

THE ENGINEERING AND MINING JOURNAL



(Published Every Saturday at 253 Broadway, New York.)

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

VOL. LXVII. JUNE 24. No. 25.

RICHARD P. ROTHWELL, C. E. M. E., Editor. ROSSITER W. RAYMOND, Ph. D., M. E., Special Contributor. THE SCIENTIFIC PUBLISHING CO., Publishers.

subscriptions are PAYABLE IN ADVANCE For the United States, Mexico and Canada, \$5 per annum: all other countries in the Postal Union, \$7. REMITTANCES should be made by bank drafts, post office orders or express money orders on New York, payable to the Scientific Publishing Co.

Main Office: 253 Broadway (P. O. Box 1838), NEW YORK. Telephone Number, 3,095 Cortlandt. New York Cable Address—"ROTHWELL." (Use McNeill's or A. B. O. 4th Edition Code.) London Cable Address—"PULCHERRO."

Branch Offices: Chicago, Ill., 737 Monadnock Building, Phone 73 Harrison. Denver, Colo., Boston Building, Room 206. Salt Lake City, Utah, Atlas Building. San Francisco, Cal., 207 Montgomery Street. City of Mexico, 104 Ave. Madrid. Robt. S. Barrett, Manager. Victoria, B. C., Office, 28 Broad Street. Wm. M. Brewer, Manager. London, Eng., Office, 20 Bucklersbury, 368. E. Walker, Manager.

English subscriptions to the JOURNAL may be paid at the London office at the rate of \$7 = £1 8s 9d.; the publications of the Scientific Publishing Company may be bought at the rate of 4s. 2d. to the dollar. net.

CONTENTS.

Table listing articles and their page numbers. Includes 'Quick Work on the Mesabi Range', 'Iron Production in Russia', 'The Troubles in the Transvaal', 'Consolidating the Anthracite Trade', 'The Boston & British Columbia Company', 'Lead Production in 1898', 'A Model Prospectus', 'New Publications', 'Books Received', 'Correspondence', 'Dust Collection from Blast Furnace Gases', 'The Commercial Manufacturing of Liquid Air', '* Human Rays', 'Abstracts of Official Reports', '* Tilting Open-Hearth Furnaces as Ensley, Alabama', 'The Development of American Shipping', 'The Mineral Production of Iowa in 1898', 'Recent Decisions Affecting the Mining Industry', '* A Self-Dumping Mine Cage', 'Preparation of Metallic Tellurium', 'The Electro-Deposition of Palladium', 'Questions and Answers', '* Patents Relating to Mining and Metallurgy'.

Table listing various sections and their page numbers. Includes 'Personal', 'Obituary', 'Societies and Technical Schools', 'Industrial Notes', 'Trade Catalogues', 'Machinery and Supplies', 'Mining News', 'United States', 'Alaska', 'California', 'Colorado', 'Idaho', 'Maine', 'Michigan', 'Minnesota', 'Missouri', 'Montana', 'New Mexico', 'Pennsylvania', 'South Dakota', 'Tennessee', 'Utah', 'Washington', 'West Virginia', 'Advertisers' Directory', 'Wisconsin', 'Foreign', 'Markets', 'Coal', 'Slate', 'Chemicals and Minerals', 'Iron', 'Metals', 'Cleveland', 'Pittsburg', 'Philadelphia', 'New York', 'Gold and Silver', 'Prices, Statistics, Imports and Exports', 'Foreign Coins', 'Copper', 'Tin', 'Lead', 'Spelter', 'Antimony', 'Nickel', 'Platinum', 'Quicksilver', 'Minor Metals', 'Assessments', 'Dividends', 'Meetings', 'Mining Stocks', 'Market Reviews', 'New York', 'Boston', 'Salt Lake City', 'San Francisco', 'London', 'Paris', 'Toronto', 'Stock Quotation', 'New York', 'Philadelphia', 'Pittsburg', 'Baltimore', 'St. Louis', 'Boston', 'Cleveland', 'Butte', 'Colorado Springs', 'Denver', 'San Francisco', 'Rosalind, B. C.', 'Valparaiso', 'Salt Lake City', 'Spokane', 'Toronto', 'Mexico', 'Shanghai', 'London', 'Paris', 'Mining Co.'s, 'List of', 'Current Prices', 'Minerals, Chemicals, etc', 'Advt. Rates'.

Some extraordinary work is being done this year at the iron mines of the Mesabi Range. Thus our local correspondent reports on another page that at the Auburn Mine of the Minnesota Iron Company the output has been during June at the rate of 15 tons per shift per man on the ground. The ore from this mine runs about 64 per cent. iron, and is of Bessemer grade. At the Ohio Mine, which is an open-pit "steam-shovel" mine, at a recent visit our correspondent saw six cars, of 27 tons capacity each, loaded in 12 1/2 minutes, or at the rate of 13 tons a minute; and this was not exceptional work. There have been a number of foreign visitors in the Lake Superior region this year, and such work must open their eyes to American methods.

Russian iron and steel makers have been clearing high profits during the past year, owing to the large Government expenditures for railroad material and the determination to place those orders with Russian works as far as possible. It has been necessary, however, to go abroad for much of the material needed, and our American mills have had a fair share of the work. Such reports for 1898 as are published show profits running from 50 up to 80 or 90 per cent. on the capital stock. Under these circumstances it is no wonder that new capital from abroad is going into Russian works, and that production is increasing steadily. The railroad construction also aids in the expansion, as the new lines are furnishing transportation for new mines both of coal and iron ore which were previously inaccessible.

The situation in the Transvaal grows more serious, and there is a strong probability of an open rupture between President Kruger's government and Great Britain. In fact, warlike preparations are being made on both sides, though there is still a hope expressed that hostilities may be prevented. While the mining interests would naturally like to see British authority fully established over the country, immediate loss and destruction of property would be very great, and it is not unlikely that certain financial interests will exercise very strong pressure in favor of peace. A dispatch, said to be authentic, says that if war is declared the first move of the Boer forces will be a raid on the Kimberley diamond mines. It is not unlikely; and it is very probable also that some form of pressure or even confiscation may be brought to bear on the gold mining companies of the Witwatersrand. At any rate there is general excitement and confusion over the prospect, and at the best there may be a considerable check to production.

The announcement that Drexel, Morgan & Company had exercised their option to take 75,000 shares of Lehigh Valley stock owned by the Packer Estate draws attention to the degree to which the anthracite coal trade is becoming consolidated. Thus the Morgan banking houses in New York and Philadelphia now control the Lehigh Valley and the Reading, and practically the Erie; the Vanderbilts, while they do not absolutely control the Delaware & Hudson and the Delaware, Lackawanna & Western, have a sufficiently large holding in both to give them an effectual voice in the management; and the New Jersey Central is owned by interests in New York which are closely allied with both the others named. The so-called individual operators have been largely consolidated by recent changes, and the more important of them are now controlled by the same group. In all speculations as to the future of the trade, therefore, account will have to be taken of a probable unity of action and financial control which has been altogether lacking in the past.

A correspondent, in another column, calls attention to the prospectus of the Boston & British Columbia Copper Mining and Smelting Company, and points out the very wide discrepancy between its statements and the actual facts. Some exaggeration is expected in a prospectus, but in this case our correspondent shows such a disregard of actual conditions as appears to be more than mere exaggeration. It seems to show that those who are thinking of investment in the Boston & British Columbia Company and those who have already bought stock—as we are informed a number of our Boston friends have done—should at once investigate thoroughly the whole affair. The stock was introduced in Boston at a time very opportune for the promoters, when everything with "copper" in its name was salable, and it is believed that a good deal of it was sold.

British Columbia has many excellent mining propositions, and a great and flourishing industry is being built up there. We are very much pleased to see that our friends there are disposed to resent attempts to use the real wealth and advantages of the Province to aid the schemes of unscrupulous promoters. They understand clearly how the attempts of these people to boom their schemes injure the real interests of the country. The "Engineering and Mining Journal" is ready to do all in

its power to aid both in forwarding legitimate mining enterprise in British Columbia, and in exposing the fake schemes which are the worst enemies of honest industry and enterprise.

LEAD PRODUCTION IN 1898.

