices for the metal inevitable.

The lead and zinc shares have generally maintained themselves very well. Huanchaca (silver) again shows an increase. The condition of the mine is reported to be improving and if the management continues to do as well as it has recently, it is possible that dividends may be resumed in 1897.

Politically matters are quiet, although we find ourselves in rather strange company with Great Britain ranged on the side of France and Russia in the Turkish question; but who can tell what is going to happen next in the East?

MEETINGS.

Arcadia Mining Company, in Room 8, Freeman Block, Pike's Peak avenue, Colorado Springs, Colo., on January 6th, at 2 p. m.

Bull Hill Mining and Milling Company, at 28 South Tejon street, Colorado Springs, Colo., on January 4th, at 3 p. m.

Constantine Gold Mining Company, at the Brown Palace Hotel, Denver, Colo., on December 30th, at 10 a. m.

Cowenhoven Mining, Transportation and Drainage Tunnel Company, at the office of the company in Aspen, Colo., on January 12th, at 10 a. m.

Cripple Creek Golden Group Mining and Milling Company, at St. James Hotel, Denver, Colo., on December 26th, at 2 p. m.

Gene Field Gold Mining Company, at 620 Mining Exchange Building, Denver, Colo., on January 2d, at 7 p. m.

Snowy Range Placer Mining and Milling Company, at the office of C. W. Bramel, in Laramie, Wyo., on January 5th, at 12 m.

Syndicate Mining and Milling Company, in Room 206, McCornick Building, Salt Lake City, Utah, on January 8th, at 2 p. m.

ASSESSMENTS.

Table with columns: Name of Co., Loc'n., No., Ding., Sale, Amt. Lists various mining companies and their assessment details.

* New assessment.

DIVIDENDS.

Table with columns: NAME OF COMPANY, Current Dividends (Date, Am't.), Paid since Jan. 1, 1896, Total to date. Lists dividends for numerous companies.

* November dividend paid.

NOTE.—This table does not give all the dividends paid by mining companies, as it is impossible to obtain a complete list of dividends declared. Many companies are close corporations and refuse to give the information. Readers of the Engineering and Mining Journal will confer a favor on the publishers if they will notify the Journal of any errors or omissions in the above table.

STOCK QUOTATIONS.

BOSTON, MASS.*

Table with columns: NAME OF COMPANY, Location, Par val, Dec 11, Dec 12, Dec 14, Dec 15, Dec 16, Dec 17, Sales.

*Official quotations Boston Stock Exchange. Total sales, 33,125.

NEW YORK.*

Table with columns: NAME OF COMPANY, Location, Par val, Dec 12, Dec 14, Dec 15, Dec 16, Dec 17, Dec 18, Sales.

*Official quotations N.Y. Stock and Con. Stock & Petroleum Exchs. Total shares sold, 12,900.

INDUSTRIAL COAL AND COAL RAILROAD.*

Table with columns: NAME OF COMPANY, Par value, Dec 12, Dec 14, Dec 15, Dec 16, Dec 17, Dec 18, Sales.

*Official quotations N.Y. Stock Exchange. Total shares sold, 224,713.

COLORADO SPRINGS, COLO.*

Table with columns: NAME OF COMPANY, Par val, Dec 7, Dec 8, Dec 9, Dec 10, Dec 11, Dec 12, Sales, Sales.*

* Official quotations and sales Colo. Springs Mg. Stock Assoc. * Board of Trade Exchange.

SAN FRANCISCO, CAL.*

Table with columns: NAME OF COMPANY, Location, Par value, Dec 11, Dec 12, Dec 14, Dec 15, Dec 16, Dec 17.

*Official telegraphic quotations, San Francisco Stock Exchange.

BALTIMORE, MD.*

Week ending Dec. 10.

Table with columns: NAME OF COMPANY, Location, Par value, Bld, Ask, NAME OF COMPANY, Location, Par value, Bld, Ask.

*Official quotations Baltimore Stock Exchange.

BRITISH COLUMBIA.*

Week ending Dec. 12.

Table with columns: NAME, Selling price, NAME, Selling price, NAME, Selling price.

Par val.: Hall Mines and Le Rol, \$5; Slocan Star, 5/6; other stocks, \$1.

LONDON.

Dec. 4.

Table with columns: NAME OF COMPANY, Country, Product, Capital stock, Par value, Last dividend, Quotations. Lists various mining and industrial companies from Alaska to Wemmer.

* Dividend pending.

Week ending Dec. 4.

Table with columns: NAME OF COMPANY, Country, Product, Capital Stock, Par value, Divs. last year, Op'ning, Closing. Lists companies like Acieries de Creusot, Boleo, and others.

MEXICO.

Week ending Dec. 10.

Table with columns: NAME OF COMPANY, State, No. of shares, Last dividend, Last assessment, Prices. Lists companies like Amistad y Concordia, Angustias, etc.

NOTE - In most Mexican mining companies the shares have no fixed par value. The capital is formed of a certain number of shares, the total value not being named. Prices are in Mexican dollars.

VALPARAISO, CHILE.*

Sept. 31.

Table with columns: NAME OF COMPANY, Capital, Share value, Last Dividend, Prices. Lists companies like Arturo Prat, Caracoles, etc.

* Special Report of Jackson Bros. Values are in Chilean pesos or dollars.

SHANGHAI, CHINA.*

Nov. 15.

Table with columns: NAME OF COMPANY, Country, No. of shares, Value, Last dividend, Price. Lists companies like Julebu & Trad., Funjom Ig. Co., etc.

* Special Report of J. P. Bisset & Co. The prices quoted are in Shanghai taels.

DENVER, COLO.*

Table with columns: NAME OF COMPANY, Par val, Dec 7, Dec 8, Dec 9, Dec 10, Dec 11, Dec 12, Sales. Lists various mining and industrial companies.

* Official quotations Colorado Mining Stock Exchange. Total shares sold, listed, 2,001,150; unlisted, 1,000,851. Total, 3,002,001.