The revised figures of lead production, as prepared for "The Mineral Industry," Volume VII, show that the lead production in the United States in 1898 was the largest ever made. The output by districts is shown in the following table, the figures being in short tons of 2,000 pounds:

	1897.	1898.	Changes.
Southeast Missouri.....	34,255	35,769	I. 1,514
Coeur d'Alenes, Idaho.....	57,777	56,339	D. 1,438
Colorado.....	40,400	56,708	I. 16,308
Montana.....	12,897	19,702	D. 2,195
Utah.....	38,693	45,173	I. 6,480
Southwest Missouri and Kansas.....	5,440	6,245	I. 805
Other States.....	9,328	17,539	I. 8,211
Totals, short tons.....	198,790	228,475	I. 29,685
" metric tons.....	180,342	207,273	I. 26,931

The increase in production last year was chiefly from Colorado, Utah and the outside mines and smelters classified under "Other States." Montana showed a considerable relative decrease. In two of the important districts—the Coeur d'Alenes in Idaho and the soft lead district of Southeast Missouri—there were only slight changes. Colorado was in advance of all other districts last year, leading the Coeur d'Alenes, however, by only 369 tons. In the division of production we find that Colorado furnished 24.8 per cent. of the total; the Coeur d'Alenes, 24.7; Utah, 19.8; Southeast Missouri, 15.6; Montana, 4.7; Southwest Missouri and Kansas, 2.7, and the other States, 7.7 per cent.

In classifying the metal we find that by far the greater part—169,364 tons, or 74.1 per cent. of the total—was desilverized lead, or lead mined chiefly, or at least partly, for the silver values. The soft lead, carrying no silver, was 50,468 tons, or 22.1 per cent.; while the remainder—8,643 tons, or 3.8 per cent.—was hard or antimonial lead.

In addition to the lead made from domestic ores, there was a large quantity smelted or refined from foreign ores and base bullion. This is shown in the table below, in which the figures are again given in short tons, of 2,000 pounds:

	1897.	1898.	Changes.
Smelted from domestic ores.....	198,790	228,475	I. 29,685
" " foreign.....	92,117	89,209	D. 2,908
Total production.....	290,907	317,684	I. 26,777
Stocks, January 1st.....	13,024	31,161	I. 18,137
Total supplies.....	303,931	348,845	I. 44,914
Exported.....	60,262	78,168	I. 17,906
Balance for consumption.....	243,669	270,677	I. 27,008
Stocks, December 31st.....	31,161	23,088	D. 7,473
Approximate consumption.....	212,508	246,989	I. 34,481

The increase in the domestic production was accompanied by a decrease of 3.2 per cent. in the lead smelted from foreign ores or refined from foreign base bullion; so that the increase in the total supply of metal was 9.2 per cent. As in previous years the foreign ores and base bullion treated came chiefly—almost entirely—from Mexico and British Columbia. By far the larger part of this is refined in bond and the lead is exported. In 1898 only 12.5 per cent. of it was retained in this country. Of the total given as exported during the year we find that the quantity of lead from domestic ores was only 125 tons, while that of lead from foreign ores and bullion was 78,043 tons. A balance of 11,106 tons of foreign lead was either consumed in this country or added to the stocks on hand at the close of the year. The total increase in exports was large, amounting to 29.8 per cent., as compared with the previous year. Nearly one-fourth (24.6 per cent.) of the lead refined was sent abroad.

The large increase in the production of lead was accompanied by an equal or greater increase in demand, and at no time during the year was there any accumulation of stocks. The price showed comparatively narrow fluctuations; the average in New York in January was 3.65 cents a pound, and the monthly averages rose gradually to 4 cents in August. From that point there was slight decline, the December average being 3.76 cents. Since the close of the year there has been a steady increase, the January average being 4.18 cents, while that for May was 4.44 cents, with an increasing demand both in the United States and abroad.

A MODEL PROSPECTUS.

Long experience and the examination of a multitude of documents have taught us that the great majority of the prospectuses issued by new companies may be divided into three classes: **The fake prospectus;**

the prospectus intended to conceal the facts; and the prospectus which is honest enough in intention, but does not know how.

Of these three classes it must be confessed that the fake is often the most interesting reading. When one is not bound by any awkward limitations of facts, and truth is out of the question altogether, it is quite easy to make up an attractive story. With a little experience an account of a mythical mining property can be made to read very well. Assays and returns can be made to fit very plausibly, and we could even mention cases where the experts were invented and the reports of supposititious persons presented in great detail. The danger to writers of this class of documents is that they are apt to be carried away by their imaginations, and to present statements so extravagant that they will be at once suspected by anyone having any knowledge of mining at all. They are usually written, however, for people who have no such knowledge, and too often serve the purpose of the writers.

The second class is often divided from the first by a line so narrow that it may be difficult to define it. Usually, however, there is some basis of fact in this case, but it is kept in the background and the reader is treated to a profusion of glittering generalities, and accounts of everything except the mine or prospect in question. The subject of this kind of prospectus is generally a prospect only, and its object is to conceal the risks involved in the enterprise, and to present possibilities as certainties. There are many degrees of badness about this kind of prospectus, and it takes careful reading to discriminate among them.

Prospectuses of the third class are often very provoking to the reader. They may really have something to describe and may be honestly intended; but they are too often confused in statement and are apt to miss the vital points and omit just the information which is most needed. Unfortunately also this class of prospectus will often impress the reader much less than the others, and will fail where a dishonest one will succeed in finding a buyer for the stock of the company which issues it.

It is indeed a relief where one finds a prospectus which is what such a document ought to be; and it is so rare that it deserves special mention.

The pamphlet now before us is the prospectus of "Stratton's Independence, Limited," the London corporation which has recently been formed to buy and operate the Independence mine in the Cripple Creek District in Colorado. In this case the company takes the public very fully into its confidence; and no investor can hereafter claim that he did not know what he was getting when he bought stock, if he has read this prospectus.

Very sensibly all of the 62 pages of the pamphlet, except three pages explaining the organization and capitalization of the company, is given up to the expert's report on the property, made by Mr. T. A. Rickard. This report is here presented in full, and it is an admirable one, giving the fullest possible particulars of the past operations and present condition of the property. Mr. Rickard had two advantages; the mine has been worked and development carried out so far that it was possible to study its condition closely; and he is thoroughly familiar with the Cripple Creek District.

The Independence Mine is not a new producer, since the first shipments were made in 1891, and the total yield in gold from that time up to the close of 1898 was \$3,837,359, of which \$2,402,164—or 62.6 per cent.—was profit. The average grade of the ore at one time ran up to 6.88 ounces to the ton, and though it has fallen somewhat, it was 3.90 ounces gold in 1898. The ore production for 1898 was the lowest for any year since the first after the mine was opened, because production was almost entirely suspended, to give opportunity for extensive development, and the only ore taken out was that necessarily moved in the development work. Mr. Rickard considers that the high-grade ore now in sight is worth about \$6,700,000; and there are strong probabilities of the discovery of additional ore bodies.

We do not propose to give figures, however, but to say that the report is not satisfied with the mere statement of reserves in sight, but shows just how the estimate was made, how sampling and testing was carried on; and in short explains as nearly as may be the exact condition of affairs. The question of working expenses is also treated very fully, and the costs for a year are given with a great deal of detail.

There is also an interesting illustrated account of the geology of the mine and incidentally of the district. This is of importance as indicating the probability of further discoveries of value.

There is no mill to be passed on in this case, since the Independence, like most of its neighbors, ships all its ores, the higher grade to the Denver smelters, the low-grade to the local cyanide or chlorination works.

If such prospectuses as this, with reports from engineers of high standing, were more common, mining investments would be larger, and there would be less disposition to regard the purchase of such stocks as mere gambling. We would have gold and silver mining brought forward as legitimate business propositions, just as iron and steel making are. The sooner the dishonest or ignorant prospectuses disappear, the

better for the mining industry everywhere. The question of the capitalization of the company, that is, of the price to be paid by the investor for what the engineer says he can expect to get, we do not at present refer to.

NEW PUBLICATIONS.

"Proceedings of the Eleventh Annual Meeting of the Iowa Engineering Society: 1899." Edited by E. P. Boynton, Secretary. Cedar Rapids, Iowa; published by the Society. Pages, 160; illustrated. Price, 50 cents.

The Iowa Engineering Society, though smaller in numbers than some other State and local associations of the same class, has always been an active body, and the present volume of its "Proceedings" shows in its papers and discussions no lack of interest and progress. These include papers on Water Supply; Roads and Road Building; Paving Brick; Cement and its Uses; Map Making; Water Measurement, and other practical topics. Iowa is not a mining State, so that mining topics find small place, the clay and cement industries being the nearest approach. An excellent paper is one on the Metric System, by B. Schreiner, and it is interesting to find, in the discussion on this topic, that the adoption of the system was generally approved, there being very few dissenting opinions. A study of the Roads of Linn County, by J. H. Lary, furnishes some good texts for the advocates of road improvement, showing the value to the farmers of the expenditure on roads, which they are too often found resisting.

The Iowa Engineering Society has no reason to be ashamed of this volume of "Proceedings," and its members are evidently ready to make further improvements upon it next year.

"Steinbruchindustrie und Steinbruchgeologie" ("The Quarry Industry and Quarry Geology"). Von Dr. O. Herrmann. Berlin, Germany; Gebruder Borntraeger. Pages, 428; illustrated. Price (in New York), paper, \$3.25; cloth, \$3.75.

Books especially devoted to the quarry and its products are few in number, this field having been less attractive to authors, apparently, than coal and metal mining. General references to building stones may be found in geological works, and there are papers on special groups of building stones to be found scattered through technical papers and the proceedings of societies; but there is still plenty of room for new literature on quarrying. Dr. Herrmann has gone at his work with characteristic German thoroughness, though he has naturally devoted his pages largely to German practice, and especially to that of Saxony.

The volume is divided into three parts, the first treating of building stones and quarrying generally. This part contains a systematic description of the principal rocks, with their formation and composition, and the qualities of the constituent minerals. These are considered from a practical point of view, and their properties are carefully stated, the relative hardness, durability, resistance to weather and other points affecting the utility in construction being pointed out. The relation of chemical composition to physical qualities is treated at some length. In this section also a good deal is said of the laying out and working of quarries, the best methods of treating different varieties of stone, and the machinery and appliances used. There are also sections on stone dressing, on slate quarrying and manufacture, on the utilization of waste, the preparation of stone for road-building and similar matters. Much space is given to the working and polishing of the harder stones—granite, porphyry, marble and the like—and their uses in building and ornamentation. In this connection attention is called to the importance to which the quarry industry has attained in Sweden and Norway, especially in these harder stones. The deeply colored granites and diorites from the Scandinavian quarries are now found all over Germany and have been used to much advantage in many important buildings.

The second part is devoted especially to the quarry industry in Saxony, and is therefore chiefly of local interest. It appears to cover the subject very thoroughly.

The third part is exceedingly convenient for reference. It gives a general catalogue and description of stones used for building, arranged in parallel columns, one giving the mineral composition and geographical details, the other the industrial and commercial facts. These descriptions are in condensed form and convey a great quantity of information in a small space. We do not know of any compilation of the kind which has been so carefully made and so thoroughly worked out. Its chief defect for us is the small attention given to special American stones, though, of course, there is much that applies to our building stones as well as those of Europe. It may be added that this criticism applies to all parts of the book, American practice finding little space, and European—especially German—methods being those described and considered. This was to be expected, however, considering the authorship of the book.

In addition to the sections mentioned there is a long list of references to books and papers on quarrying and economic geology. The list is chiefly of German works.

The book will be useful to architects and engineers, as well as to builders and quarrymen; and it is an acceptable addition to technical literature.

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.

"Iowa Engineering Society: Proceedings of the Eleventh Annual Meeting, 1899." Cedar Rapids, Iowa; Published for the Society, E. P. Boynton, Secretary. Pages, 192; illustrated. Price, 50 cents.

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 will only be published when so requested. Letter should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

The Arizona Copper Syndicate, Limited.

Sir.—I have inquiries from the east regarding the Arizona Copper Syndicate, Limited, which state that I had reported on this property "that the Syndicate's several mines are an extension of the great Humboldt vein." As I do not know this so-called syndicate and have never been employed by them, I never made any such statements.

For the benefit of the public I trust you will take note of this. From what I can learn of them they are a second edition of the Spensazuma bubble.

Tucson, Arizona, June 11, 1899.

W. R. Wemple.

Battery and Tailings Assays.

Sir.—I notice in your issue of June 3d a query from J. W. M. in regard to differences between battery and tailings assays and resultant values obtained. I would suggest that in all probability a great part of the difference lies in the weight of ore milled; there are, I think, few mills where the supply is so regular in hardness, toughness, etc., as to make the amount milled hourly a constant, and, were such the case, in how many mills is the ore weighed and moisture determined? Still, without these refinements I cannot see how J. W. M. is going to get over his trouble; or a similar one of my own, of having a higher output than my tonnage and assays demanded.

San Francisco, June 11, 1899.

E. G.

Placer Mining in the Tropics.

Sir: I shall be much obliged if you can give, or put me in the way to get, information concerning machinery for alluvial washing here. The conditions of the country are as follows:

Country, flat; hills cut by denudation 50 to 100 ft.; no fall to get head of water or rid of tailings therefore head of water and tailings delivery must be controlled by steam. Except in working the hillsides, there is not sufficient fall to work a flume except by building trestles and using a pump to elevate. Labor is indifferent (colored), and expensive, therefore a plant is required to be easily transported and moved.

Bedrock is the deposit of the decomposed country rocks, chiefly diorite. The country is thickly timbered, but the timber as a rule has little value, either as lumber or for firewood. In working along the hillsides, I presume it would be necessary to fell the trees, using them for firewood, and burning the tops and underbrush. The climate is tropical.

My proposal of working would be by means of the most portable and sufficiently powerful pump to wash down flumes cut in the clay bedrock, to a grizzly, which would separate the float quartz which usually runs well in gold; then into a horizontal cylinder—a kind of trommel—either revolving or with revolving arms, which would disintegrate the clay and further separate the coarse gravel; then over a table, the tailings being disposed of by means of an elevator (steam) or a centrifugal pump.

I am anxious to learn: 1. What would be the best pump to work the giants, the plant to have a capacity of say 500 cu. yds. per day; also the amount of water required.

2. The best form of cylinder, trommel or a puddler.

3. The best form of table.

4. The best method of handling the tailings. Would the stumps of the trees in the ground be an obstacle to the effective working? The roots are only about 1 to 2 ft. below surface, and do not go down.

5. In sluicing down the flumes cut in the clay bedrock, would gold get driven into the clay and so be lost?

6. What would be the boiler capacity required for the whole plant? If some such method as I have outlined can be proved successful, there is a large field here, the alluvial ground being undoubtedly good, and the present methods expensive and primitive.

You are quite right in the remarks you make in the "Engineering and Mining Journal" of April 1st, to a correspondent about the Guianas. I have read also with much interest the article on platinum washings in Russia in yours of March 25th.

I have endeavored to make the conditions explicit in as few words as possible, and I shall be very glad of any information you may be able to put me in the way of.

E. F. H.

[Our correspondent outlines a system of mining which appears to him to be well suited to the conditions. We should be much pleased to have any of our readers who have had experience in placer mining, or who manufacture machinery for such purpose, answer the questions put, or suggest methods of working.—Editor E. & M. J.]

An Opening for American Refining Works.

Sir: I wish to call attention to an important opening which is presented to the smelting and refining works of the United States, and has come recently under my personal observation. I refer to the copper mattes carrying precious metals, which are now generally shipped from South America to England or Germany for treatment and refining. We know that Chile ships every year large quantities of copper and copper ore, as well as matte; Peru and Bolivia ship silver and gold as well as ores. It is not so generally known that from the western part of the Argentine Republic there is shipped some 3,000 tons yearly of matte high in silver and gold. The charge of the German and English refiners for treatment is \$25 to \$40 a ton, and a moderate reduction on their rates would enable American establishments to secure the business.

Having had experience in smelting and refining works, and having recently spent much time in the country on both sides of the Andes, I venture to say that I understand thoroughly the profit in this business,

and the way in which the trade can be handled. The country presents peculiar advantages for the trade. Besides the large and well-known mines, there are many small mines worked by companies or partnerships, and many small smelting works scattered through the country. Recent railroad extensions make shipment to the coast—the Atlantic for points east of the crest of the Andes, and the Pacific for points west—easy.

In purchasing mattes it is usual to take first the gross value of copper, silver and gold contained; then to deduct: 1. An agreed percentage for losses in handling and refining. 2. Cost of smelting and refining. 3. Freight, storage, loading and insurance. 4. Merchants' and brokers' commissions. On Argentine mattes the usual rates are 3 to 4 per cent. for losses; 3 per cent. merchants' commission; 1¼ per cent. brokerage. The Buenos Aires bankers charge 2 per cent. quarterly for advances on mattes. The average grade of Argentine matte by assay is 30 to 45 per cent. copper, 40 to 60 lbs. silver and 1 to 3 oz. gold per ton. The silver ores (concentrates) shipped from Buenos Aires run from 20 lbs. up to 50 lbs. and sometimes as high as 100 lbs. to the ton.