SALT LAKE CITY, UTAH.*

Week ending Dec. 12.

Table with columns: STOCKS, Par value, Bid, Asked, Actual selling price. Lists companies like Ajax, Alliance, Annie, etc.

* Special Report of James A. Pollock. † All the companies are located in Utah.

PHILADELPHIA PA.*

Table with columns: NAME OF COMPANY, Loc'n, Par Val, Dec. 10, Dec. 11, Dec. 12, Dec. 14, Dec. 15, Dec. 16, Sales. Lists companies like Cambria Iron, Choc & Gif. Cifs, etc.

* Official quotations Philadelphia Stock Exchange. † Ex. dividend. Total sales, 5,549.

HELENA, MONT.*

Week ending Nov. 27.

Table with columns: NAME OF COMPANY, Location, Company's office, Par value, Bid, Asked, Shares sold, Price. Lists companies like Am. Dev. & M. Co., Bald Butte, etc.

* Special Report of Samuel K. Davis. Total shares sold, 10,000.

PITTSBURG, PA.*

Week ending Dec. 12.

Table with columns: NAME OF COMPANY, Loc'n, Par val, Bid, Ask, Selling price. Lists companies like Mansfield, N.Y. & C. Gas Co., etc.

* Official quotations Pittsburgh Stock Exchange.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns: Name and Location of Company, Capital Stock, Shares (No., Par Val), Assessments (Total Levied, Date and Amount of Last), Dividends (Total Paid, Date and Amount of Last), and Name and Location of Company, Capital Stock, Shares (No., Par Val), Assessments (Total Levied, Date and Amount of Last).

G., Gold. S., Silver. L., Lead. C., Copper. B., Borax. * Non-assessable. + The Deadwood previously paid \$275,000 in eleven dividends and the Terra \$75,000. † Previous to the consolidation in August, 1884, the California had paid \$31,330,000 in dividends and the Cons. Virginia \$42,390,000. ‡ Dividends paid since consolidation. Note.—Corrections to this table are made monthly. Correspondents are requested to forward changes or additions so as to reach us before the end of each month.

CLASSIFIED LIST OF ADVERTISERS.

Air Compressors and Rock Drills. American Diamond Rock Drill Co. Bullock, M. C., Mfg. Co. ... (See Diamond Drills.)

Air Hoists. Whiting Foundry Equipment Co. Amalgamators. Bucyrus Steam Shovel & Dredge Co. ... Frasier & Chalmers.

Amalgam Plates. Western Plating and Mfg. Co. Anti-Friction Metals. Besty, Chas. H., & Co. ... Chester Steel Cast. Co.

Anti-Rust. Goets, Otto. Architects and Builders. Berlin Iron Bridge Co. ... Pittsburgh Bridge Co.

Assayers and Chemists' Supplies. Alsworth, Wm. Penn. Sm. & Ref. Wks. Baker & Adamson. ... Roessler & Hasselacher

Assays. Sargent, E. H., & Co. Solway Process Co. Chur, Walter. ... Standard Fire Brick Co.

Attorneys, Corporation. Emig, C. E. McCall & Hamilton. Agents. Hill-Fowler Mfg. Co. ... Babbits' Metal.

Bankers and Brokers. Arkell, E., & Co. Blackett, J. St. Clair. ... Bonbright, W. P. & Co.

Barrel Making. Bristol Co. Blasting Caps. Metallic Cap Mfg. Co. ... Rheinisch Westphalian Explosive Co.

Blasting Batteries. Climax Fuse Co. Lau, J. H., & Co. Blowers, Pressure. ... Connersville Blower Co.

Bolters. Denver Eng. Wks. Co. Frasier & Chalmers. Philadelphia E. N. S. Wks., Ltd. ... (See Machinery.)

Brattice Cloth. Besty, Chas. H., & Co. Brick Machinery. ... Chisolm, Boyd & White Co.

Bridges. Berlin Iron Bridge Co. Shiffer Bridge Co. Car Wheels. ... Whiting Foundry Equipment Co.

Carburens. New York Diamond Drill Co. Chain and Link Belting. ... (See Belting.)

Chemists. Simonds & Wainwright. Chilled Castings. ... Whiting Foundry Equipment Co.

Coal. Berwind-White Coal Co. ... Maryland Coal Co. ... Potia, F. A., & Co.

Coal Washers. Frasier & Chalmers. Caster & Curran. ... Consohation Coal Co.

Coal Cutters. Ingersoll-Sergeant Drill Co. ... Jeffrey Mfg. Co. ... Link Belt Machinery Co.

Compressors. Clayton Air Compressor Works. ... Laidlaw-Dunn-Gordon Co.

Concentrators, Crushers, Pulverizers, Separators, Etc. Atte Co., Ed. P. Blake, Theo. A. ... Bradley Pulverizer Co.

Contractors. Bobina Conveying Belt Co. Copper Dealers and Producers. American Metal Co. ... Arizona Copper Co.

Copper Dealers and Producers. American Metal Co. Arizona Copper Co. ... Atlantic Mining Co. ... Baltimore Cop. Wks.

Cyanide. Roessler & Hasselacher Chemical Co. Cyanide Potash. ... Gas Light & Coke Co.

Diamonds. Lexow, Theodor. New York Diamond Drill Co. Diamond Drills. ... Bullock, M. C., Mfg. Co.

Draughtsmen. Young, Peter. Drawing Materials. ... Lallie, J. S. J. ... Letz Co.

Dredges. Bucyrus Steam Shovel & Dredge Co. ... Marion Steam Shovel Co. Dryers. ... Brown, Horace F. ... Cunniff, F. D. & Son Co.

Dump Cars. Denver Eng. Works Co. Hendrie & Bolthoff Mfg. Co. Educational Institutions. ... Arizona School of Mines.

Electrical Machinery and Supplies. American Engine Co. ... Besty, Chas. H., & Co.

Elevators, Conveyors and Hoisting Machines. Frasier & Chalmers. ... Hunt, G. W., Co.