In many cases the buyers of ores and matte go directly to the mines and smelting works and buy the ores and mattes. This is the most profitable way of doing business, if it can be done properly; but it requires, besides technical knowledge and ability to sample and assay, a knowledge of Spanish and plenty of patience. Business with miners living in the foothills of the Andes has its rough side; and a successful buyer must learn thoroughly the peculiarities of the people. He must accommodate himself to their ways, establish friendly relations with them, and gain their confidence. When this is once done he has many opportunities for profit. The miners and smelters, as a rule, are always poor, and are willing to make large reductions for cash payment. They much prefer this direct dealing to the slow process of shipping and waiting for returns.

At the present time ores and matte can be shipped to New York from Buenos Aires at about \$6 per ton; from Valparaiso at \$10 to \$11 per ton.

I hope this letter may draw the attention of smelters and refiners to the excellent opportunities for profit presented by this South American trade. If they investigate the business, I believe they will be ready to engage in it, since there is no doubt that such work is now done more cheaply in the United States than in Europe.

Perth Amboy, N. J., June 2, 1899.

Charles Picard.

The Boston & British Columbia Company.

Sir:—I want to call your attention to the prospectus of a concern called the Boston & British Columbia Copper Mining and Smelting Company, issued recently under the auspices of some adventurers who spent a few months last year in the Revelstoke Division of British Columbia. They succeeded in getting a little money—about \$3,000—with which to make the first payment on a bond on a claim or group of claims known as the Standard, in the Standard Basin above Revelstoke. The claims are very fair, but quite undeveloped prospects; perhaps 100 ft. of work having been performed upon them, with the result that a ledge of copper ore said to be 4 ft. wide has been exposed, but so far as I can ascertain the value of the ore-body has not been tested by assay. On the strength of a bond on this prospect the company above mentioned, with a capital of \$3,000,000, has been promoted in Boston, and judging from the prospectus, is as bare-faced a fake as has ever been perpetrated. We are told that this corporation is formed under the laws of the State of Maine and registered in the Province of British Columbia, but I took the trouble to enquire at the office of the British Columbia Registrar to-day and was informed that no such company as the Boston & British Columbia Copper Mining and Smelting Company had been registered there. Meanwhile I send you the following extracts from the prospectus, which I think you will agree are quite unique in their way:

"This company owns the valuable copper properties known as the Standard Group of copper mines, consisting of seven full claims. . . . There are five distinct parallel copper ledges running through these claims; the narrowest ledge averages 14 ft. in width and the widest ledge at the Standard Mine will run from 45 to 75 ft. in width. There are about 3½ miles of copper lode matter on this property owned by the company.

"A large amount of money has already been expended on development work. . . . Present development in the tunnels, shafts, crosscuts and winzes discloses several huge veins of mineral of great value in copper.

"The ore bodies have been thoroughly sampled on the surface, and in the different levels as the work has progressed, and the value of copper to the ton of ore has been learned from time to time by assays and mill tests, and you will notice by reference to these assays, tabulated herewith, that the veins and lodes grow richer in copper as depth is attained. [Then follow assays varying from 7 to 75 per cent. copper.]

"In computing the value of the copper in the above tables, copper has been figured at 19c. per lb. . . . The quality of the copper is excellent, being peculiarly ductile, and equal, if not superior to any copper produced elsewhere.

"The numerous assays and mill tests amply demonstrate the fact that 100 tons of average ore will produce at least 12 tons of metallic copper, at present prices worth \$4,200. It is expected to work about 100 tons per day at first, and to largely increase the amount. It can be mined, transported to the company's reduction works and treated for \$5 per ton. Our by-products will pay all expenses, leaving the ingot copper produced net profit. A profit of \$4,200 per day is \$1,500,000 a year, and capable of great increase in proportion as the plant is enlarged, is entirely reasonable from the beginning and absolutely assured.

"Copper mining is one of the safest and most profitable industries in America. One need only call attention to prove this statement to the Calumet & Hecla, the Anaconda, the Boston & Montana, the Parrot, the Osceola, the Quincy, the Tamarack and the United Verde Copper Mines. The enormous dividends paid by these corporations and many other copper properties are well known.

"One may fully understand what the mineral showing on the properties owned by this company means when the fact is set forth that the ores of the greatest of all the copper mines in America average not over 4 to 5 per cent. in copper. . . . Contrast these facts with the enormous ore bodies in the Standard Group of copper mines owned by

this company. Our Mr. George W. Beach, the well known mining expert, of British Columbia, in his report to the directors of this company makes the following important statement: 'The Standard Group of copper mines has every evidence of being a magnificent copper proposition. The ore shoots are permanent and when sampled in the deeper levels show a higher percentage of copper and gold values than on the surface. From actual measurement I have computed that there are 750,000 tons of copper ore in sight.'

My only comment on this is that no reference is made in any way to the Standard Group of claims in the recently published "Report of the Minister of Mines of British Columbia for 1898," an omission that would not have occurred had the property possessed any claim to particular merit, and that, as I have already led you to suppose, the prospectus is one tissue of misstatements and absolute untruths from beginning to end. In the interests of legitimate mining it is to be hoped that if there is a law in the United States that can be applied in cases of this kind, those responsible for this bubble will be prosecuted and suitably punished.

H. Mortimer Lamb,
Managing Editor Mining Record.

Victoria, B. C., June 13, 1899.

DUST COLLECTION FROM BLAST FURNACE GASES.

An appliance intended to arrest a considerable portion of the dust drawn along by the gases has been fitted to one of two blast furnaces lately reconstructed at the Chiers Ironworks, at Longwy, France. The principle of the arrangement consists in throwing down the dust by a sudden change in the direction given to the gaseous current that is deflected upon a liquid surface, water for instance, that can absorb the solid particles which by virtue of their vis viva remain there, while the molecules of gas partially purified rebound. In this case there are three changes of direction, in addition to one where there is no liquid, just after the gases leave the furnace, in a cylindrical-conical funnel, towards the base of which terminates the gas off-take. The gases strike the bottom and escape up the annular space between the inlet pipe and the cylindrical portion of the dust trap on their way to the top of the main purifier. The latter consists of a rectangular chamber, about 1.5 meters high, divided into three compartments by partitions parallel with the short sides; and its bottom, containing water, has the form of an inverted truncated cone, which is fitted with an internal sully valve for taking off the dirt deposited. The gas enters the first compartment by a vertical pipe provided with safety valves at three points in its height; and the gas, charged with dust, strikes the surface of the water and rises in a similar pipe, to re-descend in the same manner in the next compartment. After these three changes of direction the gas current is divided, part going to the boilers, and part to the hot air stoves, which with this arrangement only require cleaning once in six months. A very similar device is said to be used at the John Cockerill Works at Seraing, Belgium.

PETROLEUM IN RUSSIA.—The production of petroleum in the Baku District in Russia for the three months ending March 31st is reported by the London "Petroleum Review" at 2,219,290 metric tons. The total number of wells in operation at the end of the quarter was 942. As compared with 1898 there was an increase of 16,590 tons in production.

UTILIZING SMALL HEADS OF WATER.—According to a French contemporary, while American engineers do not utilize falls of less than 80 cm. (2½ ft.) for driving turbines, their French colleagues turn to account falls of even 10 cm. (4 in.), because at Maquens, near Carcassonne, a "turbulette" working with this slight column of water develops a power of 9 kgs., raising the water to the height of 35 m.; and at Aix-en-Savoie water is raised to the height of 55 m. (180 ft.) with an available fall of only 25 cm. (10 in.). At Toulouse a turbine working with a column of 50 cm. yields a force of 15-horse-power. In order to obtain good results all that is required is to arrange that the turbine be constantly under water.

SAULT STE. MARIE CANAL TRAFFIC.—Reports of canal commerce at Sault Ste. Marie (both Canadian and United States canals, representing the entire freight movement to and from Lake Superior) show a total of 2,908,068 net tons of freight moved east and west to June 1st, this year, as against 3,372,374 tons on the same date a year ago. The decrease of 464,279 tons is not large in view of the late opening of navigation and the Buffalo freight handlers' strike. The mineral freight items compare as follows:

	1897.	1898.	1899.
Copper	23,984	26,790	10,852
Iron ore	890,205	1,824,595	1,619,344
Coal, bituminous	339,389	576,009	317,201
Coal, anthracite	52,960	62,821	128,789

Of the total freight this year 2,365,806 tons were east-bound and 542,262 tons west-bound.