Emery Wheels. Besty, Chas. H., & Co. Engineers, Chemists, Metallurgists. ... See Directory Pages 1, 5 and 6.

Engineers' Instruments and Supplies. Aloe, A. S. Co. ... Buff & Berger. ... Kenuff & Esser Co.

Excavators. Bucyrus Steam Shovel & Dredge Co. ... Vulcan Iron Works. Fire-Brick and Clay. ... Chur, Walter. ... Gar-en City Sand Co.

Furnaces. Brown, Horace F. ... Moore, S. L., & Son Co. Fuses. ... Climax Fuse Co. ... Ingersoll-Sergeant Drill Co.

Gas Engines. Hercules Gas Engine Works. ... Norman, J. J., & Co. Gas Works. ... Pollock, Wm. B. & Co.

Gauges, Recording, Etc. Bristol Co. Geating. ... Besty, Chas. H., & Co. ... Denver Eng. Wks. Co.

Grease, Graphite, Etc. Besty, Chas. H., & Co. ... Dixon, Jos., Cruc. Co. Heavy Machinery. ... Denver Eng. Works Co.

Hose, Rubber, Etc. New York Belting & Packing Co., Ltd. Hydraulic Rams. ... Power Specialty Co. Injectors. ... Jenkins Bros.

Insulated Wires and Cables. Okonite Co., Ltd. Insurance Companies. Hartford Steam Boiler Inspect'n and Ins. Co. ... Mutual Life Insurance Co.

Joint Fittings. Tight Joint Co. Lead Linings for Chlorination Tubs. ... Raymond Lead Co.

Locomotives. General Electric Co. Hunt, G. W., Co. Porter, H. E., & Co. Locomotors. ... Detroit Lubricator Co.

Machinery. Dealers in Mining, Milling and Other Machinery. Allis, Edw. P., & Co. ... American Diamond Rock Drill Co.

Metal Dealers. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Metal Drills. American Dev. & Mg. Co. ... Johnson, Matthey & Co. ... Lambert's Wharf Co.

Publications. American Fertilizer. ... Mining Investor. ... Mining Journal. ... Scientific Pub. Co.

Pumps. Blake, Geo. F., Mfg. Co. ... Cameron, A. S., Steam Pump Works. ... Denver Eng. Wks. Co.

Quarrying Machines. Ingersoll-Sergeant Drill Co. ... Sand Drill Co. ... Sullivan Machinery Co.

Quintessence. Eureka Co. Railroads. ... Atchison, Topeka & Santa Fe Ry. ... Chicago & N. West. R. R.

Railroad Supplies and Equipment. Robinson & Orr. (See Machinery.) Regulators, Dampers, Hoses, Etc. ... Eddy Valve Co. ... Jenkins Bros.

Rock Drills. (See Air Compressors.) Rolling. Berlin Iron Bridge Co. ... Phelps, Dodge & Co. ... Shiffer Bridge Co.

Rubber Goods. New York Belting & Packing Co., Ltd. Screens. ... Atchison, R. Perf. Metal Co. ... Denver Eng. Wks. Co.

Second Hand Machinery. Hine & Robertson. Robinson & Orr. Shoes and Dies. ... Chester Steel Cast. Co. ... Denver Eng. Wks. Co.

Shovels (Steam). Bucyrus Steam Shovel & Dredge Co. ... Marion Steam Shovel Co. Smelting and Refining Works. ... Orford Copper Co. ... Penna. Salt Mfg. Co.

Steel Rails, Castings, Rolls, Drill Steel. Bethlehem Iron Co. ... Moore, S. L., & Sons Co. ... Chester Steel Cast. Co.

Tanks. Denver Eng. Wks. Co. Williams Mfg. Co. Gates Iron Works. Telegraph Wires and Cables. ... Okonite Co., Ltd. Teels. ... Besty, Chas. H., & Co. ... Pratt & Whitney Co.

Tubes. Besty, Chas. H., & Co. Pollock, Wm. B. & Co. Williams Str. s. Tubing-Rubber. ... New York Belting and Packing Co., Ltd. Turbine Water-Wheels. ... Lefell, Jas., & Co. ... Pelton Water Wheel Co.

Valves. Eddy Valve Co. Jenkins Bros. Ventilators. ... Bullock, M. C., Mfg. Co. ... Tod, Wm., & Co. ... Frasier & Chalmers.

Voltsmeters. Weston Electrical Instrument Co. Vulcanite Emery Wheels. ... New York Belting and Packing Co., Ltd. Water-Wheels. ... Lefell, James, & Co. ... Pelton Water Wheel Co.

Well Drilling Machinery. ... Sullivan Mach'y Co. Williams Bros. Wharfage. ... Lambert's Wharfage Co. Wheels, Car. ... Chester Steel Cast. Co. ... Taylor Iron & Steel Co.

White Lead. Cookson & Co. Foster, Blackett & Co. Wire Cloth. ... Atchison, R. Perf. Metal Co. ... Harrington & King Perforating Co.

Wire Rope and Wire. Besty, Chas. H., & Co. ... Hunt, G. W., Co. ... Broderick & Bascom. ... Rope Co. ... California Wire Wks. ... Cooper Hewitt & Co.

Wire Rope Tramway. Frasn & Chalmers. Machine Co. ... Hunt, C. W., Co. ... Robinson, J. A., Son & Co. ... Vulcan Iron Works.

POSITIONS VACANT.

FREE ADVERTISING

Inquiries from employers in want of Superintendents, Engineers, Metallurgists, Chemists, Mine or Furnace Foremen, or other assistance of this character, will be inserted in this column WITHOUT CHARGE, whether subscribers or not.

The labor and expense involved in ascertaining what positions are open, in gratuitously advertising them and in attending to the correspondence of applicants, are incurred in the interest and for the exclusive benefit of subscribers to the ENGINEERING AND MINING JOURNAL.

Applicants should inclose the necessary postage to insure the forwarding of their letters.

1500 WANTED—YOUNG MAN TO LOOK after mining interests. Should have experience in mining and be familiar with the chlorination and cyanide processes. Must be of good standing, thoroughly reliable, and have good references. Best references required. Address RELIABLE, ENGINEERING AND MINING JOURNAL. Dec. 5.

1501 WANTED—CHEMIST AND ASSAYER with experience in bookkeeping. Position open for an energetic young man as assistant to manager. Give references, age and salary expected. Address LIBERTAD, ENGINEERING AND MINING JOURNAL. Dec. 12.

1502 WANTED—CHEMIST FOR BLAST furnace business; must be thoroughly competent and well recommended. State experience, etc. Address PIG IRON, ENGINEERING AND MINING JOURNAL. Dec. 12.

1503 WANTED—AN EXPERIENCED metallurgist and chemist as superintendent of a lead, silver and gold smelting works, located in the Middle States; must be alive and energetic, and thoroughly qualified and experienced in modern blast furnace practice and refining; a good position to the right party; answer with references. Address MAHNET, ENGINEERING AND MINING JOURNAL. Dec. 12.

1504 WANTED—THOROUGHLY COMPETENT manager for a Gas Company in city of 50,000 people; good plant, but needs putting; give full particulars as to experience, abilities, references and remuneration—part of latter must depend on results; no attention unless compliance with terms. Address GAS, ENGINEERING AND MINING JOURNAL. Dec. 12.

SITUATIONS WANTED.

Advertisements for SITUATIONS WANTED will be charged only 10 cents a line.

CHEMIST AND ASSAYER NOW IN MEXICO desires position. A Spanish-speaking country preferred. Capable of assuming position of assistant superintendent of small lead-silver blast furnaces. Address W., ENGINEERING AND MINING JOURNAL. No. 17,880, Feb. 18.

STUDENT WITH FIVE YEARS' EXPERIENCE in mining, smelting and analytical work—assaying—desires position. Spanish spoken. Address OBSERVER, ENGINEERING AND MINING JOURNAL. No. 17,889, Jan. 2.

MINING ENGINEER AND METALLURGIST would like position in charge of cyanide plant, or as assistant to superintendent of mining or smelting company. Address B. M., ENGINEERING AND MINING JOURNAL. No. 17,890, Jan. 16.

MECHANICAL ENGINEER, GRADUATE, having had one year's experience in mining and milling machinery and some months in practical mining, desires position where his training and thorough reliability will be of service. Address L. OF M., ENGINEERING AND MINING JOURNAL. No. 17,892, Dec. 26.

A CHEMIST, UNIVERSITY GRADUATE, experienced in all kinds of metal-work, wants position. Satisfactory references. Address ANALYST, ENGINEERING AND MINING JOURNAL. No. 17,875, Dec. 26.

TWELVE YEARS SUPERINTENDENT AND Manager of gold mines and mills desires position; can make any gold mine pay that it is possible to make profitable; age 33 years; best references as to honesty, energy, sobriety, executive and business ability, etc. Address PRACTICAL, ENGINEERING AND MINING JOURNAL. No. 17,882, Dec. 26.

WANTED—BY AN EXPERT COPPER Smelter and Refiner, a situation as foreman smelter and refiner; willing to make himself generally useful; experienced in treating all classes of copper ore. Apply W., ENGINEERING AND MINING JOURNAL. No. 17,891, Jan. 9.

CYANIDE AND MILLMAN, EXPERT ASSAYER and civil engineer. Ten years' experience in Wester gold and silver mines as engineer and assayer, and in charge gold stamp mill and cyanide plant. Highest recommendations from former employers. Wish position in charge gold mine or mill and cyanide plant, or as assayer and engineer for gold company. Address M. A. KNAPP, Hawthorne, Nev. No. 17,888, Jan. 2.

WANTED—AN IDEA; WHO CAN THINK of some simple thing to patent? Protect your ideas; they may bring you wealth. Write JOHN WEDDERBURN & CO., Patent Attorneys, Washington, D. C., for their \$1,800 prize offer, and new list of 1,000 inventions wanted.

Contracts Open.

TREASURY DEPARTMENT—Office of Supervising Architect, Washington, D. C., December 14th, 1896.—Sealed proposals will be received at this office until 2 o'clock p. m. on the 7th day of January, 1897, and opened immediately thereafter, for all the labor and materials and erecting complete either a hydraulic or electric passenger elevator, also new steam boiler etc., for the U. S. Court House and Post Office building at Topeka, Kan., in accordance with the drawing and specification, copies of which may be had at this office or the office of the Custodian at Topeka, Kan. Each bid must be accompanied by a certified check for a sum not less than 2% of the amount of the proposal. The right is reserved to reject any or all bids and to waive any defect or informality in any bid, should it be deemed in the interest of the government to do so. All proposals received after the time stated for opening will be returned to the bidders. WM. MARTIN AIKEN, Supervising Architect. Orig.

STEEL RAILS.—Supply of 150,000 tons of steel rails and other permanent way materials, to be manufactured in the Colony of New South Wales. Offers are hereby invited by the Government of New South Wales and will be received by the Secretary for Public Works in Sydney, and the Agent-General for New South Wales, in London, until December 30th, 1896, from persons willing to contract for the supply of 150,000 tons of steel rails and the necessary quantity of fish-plates, fish-bolts and spikes, manufactured in the Colony of New South Wales, out of iron ore and other necessary materials, the natural product of, and with coal, coke or other fuel, smelted, gotten and raised within the said colony, upon the terms and conditions which can be seen at the offices of the Minister for Public Works, Sydney, or the Agent-General for New South Wales, London. J. H. YOUNG, Minister for Public Works.

JETTY.—U. S. Engineer Office, Wilmington, Del. Proposals for construction of Brush and Stone Jetty in harbor of Cape Charles City, Va., will be received until December 28th, 1896. Information furnished on application. WM. F. SMITH, U. S. Agent.