CEMENT IN POLAND.—According to the London "Chemical Trade Journal," the high prices for cement ruling at the end of 1897 were maintained during the year 1898; even at the close of the building season the demand was very considerable. The demand in Germany was caused by a new law which came into force in that country in 1898, by which every German town with a population of over 10,000 must be drained. Thus Germany actually became a market for Russian cement, whereas in former years some 15,000 barrels of cement were imported annually from Germany to Russia. The German syndicate of cement works on the one side, and the cement works in Russian Poland on the other, have now entered into an agreement by which they mutually bind themselves not to export any cement during 1899. Should this arrangement be found advantageous for both sides it will be further prolonged. Of the new cement works which are building in Poland only one has actually started operations. The total production of cement in Poland is about 8,000,000 poods, or 146,000 short tons.

HUMAN RAYS.

Written for the Engineering and Mining Journal by Ottokar Hofmann.

I have discovered the very interesting fact that the human body emits rays which act on a sensitive photographic plate. There is a distinct difference in the property of these rays and that of light. They pass through certain opaque substances, while to others they impart their vibration; and these substances in this condition then act on the photographic plate. Before giving a description of my experiments I will mention that it seems that not all persons emit rays of the same chemical energy. Some persons whom I tried produced a strong, while others only a faint impression on the film and others even none at all. But it may be that, had I tried these same persons the next day, the result would have been an entirely different one, because I made the observation on myself that at different times there was much difference in the chemical energy of the rays emitting my fingers. What causes these differences I do not know, but these rays being produced by the functions of our organic system, it is not improbable that these differences occur in connection with the regularity and irregularity of these functions. However, my experience in this direction is too limited to justify the expression of a positive opinion.

I filled a developing tray a little over half with developing solution and placed a sensitive photographic plate in it with the film up. This was done in perfect darkness without the use of a developing lamp. (The developing solution consisted of: Metol, ¼ oz.; hydrochinon, ¼ oz.; water, 80 oz.; sulphite of soda, crystals, 4 oz., and carbonate of soda, crystals, 2½ oz.) Then I put the tips of my fingers into the solution and kept them for 10 minutes as close as possible to the film. After this the plate was put us usual into the "hypo" solution. When taken out the negative showed five distinct black spots on the plate, Fig. 1. This showed that a chemical reaction took place, but it did not give any

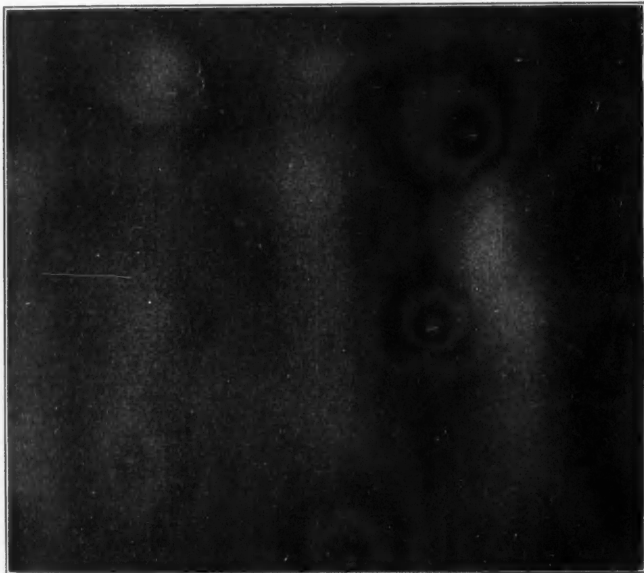


FIG. 1.

HUMAN RAYS.

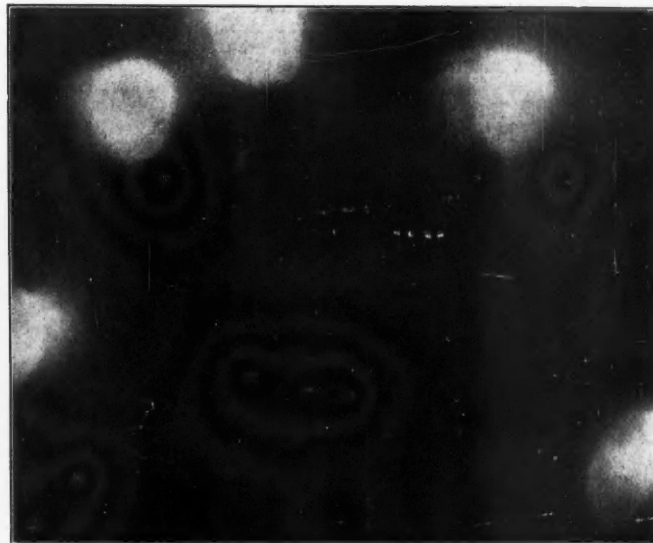


FIG. 2.

information as to the nature of this reaction, whether it was caused by a chemical reagent like hydrogen sulphide, which the body emitted, or by rays, especially as it was difficult to keep the fingers close to the plate without touching the film occasionally.

In my next experiment I put the plate in the tray with the film down and resting on the four little buttons with which the bottom of the tray was provided. Then I pressed the back of my four fingers gently against the plate and kept them in position for 10 minutes. The result was a quite distinct image of my fingers on the film. See Fig. 2. In this case the reaction on the silver compounds of the film was apparently produced through the glass, still the possibility was left that hydrogen sulphide may have been absorbed by the liquid, and being so very diluted, may have acted only on those parts of the film which were warmed by the touch of the fingers.

Next I soaked a plate for 5 minutes in the developing solution, then took the plate out, held it in one hand and pressed the fingers gently against the glass side of the plate. There was again the image of the fingers impressed on the film. This was nearly conclusive that the reaction took place through the glass, but there was still the faint possibility left that hydrogen sulphide emitted into the air acted more readily on the warmer places of the film.

I now soaked again a plate for 5 minutes in the developing solution and pressed the plate with the film against the rim of a cut glass vase. The soft film closed the vase hermetically. Then I placed the fingers on the back of the plate for 10 minutes, and obtained a very distinct imprint of the fingers. See Fig. 3. During the operation the plate was sliding a little on the rim of the vase, as can be seen by the photograph, but nevertheless the inside of the vase remained perfectly closed, so that no air could enter the same while the experiment was performed. It can be seen that the part of the fingers within the rim of the vase is just as plainly imprinted as the part outside of it.

The result of this experiment convinced me that the reaction on the silver compounds of the film was caused by rays and not by any chemical reagent.

Then I tried the effect of the rays when intersected by different substances. I placed a silver dollar on the glass side of the plate, the dol-

lar being covered by the developing solution, and held two fingers during 10 minutes on the metal. The result was a distinct impression of the dollar without giving any detail of the stamp of the coin. The fingers touching the coin were not imprinted on the film. See Fig. 4. This indicates that the rays did not pass through the metal, but that their vibration was imparted to the metal, which then acted on the film. Then I placed, also on the glass side of a plate, two silver dollars and touched one of them. The result showed that the image of the dollar which I touched was imprinted on the film, while the other did not act at all. Next I tried a plate of fine silver 1/32 in. thick, 2 in. wide and 3 in. long and touched the same with three fingers. Though the silver plate was thin, the tips of my fingers were not impressed on the film, but an imprint of the whole plate was plainly visible. The impression, however, was not as strong as that obtained with the dollar, indicating that the force of the rays may be in proportion to the surface of the metal. Then I experimented with a round plate of lead of the size and thickness of a silver dollar. The result was the same as obtained with the coin, only that the imprint was fainter, suggesting that not all metals are equally affected by the rays. In order to investigate if these rays can be conducted for some distance through the metal, I had soldered with lead to the center of the round lead plate a lead rod ¼ in. thick and 10 in. long. The soldering was done with lead to avoid the formation of a galvanic current by the contact of two different metals. I bent the rod about 4 in. above the lead plate, held the bent part of the rod in my hand and kept the metal 10 minutes on the glass side of the photographic plate. The shape of the metal was not imprinted on the film, only a few irregular spots where the metal rested were visible, but it could be plainly seen that an action took place over the whole film. The negative became dark.

In my next experiment I placed again a photographic plate in the tray with the film down. Then I took the hard rubber tray in my hand and placed my fingers on the outside of the bottom of the same and held them in position the usual time. The result of the experiment was a

plain imprint of my fingers on the film. As the plate rested on the four little buttons of the bottom of the tray, the rays therefore passed through ½ in. thick hard rubber and a sheet of solution.

Comparing the results of the experiments, we find that by placing the fingers on the rubber or glass we obtain the image of the fingers, while if we place them on a metal we do not obtain the image of the fingers, but that of the metal we touched. Though the information obtained by these few experiments is very limited, the results seem to indicate that the human rays have the property of passing undisturbed through a material which is a non-conductor of electricity (rubber, glass), while they communicate their vibration to a conductor of electricity (silver, lead), which then acts as such on the film.