CORAL EXCAVATION.—Honolulu, Hawaii.—Sealed proposals will be received at the office of the Minister of the Interior of the Republic of Hawaii, at Honolulu, until December 31st, 1896, for the excavation of the hard coral in a slip to be constructed in the Harbor of Honolulu. Plans and specifications at the office of the Hawaiian Consulates at New York, San Francisco, California and Victoria, B. C., and also at the office of the Superintendent of Public Works, Honolulu. The Minister of the Interior does not bind himself to accept the lowest or any bids. J. A. KING, Minister of the Interior, Interior Office, Honolulu.

WATER-WORKS AND ELECTRIC LIGHT wanted.—Proposals for franchises, by Tippecanoe City Ohio. For particulars write JOHN M. HAAGA, Clerk.

DREDGING.—U. S. Engineer Office, New London, Conn.—Sealed proposals in triplicate for dredging in New Haven Harbor, Housatonic, Thames and Mystic Rivers, Conn., will be received here until December 23d, 1896. Information furnished on application. SMITH S. LEACH, Capt., Engrs.

WATER-WORKS—Mokenca, Ill.—The city of Mokenca will receive bids for the construction of a system of water mains and the appurtenances thereto including to include all such things as are mains and go to constitute mains constructed as are contemplated in a certain ordinance of said city establishing a general system of water-works for said city passed August 13th, 1895. Bids will be received by said city up to noon of the 10th day of January, 1897. All bids must be sealed and delivered to Charles B. Astle, City Clerk, and each bid must be accompanied with five hundred dollars (\$500) in lawful money or certified check of responsible bank. A ten thousand dollar (\$10,000) bond for the faithful execution of the contract will be required. The surety of the contract bond must be some surety company authorized by law to act as bondsmen in the State of Illinois. The city reserves the right to reject any and all bids. Plans, profiles and specifications may be seen at the office of the City Clerk, or any other information. Payment for above work will be under special assessment, proceedings which have been approved by the Supreme Court of Illinois.

WATER-WORKS—Abbeville, S. C.—Sealed proposals for furnishing material and labor required in the construction of a complete system of water-works for the city of Abbeville, S. C., will be received by the Secretary of Water Commissioners until January 4th, 1897. The approximate quantities are: 531 tons cast-iron pipe, 4, 6, 8 in.; 10 tons special castings; 50 double-nozzle fire hydrants; 35 valves and boxes; laying 6 1/2 miles of main; stand pipe, pump and boiler; pumping station. Bids will be received for the whole or any section of the work and the Commissioners reserve the right to reject any or all bids. Certified check for \$150 must accompany each bid. Plans can be seen and specifications obtained at the office of the Water Commissioners, Abbeville, S. C., or at the office of POWNALL & MINSHALL, Engineers, 140, Nassau street, New York City.

THE WELLS LIGHT
WALLWORK & WELLS' PATENTS.



This is the ONE light that will answer your needs in sudden emergencies, as it is

Always Ready,
Portable,
Self-Contained,
Perfectly Safe,

and UNAFFECTED
by WIND or

Over 10,000 in use.
800 to 4,000 Candle
Power from Oil.

400 RAILROADS and over 300 CONTRACTORS find valuable assistance from this light. Outdoor Night Work is its Special Feature.

THE WELLS LIGHT MFG. CO.,
EDWARD ROBINSON, Sole Prop.,
41 Washington Street, NEW YORK.

FREE SAMPLE COPY OF HOME STUDY,
... An Elementary Journal for Students

Of Mechanics, Electricity, Architecture, Mining, Plumbing, Heating and Ventilation, Steam Engineering, Civil Engineering and Mechanical and Architectural Drawing. Address

BOX 1007
HOME STUDY, SCRANTON, PA

THE ENGINEERING AND MINING JOURNAL

ADVERTISING RATES.
(NONPAREIL MEASUREMENT.)

	Lines.	Inches.	Regular Edition 1 time.	One Month 4 times.	Three Months 13 times.	Six Months 25 times.	Nine Months 30 times.	Twelve Months 32 times.
	6	1 1/2	\$2	\$5	\$12	\$20	\$28	\$31
	9	1 3/4	3	6	16	28	38	47
	12	2	3	8	20	35	47	60
	15	2 1/4	4	9	24	42	57	73
	18	2 1/2	4	11	29	50	68	87
	21	2 3/4	5	14	38	66	90	113
	24	3	6	16	42	72	98	125
	27	3 1/4	7	19	50	86	117	149
	30	3 1/2	8	20	54	93	126	161
	33	3 3/4	8	21	58	99	135	172
	36	4	9	23	61	106	143	183
	39	4 1/4	9	24	65	112	151	194
	42	4 1/2	10	25	68	118	160	204
	45	4 3/4	11	28	75	129	175	224
	48	5	12	30	81	141	190	243
	51	5 1/4	13	32	87	151	205	263
	54	5 1/2	14	35	93	161	219	286
	57	5 3/4	15	37	99	171	232	296
	60	6	16	39	105	180	242	313
	63	6 1/4	17	41	109	190	258	329
	66	6 1/2	17	43	115	200	271	346
	69	6 3/4	18	45	121	209	284	362
	72	7	19	47	126	219	296	378
	75	7 1/4	20	49	132	228	309	395
	78	7 1/2	21	51	137	238	322	411
	81	7 3/4	22	53	143	248	336	428
	84	8	22	55	149	258	349	446
	87	8 1/4	23	57	155	268	363	464
	90	8 1/2	24	59	161	278	377	482
	93	8 3/4	25	61	167	288	391	500
	96	9	26	63	173	298	405	518
	99	9 1/4	27	65	179	308	419	536
	102	9 1/2	28	67	185	318	433	554
	105	9 3/4	29	69	191	328	447	572
	108	10	30	71	197	338	461	590
	111	10 1/4	31	73	203	348	475	608
	114	10 1/2	32	75	209	358	489	626
	117	10 3/4	33	77	215	368	503	644
	120	11	34	79	221	378	517	662
	123	11 1/4	35	81	227	388	531	680
	126	11 1/2	36	83	233	398	545	698
	129	11 3/4	37	85	239	408	559	716
	132	12	38	87	245	418	573	734
	135	12 1/4	39	89	251	428	587	752
	138	12 1/2	40	91	257	438	601	770
	141	12 3/4	41	93	263	448	615	788
	144	12 1/2	42	95	269	458	629	806
	147	13	43	97	275	468	643	824

SPECIAL POSITIONS.

Front page, double regular rates.
Back outside page, 80 per cent. above regular rates.
Page facing editorials, 50 per cent. above regular rates.
Page facing market reports, 25 per cent. above regular rates.
Inside front cover, 25 per cent. above regular rates.
Inside back cover 25 per cent. above regular rates.

LANDS AND MINES FOR SALE.

J. F. CROSETT,
Secretary, Gold Mining Exchange,
No. 628 Sacramento Street, San Francisco, Cal.
GOLD MINES FOR SALE.
On Pacific Coast. Correspondence solicited.

A **SPLENDID CHANCE TO BUY CHEAP**
a Copper Mine that will pay from the start. Address H. L. SHAFFER, No. 609 Lewis Block, Pittsburgh, Pa. Dec. 5, 4w

For Sale to Settle an Estate.

Two producing patented Mining Claims, covering about 20 acres, only a small proportion of which have been developed. Located in the best portion of the Leadville District. The two claims adjoin, and are developed by a 507-foot shaft, with complete plant of machinery and buildings. One claim produced last season about \$70,000. For particulars address

EXECUTOR,
Dec. 5, 1f **P. O. Box 59, Leadville, Colo**

Los Angeles Gold Mining Co.,
MINING EXPERTS.

Buying and selling Mines. Have some reasonable-priced, good paying Mines in this State for sale. Correspondence solicited. References: First National Bank and other banks, Los Angeles, Cal. LOS ANGELES GOLD MINING CO., 449 The Wilcox Building, Los Angeles, Cal. Dec. 5, 13w

FOR SALE.

The Best Equipped Coal Mine

In this or any other country. A complete electric plant, newest and best machinery, with 1,100 acres of the best Coal lands in Western Kentucky. An old concern, with an established trade. The nearest coal mine to Nashville, Tenn., in any direction. Address

JOHN D. ANDERSON,
Nashville, Tenn.

FOR SALE.

WORKS OF THE PHOSPHATE MINING CO., LIMITED.

Under order of the United States Circuit Court for the District of South Carolina.

The valuable piece of property, being the works of the Phosphate Mining Co., Limited, generally called Bro herhood's, situated about 1 1/2 miles from Port Royal, S. C., consisting of about 24 acres, more or less, having a river frontage on Battery Creek of 971 feet, with fine wharves, etc. Convenient for loading ocean steamers (have from this point carried down steamers loaded to 21 ft. 6 in.). The Port Royal & Augusta Railroad passes through the property and has suitable switch conveniently located.

On property is fine large open shed some 240 feet by 70 feet, brick piers, with three railroad tracks overhead. Other desirable warehouse buildings, with overhead railroad trestles from wharves, boiler-house, etc.; desirable dwelling-houses and outhouses; fine artesian well and large brick cisterns.

A most desirable site for Cotton Mill, Manufacturing, Warehouse purposes, Ocean Shipments.

Also a number of 120-ton lighters in first rate order; also one No. 3 Root Blower, nearly new.

For particulars apply to

F. BROTHERHOOD, Receiver,
53 Hayne Street, CHARLESTON, S. C.
Dec. 19, 5w

ARRESTED



Every particle of water in your steam pipe with the HINE ELIMINATOR; the wear on your piston rods by using EUREKA Packing. We manufacture Dampers, Regulators, Oil Extractors, Feed Water Heaters, Coil Bending, ETC.
SEND FOR CATALOG.
HINE & ROBERTSON CO.
50 Cortlandt St., N. Y.

MACHINERY AND SUPPLIES FOR SALE.

SECOND-HAND RAILS.

If you have any Rails which are in good condition to relay—or if only good to be used as scrap—write us; we buy both kinds.

ROBINSON & ORR,
No. 419 Wood Street, Pittsburgh, Pa.

Dynamos and Motors.

100 (SECOND-HAND) FOR SALE.
WRITE FOR LIST.

REPAIRING. Factory open day and night.

Chesley Electric Co., - Hoboken, N. J.
Havemeyer Bldg., New York City. Nov. 7. 3m

JUMBO AUGERS

ONE PIECE OF STEEL. NO JOINTS OR LOOSE PARTS.

Every coal miner on earth needs a JUMBO. Warranted to convey the cuttings and bore automatically a large hole back of a small one, "without losing any time," or money refunded. Works with your old set of augers and machine. Overcomes windy shots, saves powder, increases lump coal and output. Your business solicited.

HILL-FOWLER MFG CO.,
BLUE RAPIDS, KAN., U S A.

MISCELLANEOUS WANTS.

WANTED—CAPITAL TO DEVELOP A new and promising mining field—Gold and Silver. Address
Dec. 12 4w **S. L. HEYWARD, Bucksport, Maine.**

TREASURER OR MINE AGENT.—A PRACTICAL Metallurgist, who is now, as for the past 20 years, holding the position with ample salary as general manager of a mining company, but where the surroundings are not satisfactory for a man of family (age 54), desires a less active life in above positions in some Eastern city or California, where his family can have educational advantages. Has directed the financial as well as the practical business of large operations. References furnished for honest and conscientious discharge of all duties. Address VIATOR, ENGINEERING AND MINING JOURNAL. Dec. 5, 1f

Gold Mine Partner Wanted.

A party, after fifteen years of persistent effort and the expenditure of large sums of money, has obtained the ownership and title of a group of some thirty gold placer mines, covering over one hundred and fifty square miles, and considered to be among the richest gold gravelmines of South America. Said party is desirous of having a partner able to furnish say \$75,000 for developing one of the mines that presents extraordinary inducements for operation on account of its extent, richness of gravel, large supply and head of water obtainable for hydraulic work, and for the low cost that water can be brought for to the mine.