During my experiments I observed some phenomena which were rather puzzling on account of the irregularity with which they appeared. For instance, it happened sometimes that the film melted away from some of the places where the fingers touched the glass, leaving the same bare in the shape of the fingers. The gelatine was then found adhering to the bottom of the tray in exactly the same position as the fingers were touching the plate. This happened sometimes and not at others, even if I used in both cases developer of the same temperature and touched the plate during the same number of minutes. I attribute the melting away of the film to the effect of the temperature of my fingers. Still, I had it also happen when I placed the fingers on the outside of the bottom of the tray, and it is not easy to see how the heat of the fingers could have passed through such a non-conductor of heat as rubber and through the solution during the short time of 10 minutes.

Again I observed that occasionally the places touched with the fingers assumed on the film a metallic luster. In one instance it happened that the whole plate was converted into a mirror, while, if held against the light, the dark imprint of the fingers could be plainly seen.

Using distilled water instead of the developing solution, I did not succeed in getting an imprint on the film; nor did I when I touched a dry plate and then placed it in the developer. In experimenting it is well to change frequently the developing solution.

My discovery undoubtedly opens a very interesting field for investigation for the physiologist.

THE COMMERCIAL MANUFACTURE OF LIQUID AIR.

According to a very interesting article in "Engineering News"—a periodical which has followed very closely the various experiments made with liquid air—a plant capable of producing liquid air on a commercial scale will be in operation in New York in a short time, and will have an estimated capacity of 1,500 gallons a day. From the description of the new plant we quote below.

The works are the property of the General Liquid Air and Refrigerating Company, of New York. This company has been organized to control the inventions of Messrs. O. P. Ostergren and Moritz Burger, relating to the liquefaction of air. It has secured patents in the United States, and in a number of foreign countries, and it has built and has now ready for operation a plant for the commercial production of liquid air on a scale sufficiently large to demonstrate the efficiency and value of its process.

It may be said in the first place that in principle the plant is merely a steam-power refrigerating plant, utilizing the expansion of compressed air to produce a low temperature, and causing this cold air to react upon itself, utilizing a different principle, as they claim, from that of the Tripler or the Hampson apparatus, until a temperature is reached so low that liquefaction occurs.

The steam is furnished by three vertical fire tube boilers, of 75 nominal horse power each. These deliver steam at 150 lbs. pressure to two independent, two-stage horizontal straight line air compressors, built by the Ingersoll-Sergeant Drill Company, of New York City. One which may properly be termed the low-pressure compressor, has a 16 by 18-in. steam cylinder, an 18½-in. low-pressure cylinder, and a 12-in. intermediate air cylinder. These are connected by the first intercooler. The large low-pressure cylinder is in reality a vacuum cylinder, and in this the maximum pressure is never more than the atmosphere, or 15 lbs. The air leaves the second cylinder at 60 lbs. gauge pressure, and passes through the second intercooler to the low-pressure cylinder of the second compressor. This has a 22 by 24-in. steam cylinder, low and high-pressure cylinders 7½ and 7 in., respectively, in diameter.

The third compressing cylinder delivers the air into the third intercooler at a pressure of 300 lbs., and from it the air enters the high-pressure cylinder and is raised to 1,200 lbs. pressure. The air then passes to the aftercooler. In this, as well as in the intercoolers, the operation is simply to extract the heat which has been generated by the compression of the air by passing the air over water-cooled tubes.

So far the operation is identical with that of any ordinary four-stage air compressing plant. It is from this point on that the special apparatus for purifying and refrigerating the compressed air comes into play. Continuing the circuit from the aftercooler, the air enters at the base of a tall separator, whose purpose is to remove all moisture, oil, dust or other impurities from the compressed air, an operation quite essential to prevent the liquefier becoming clogged with ice and grease. As it enters the separator the compressed air meets a perforated disk, which breaks the incoming current up into a large number of fine jets. These bubble up through a column of water which washes the air and extracts from it all grease or other impurities which it may have accumulated in its journey through the compressors, intercoolers and piping. Breaking from the water surface, the level of which can be maintained by means of a blow-off pipe, the air rises towards the top of the separator and strikes a series of conical baffle plates, between which it zigzags.

Just beyond the outlet end of the separator is a pressure regulating valve, whose duty is to let the compressed air pass by at a constant pressure, so that it will enter the liquefier in a constant and steady stream. From the far side of this valve a small pipe is carried to the automatic governor of the steam end of the high-pressure compressor to insure its proper action.

Passing on the air enters the header of the brine or cooling tank. The header has an inner tube, which is small enough to considerably increase the velocity of the entering air, and at its lower end is provided with a small inverted conical, nozzle closing receptacle, known as the "supplementary moisture collector." The air passing through the small tube with increased velocity projects into the nozzle any moisture which may have passed the separator, and then passes up between the small tube and the header. Radiating from this header and winding spirally inward towards the center of the tank, is a series of flat coils, all of which terminate in a second header, from which the air pipe leads to the liquefier. Beginning at the center of the tank and winding outward in the reverse direction, is a similar and duplicate set of spiral tubes which terminate in an outside header. This second set contains the expanded air returning from the liquefier. The cold expanded air in passing through the coils is in close proximity to the entering compressed and warm air.

The principal part of the system and, of course, the one to which the most interest attaches, is this liquefier, which consists of two portions, the upper and larger or the liquefier proper, and the smaller and lower portion called the aftercooler, which contains the reservoir for the liquid air and plays a very important part in the proper working of the system. The upper portion is filled with two sets of coils of small copper pipes which are wound in flat spirals in reverse directions, that is, those for the entering air spirally inward to the central of the header, and the other set starting from the outer section of the breaker and spirally outward to an outside header. A fundamental difference exists between the brine tank and the liquefier in the fact that the tubes of the latter are soldered together in vertical rows, thus forming a spiral space from the outside to the inside, or vice versa. In other words, it is as if a solid flat strip of 40 tubes were wound in a spiral. Connected with the space which surrounds both sets of tubes is a large exhaust pipe leading to the suction end of the first cylinder of the low-pressure compressor, already mentioned, whose function it is to exhaust the air from this space and the interior of the aftercooler, as will be explained later.

The aftercooler consists of a central chamber closed by a heavy cast-iron inverted cup, resting on a knife-edge turned on the top of the reservoir, and a siphon tube dipping to the bottom of the reservoir and winding around the cup and cover, and finally emerging to the outside of the supporting casing of the apparatus. This is all enclosed in an

air-tight casing which is connected to the spiral space of the liquefier, and hence to the vacuum pump.

At the lower extremity of the central header of the liquefier, and at the top of the aftercooler, are two similar valves, both operated by separate valve handles from the outside of the apparatus.

The air, at a pressure of about 1,200 lbs., and a temperature equal to that of the brine tank, say 50 or 60° F., flows into the outside header, and round and round through the spiral tubes towards the central chamber, and finally through the expansion valve into the small space below. This valve is so adjusted as to throttle the flow and keep the difference of pressure between the two sides of the valve at approximately 900 lbs. This drop in pressure, and consequent expansion cools the air a certain amount. This cooled air now passes upward in the outer portion of the central header and starts in its spiral course outward, the tubes in which it is confined being in close metallic contact with the entering air tubes. No matter how small the difference in temperature may be, the entering air will in consequence lose some of its heat to the outgoing cooler air, and will thus arrive at the expansion valve at a slightly reduced temperature only to expand and produce a further drop in temperature, which in its turn still further cools the entering air. This accumulative cooling continues until eventually the critical temperature of air is reached. Then, and then only, a portion of the air passing through the expansion valve liquefies and collects in the small chamber over the second or aftercooler, or reservoir valve. That portion which does not liquefy, which is, however, intensely cold, of course passes into the cooling tubes as before.

From what has been said it will be seen that the air once taken into the system is used over and over. There is, of course, need for new air to take the place of that liquefied, and this is drawn in from outside through the cleanser and a suitable automatic valve. This cleanser consists of an inlet tube coming from the roof of the building, and extending down to the bottom of the containing tank. From the bottom of the four arms, the air bubbles out and up through water to a coke filter, where it is thoroughly scrubbed. It is also subjected to a water spray, after which it remains in the upper portion of the tank until needed by the system, when it is drawn into the vacuum cylinder.