Facilities for dumping are of the most approved kind. To the right party interest will be given in all the mines. It is believed that from the first mine worked sufficient capital can be obtained to allow the owners to work the other mines without calling for outside assistance. Mines easy of access.

This is a bona-fide proposition. The closest investigation is expected and desired. For further particulars address
TURNER,
Box 2932, Boston, Mass.

BOOK BUYERS

Consult the Scientific Publishing Co., New York.

AMERICAN DEVELOPING & MINING COMPANY.

OFFICE—INTER-MOUNTAIN BLDG.
BUTTE, MONTANA.

Mines Leased, Bonded, Bought, Developed and Operated.

Correspondence from Owners of Mining Properties and Parties Seeking Mining Investments solicited.

—References on Application.—
Moreing & Neil's Code Used.

Cable Address, **ADAMCO, BUTTE.**

RIPPLE CREEK \$300,000 CAPITAL. 3 YEARS ON SURFACE.
INVESTMENT. RELIABLE INFORMATION WITH MAP-FREE. THE WOOD INVESTMENT CO. COLORADO SPRINGS, Colo.

ANTI RUST PAINT
FOR ROOFS, STRUCTURES, SMOKE STACKS AND ALL EXPOSED IRON WORK. SAMPLE FREE. OTTO GOETZE, SOLE AGENT, 114 BROAD STREET, NEW YORK.

WOLFRAM (TUNGSTIC ACID).

The subscribers are prepared to supply the above mineral in quantity. Correspondence invited.
METALITE CO., 11 Dundas St., GLASGOW
Nov 28, 6w

DIVIDENDS.

ISABELLA GOLD MINING COMPANY.
COLORADO SPRINGS, Colo., September 10th, 1896.
DIVIDEND NO. 2.
A dividend of ONE CENT PER SHARE (\$22,500) has been declared, payable September 25th, 1896, to stock holders of record September 18th, 1896.
The stock transfer books will be closed September 18th, 1896, at 3 o'clock p. m., and will be re-opened on the morning of September 26th, 1896.
PERCY HAGERMAN,
Vice-President and Treasurer.

ASSESSMENTS.

CON. CALIFORNIA AND VIRGINIA MINING COMPANY.—Location of principal place of business, San Francisco, Cal.; location of works, Virginia Mining District, Storey County, Nevada.
Notice is hereby given that a meeting of the Board of Directors, held on the 8th day of December, 1896, an assessment (No. 7) of Twenty-five Cents (25c.) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, room 29, Nevada block, No. 309 Montgomery street, San Francisco, Cal.
Any stock upon which this assessment shall remain unpaid on the 14th day of January, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before will be sold on THURSDAY, the 4th day of February, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale. By order of the Board of Directors,
A. W. HAVENS, Secretary.
Office—Room 29, Nevada block, No. 309 Montgomery street, San Francisco, Cal. Dec. 19, 2w

Received Too Late for Classification.

CROFT, HENRY,
Assoc. M. Inst. C. E., M. I. M. E., England,
Consulting Engineer.
Fourteen years' experience in British Columbia. Mining and Financial Broker.
Rossland, B. C.

HICKS, EDWIN F.,
Analytical and Consulting Chemist,
62 Beaver Street, New York.

CHEMIST AND METALLURGIST WITH first-class references, 12 years' practical experience, wishes position with good company operating Smelting Works or Gold Mills, using Bred Chlorination or Cyanide Process; works put in operation a specialty; would accept temporary engagement. Address E. A. F., Durango, Colo. No. 17,894, Jan. 16,

FRED. F. HUNT,
77 Pine St., New York,
ANALYST AND ASSAYER.
Weighing, Sampling and Assaying of Ores, Mattes,
Lead Bullion and all Mineral Products.

STUDENTS

Instruction in Assaying, Chemistry and
Mineralogy for Business Men.
SIMONDS & WAINWRIGHT,
CHEMICAL & MINING ENGINEERS & ANALYSTS.
Laboratories, 20 Platt St. (cor. of Gold), New York.
Assays, Analyses, Experimental Research and Consultation.

NICKEL

GRAIN—for Anodes, German-
Silver and Steel.

THE CANADIAN COPPER CO.,
201 Perry-Payne Bldg., Cleveland, O.

LAMBERT'S WHARFAGE CO.,

Prince of Wales Dock, SWANSEA.
Ores, Mattes, Regulus and Bars Received and
Prepared for Market.
Copper, Lead, Tin, Spelter and Pig Iron Received
Weighed and Sampled and Warrants
issued against same.
N. B.—Warrants are on the Accepted List of the London
Metal Exchange.
Regular lines of Steamers from America, Europe, etc.
Consign Goods to Lambert's Cranes,
Prince of Wales Dock, Swansea.

HERMANN THOFEHRN,

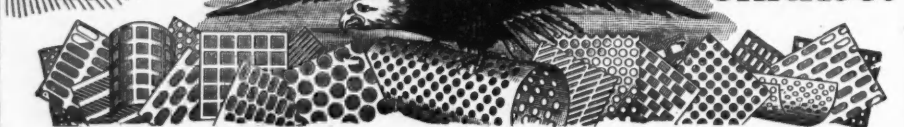
CONSULTING ENGINEER.

Construction and Transformation of
Electrolytic Refining Works.
Treatment of Refractory Gold Ores.
Transport of Power.
PARIS: 16 Rue Erlanger.
NEW YORK: Room 8 B, 58 William St.

LEWISOHN BROTHERS,

P. O. Box 1247. 81 and 83 FULTON STREET, NEW YORK.
Advances made on Copper, Matte and Ores.
Agents for the following Mining Companies: Boston & Montana C. C. & S. Mining Co.
Old Dominion Copper Mining & Smelting Co.; Arizona Copper Co., Ltd.; Tamarack
Mining Co.; Osceola Consolidated Mining Co.; Butte & Boston Mining Co.; Kearsarge
Mining Co.; Tamarack Junior Mining Co.