Returning to the liquefier again, it will be seen that opening the aftercooler valve allows the liquid air to pass into the reservoir below, where at first it will immediately volatilize, owing to this portion of the apparatus being warm. This will produce in the reservoir sufficient pressure to lift the heavy inverted cup and permit the intensely cold air to flow out into the vacuum space of the aftercooler, and thence through the spiral space of the liquefier. At the same time a portion of the cold air will pass through the coiled siphon tube and out the draw-off valve. Soon the parts of the aftercooler become sufficiently chilled, and the liquid air passing through the lower valve remains in a liquid state. The heavy cap is so proportioned that there is a pressure of about 6 lbs. per sq. in. on the liquid surface, and this is sufficient to force the liquid air through the siphon tube and out of the faucet. We then have the following condition of affairs:

The reservoir is partially filled with liquid air, as is also the coils of the aftercooler, and the space surrounding the tubes is constantly being exhausted, so that whatever liquid air or vapor air may spill over when the inverted cap lifts is instantly evaporated in and around these filled tubes, thus further reducing the temperature of the air about to be drawn off; the vacuum spiral space surrounding the tubes of the liquefier is constantly having the intensely cold evaporated air passing through it and the temperature of the whole apparatus is therefore being gradually reduced towards some minimum, which so far as present indications go is remarkably near absolute zero. In fact, judging from results obtained the first time the plant was operated to test the compressors, etc., it may be expected that air will be actually solidified.

The same test seemed to indicate that the brine tank is superfluous, and it was found that the entering and leaving air and the liquefier casing were at practically the same temperature.

To readers who have followed the above description of the air liquefying process, it will be apparent that its efficiency, or the quantity of liquid air produced for a given expenditure of power, depends primarily upon the amount of refrigeration which is effected in the expansion of the air through the contracted orifice of the expansion valve from a pressure of 1,200 lbs. to a pressure of 300 lbs. The cooling which is effected in such an expansion from ordinary atmospheric temperatures, when the expansion takes place in a cylinder against a piston, is, of course, known with fair accuracy; but what the cooling may be when the expansion occurs through a nozzle and the jet of air at high velocity performs more or less internal work which tends to restore its original heat, is something as yet unknown, and which can only be determined by careful experiment.

Such preliminary tests as have been made with the above apparatus, however, indicate that the refrigeration due to the expansion under the conditions existing in this apparatus, is much greater than such empirical formulas as have been heretofore relied upon have indicated. The results of complete and accurate tests to determine the product of liquid air per horse-power hour in this apparatus will therefore be awaited with interest.

HEAVY RIVER TRAFFIC.—The report of traffic on the Monongahela River above Pittsburg in May shows that 16,172,200 bushels of coal were brought down the river through lock No. 1. Lock No. 2 has even a better record, as 17,046,000 bushels of coal were brought down the river through it. Most of this is included in the amount taken through lock No. 1. The difference of nearly 1,000,000 bushels, the coal from the mines between the first and second locks, was consumed by the many large works and factories along the river in the First Pool, thus making the amount of coal brought through lock No. 1 smaller than the amount taken through lock No. 2.

During the month 6,800 tons of steel rails were brought down through lock No. 1. The movement of lumber was quite brisk, a total of 1,500,000 feet having been taken up through the first lock. In the line of general merchandise 3,374 tons were taken up the river through lock No. 1 and 749 tons were brought down.

ABSTRACTS OF OFFICIAL REPORTS.

Dominion Coal Company, Limited, Nova Scotia.

The report of this company covers the year ending February 28th, 1899. It is unsatisfactory, because it does not give the quantity of coal mined or sold, the gross earnings, nor the mining costs. It deals only with the net financial results.

The company owns a large coal estate on the Island of Cape Breton, Nova Scotia. The capital is \$2,000,000 preferred and \$15,000,000 common stock, and there are \$2,935,000 mortgage bonds outstanding. The funded debt was reduced during the year by the payment of \$58,500 bonds; and at the end of the year there was \$125,000 in the sinking fund.

The accounts show that the net returns from coal and transportation for the year were \$679,305, from which \$52,527 must be deducted for renewals and extensions at mines, leaving a balance of \$626,778. The payments from this balance were: Interest on bonds, \$176,100; sinking fund, \$57,210; miscellaneous interest, \$20,208; dividends on preferred stock, (8 per cent.) \$160,000; charged off for depreciation and additions to property, \$144,588; total \$558,106, leaving a balance of \$68,672 carried to general surplus. The total balance of this surplus account at the end of the year was \$368,702.

The chief items of additions to property were for the new pier at Sydney, \$46,922; banking trestle for winter work \$31,956; railroad extension and new equipment, \$26,338; new briquette plant, \$5,328.

The report of the directors says: "The increasing business of the company made it advisable to build an additional pier at Sydney, which has been done and charged to surplus for the year. It was also deemed advisable to provide increased facilities for banking coal during the

a balance of £16,821. From this a dividend of 6d. a share (2½ per cent.) was paid, the amount being £16,428. The balance of £393, added to £13,423 brought forward from previous half-year, left £13,816 to current account.

The directors' report says: "The directors are unable to announce any change in the status of the litigation since the issue of their circular of December 22d last, but they regard with equanimity the result of the present proceedings by our opponents.

"Negotiations are in progress in respect of a group of partly developed properties in the State of Nevada. As soon as climatic conditions permit, a thorough investigation of these properties and their surroundings will be made, which will enable the directors to decide on a course of action.

"The developments in the mine, during the past half-year, were confined to a comparatively smaller area, and consisted of levels, shafts, winzes, etc., representing a total progress of 3,723 lineal feet, at a cost of \$57,943, or an average of \$1.44 per ton of ore treated. That this expenditure has not been barren of results is evidenced by the discoveries at the south end of the mine in the 700 and 800 ft. levels. Although the ore met with in these levels was low grade, the stopes furnished a tonnage sufficient to satisfy the demands of the mills, and keep the 110 stamps continually employed. Manager Burrell is devoting his efforts to the developments in the region of the 900 and 1,000 ft. levels, which are being pushed forward as rapidly as possible."

Waihi Gold Mining Company, New Zealand.

This company's report covers the year ending December 31st, 1898. During the year work was pushed at the mine, and a total of 74,960 tons

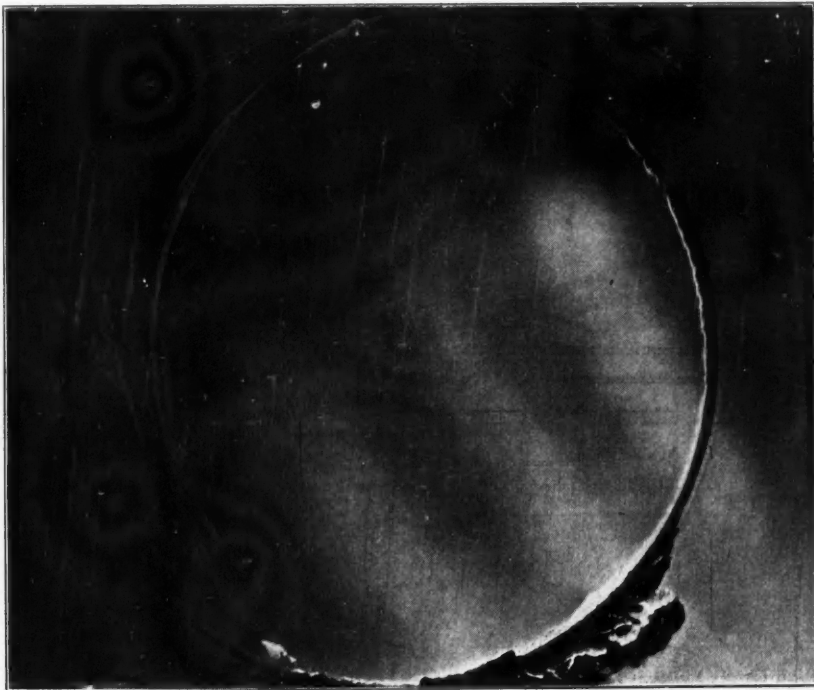


FIG. 3.

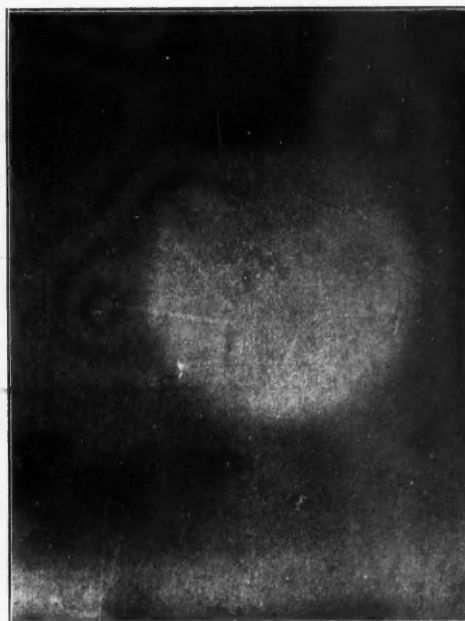


FIG. 4.