THE HARRINGTON & KING PERFORATING CO. CHICAGO.



METALS PERFORATED AS REQUIRED.
FOR MINING SCREENS OF ALL KINDS.

MILLING AND MINING MACHINERY, FOR USE IN
REDUCTION AND CONCENTRATING WORKS STONE, COAL AND ORE SCREENS,
WOOLLEN, COTTON, PAPER AND PULP MILLS, STAMP BATTERY SCREENS,
RICE, FLOUR AND COTTONSEED OIL MILLS, BRICK AND TILE WORKS, FILTERS,
SUGAR AND MALT HOUSES, SPARK ARRESTERS, GAS AND WATER WORKS,
DISTILLERIES, FILTER PRESSES, OIL, GAS AND VAPOR STOVES,
COFFEE MACHINERY, ETC., ETC.

STANDARD SIZES PERFORATED TIN AND BRASS ALWAYS IN STOCK.
Main Office and Works, 241-243 North Union St., Chicago, Ill., U. S. A.
Eastern Office, No. 284 Pearl St., New York.

THE AMERICAN METAL CO. LIMITED.

80 Wall Street (P. O. Box 957), NEW YORK.
Security Building, ST. LOUIS, MO.
COPPER, COPPER ORES AND MATTES, TIN, LEAD,
SPELTER, ANTIMONY, NICKEL, ALUMINUM.
ADVANCES MADE ON CONSIGNMENTS.
Agents for Henry R. Merton & Co., London, Birmingham
Manchester and Glasgow; Metallgesellschaft, Frankfurt-on
Main; Williams, Foster & Co., Ltd., Swansea, Eng.; Societe
le Nickel, Paris, France; Balbach Smelting & Refining Co.,
Newark, N. J.

THE ORFORD COPPER CO. COPPER SMELTERS

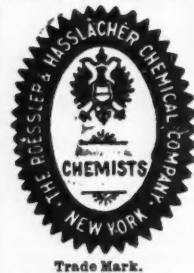
Works at Constable's Hook, N. J., opposite New
Brighton, Staten Island, Copper Ore, Mattes, or Bullion
purchased. Advances made on consignments for refin-
ing and sale. Specialty made of Silver-
Bearing Ores and Mattes.

SELL
INGOT AND CAKE COPPER.
President, ROBERT M. THOMPSON,
Office, 27 to 29 Wall Street, New York.

THE BRIDGEPORT COPPER CO.

BRIDGEPORT, CONN.
Refiners of Copper. . . .
Argentiferous Material treated
on favorable terms.
Advances Made on Consignments

W. F. ROBERTSON,
27 THAMES ST., Cor. Greenwich St., NEW YORK,
Mining Engineer,
Metallurgist and Assayer
Ores, Mattes, Lead Bullion, and all Furnace
Products Sampled and Assayed.



CYANIDE

PEROXIDE OF
SODIUM
And all other Mining Chemi-
cals.

The Roessler & Hasslacher
Chemical Co.,
73 PINE ST., NEW YORK.

Trade Mark.

LEDOUX & CO.,

9 Cliff Street, New York.
Assayers and Engineers.

ORES, BARS, BULLION AND ALL FURNACE
PRODUCTS SAMPLED AND ASSAYED.
Public Ore Yards and Sampling Works.
ADVANCES OBTAINED ON CONSIGNMENTS. PRINCIPAL
BANKS AND METAL BUYERS ACCEPT OUR
CERTIFICATES AS FINAL.

ASSAYERS BY APPOINTMENT TO NEW
YORK METAL EXCHANGE.

RICKETTS & BANKS,

104 JOHN ST., NEW YORK.
ORES TESTED.

Complete Ore Milling and Testing Works
for making practical working tests of ores to determine
the Best Method of Treatment. Milling, Metal-
lurgical and Chemical Processes investigated.

ASSAYS AND ANALYSES.
Assayers by appointment to New York Metal Exchange.

JAMES & SHAKSPEARE, ENGLAND.

1 Metal Exchange Buildings, London, E. C.,
AND
17 Irwell Chambers West, Liverpool, Eng.

METALS, MATTES AND MINERALS.

Cable Address, METALLURGY, LONDON.
Use A B C, Bedford McNeill, or Lieber's Code.

HENRY BATH & SON, London, Liverpool and Swansea, BROKERS.

All Description of
Metals, Mattes, Etc.
Warehouses, Liverpool and Swansea.
Warrants Issued under their Special Act of
Parliament.

NITRATE OF SODA.
Cable Address: - BATHOTA, LONDON.

VIVIAN, YOUNGER & BOND,

117 Leadenhall St., London E. C.

Copper, Tin, Lead, Spelter, Antimony, Silver
Bullion and all kinds of metals.
Best terms for Copper Mattes, Lead and Silver
Ores, Silver-Lead Bullion, Etc., Etc.
Tinplates, Galvanized Iron, Railway Material,
Etc., Etc.

Cable Address: "BOND," London.
Telegraph Codes Used: Bedford McNeill's
A B C 4th Edition, Moreing & Neal's.

BALTIMORE COPPER SMELTING AND ROLLING COMPANY

(The Baltimore Copper Works),
Office: KEYSER BUILDING,
BALTIMORE, MD.
Ingot Copper. Sheet Copper.

HIGH GRADE HOISTING ENGINES AND DRUMS.

We have some of the heaviest plants in the world in Iron, Copper and Silver Districts of United States.
OUR CORLISS ENGINES ARE DESIGNED EXPRESSLY FOR HOISTS.

Cable Address: "BULLOCK"

OTHER SPECIALTIES.
Diamond Core Drills.
Rock Drills and Air Compressors.
DENVER BRANCH:
925 17th Street.
M. C. BULLOCK MFG. CO.,
1170 W. LAKE STREET CHICAGO, U. S. A.