HUMAN RAYS.

winter, which has also been done. With the exception of some additional equipment for the railroad, ordered but not yet delivered, all the expenditures necessary for mining and shipping the largely increased output have been made and paid for out of the surplus earnings within the last two years, without any increase in the capital account.

"In addition to the increase in business expected from shipment to the United States during the coming year, the Canadian business promises to be much larger than ever before."

Montana Mining Company, Limited, Montana.

This company's report covers the half-year ending December 31st, 1898. Operations were carried on steadily at the mine, mill and tailings (cyanide) plant, with the results shown below. These results may be tabulated as follows:

	Ore.	Tailings.	Totals.
Tons of ore treated.....	40,130	58,337	98,467
Total return, bullion.....	\$265,770	\$175,205	\$440,975
Total expenses.....	231,929	96,538	328,467
Net profit.....	\$33,841	\$78,667	\$112,508
Averages per ton:			
Earnings.....	\$6.62	\$2.97	\$4.45
Expenses.....	5.78	1.65	3.32
Net profit.....	\$0.84	\$1.32	\$1.13
Per cent. of expenses to earnings.....	87.2	55.1	74.5

The mining expenses include \$57,943 for prospecting and development work. The expenses of the tailings treatment include \$20,628 for redemption of first cost of plant and \$1,002 for permanent improvements. The bullion return was: From ore, 11,840 oz. gold and 47,424 oz. silver; from tailings, 7,194 oz. gold and 50,863 oz. silver; total, 9,034 oz. gold and 98,287 oz. silver.

The profit and loss account, as stated in sterling, shows: Net earnings as above, £23,245; interest and miscellaneous, £453; total, £23,698. The deductions were: London charges, income tax, etc., £2,361; balance of cost of Riedler pumping plant, £4,516; total, £6,877, leaving

of ore was taken out. The ore treated in the mill was 77,929 tons, the result being 253,177 oz. bullion. As the average value was only 19s. 6¼d. (\$4.69) an ounce, the proportion of gold in the bullion was evidently low. The milling process used includes dry crushing, roasting and cyaniding. The company has two mills; the Waihi Mill (90 stamps) ran 304 days, the average crushed being 1.56 tons per stamp per day; while the Victoria Mill (100 stamps) ran 263 days, crushing 1.50 tons per stamp per day.

The average saving secured in the mill was 88.2 per cent. of the assay value of the gold and 57.6 per cent. of the silver.

The earnings and expenses for the year, given in pounds sterling, were as follows, the averages being calculated on 77,929 tons of ore worked:

	Total.	Per ton.
Bullion sales.....	£256,494	£3.29
Miscellaneous.....	1,202	0.02
Total receipts.....	£257,696	£3.31
Mining.....	£34,683	£0.45
Transportation to mill.....	1,524	0.02
Crushing ore.....	17,166	0.22
Roasting ore.....	5,081	0.07
Cyanide treatment.....	16,844	0.21
Management, taxes, etc.....	21,379	0.27
Repairs.....	5,169	0.07
Dead work and depreciation.....	16,774	0.21
Total expenses.....	£118,620	£1.52
Net profit.....	£139,076	£1.79

Reduced to United States currency, this shows gross earnings of \$16.11, expenses \$7.40 and net earnings \$8.71 to the ton worked. The expenses were 46 per cent. of the earnings.

From the balance of profit shown dividends of 8s. a share were paid, amounting (with income tax) to £102,657, and the sum of £20,000 was carried to surplus. This left a balance of £16,419, added to £20,162

carried over from 1897, left a balance of £36,581 to current year's account.

Extensive development work was done during the year, and the estimate of ore in sight at present time is 644,000 tons.

The directors' report says that experiments have been made to obtain a process of treatment applicable to the sulphide ores now appearing in the lower levels. The results have been satisfactory and the process is to be applied on a large scale. Arrangements have been made to increase the size of the Victoria Mill from 100 to 200 stamps. With the 90 at the Waihi Mill, this will give the company 290 stamps.

TILTING OPEN-HEARTH FURNACES AT ENSLEY, ALABAMA.*

By Archibald P. Head.

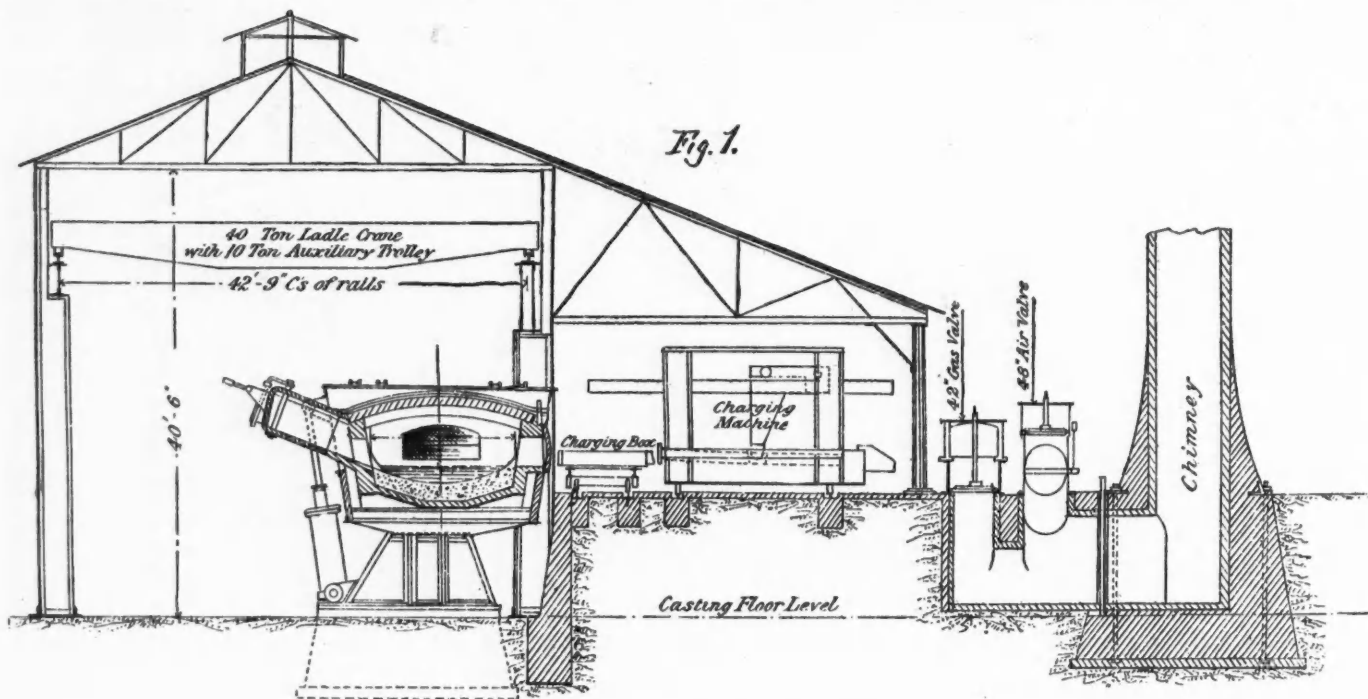
The most recent tilting open-hearth furnaces are those designed by Mr. S. T. Wellman for the new Alabama Steel and Shipbuilding Company's works at Ensley, near Birmingham, Alabama. The works in question, which are now under construction, are for the purpose of making blooms and rails from open-hearth basic steel, the pig iron used being the phosphoric variety made in large quantities in and near Birmingham, Ala., from the cheap Southern ores. Up to this it has been taken for granted that ingot iron can be made more cheaply by the Bessemer than by the open-hearth processes, and where the greater variability of the product of the former process is not of vital importance, as in the case of rails, the Bessemer process, acid or basic, has hitherto been used. Owing, however, to the improved appliances which have of recent years been introduced in connection with open-hearth practice, especially in America, the difference in cost between the two processes has been steadily diminishing, until now in the above-mentioned steel

at the same level as in the furnace. Trains of casting trucks, each carrying two ingot moulds, are brought under the pouring holes. As the distance apart of the latter is the same as that of the moulds, two moulds can be filled simultaneously. An alternative method of casting will be to pour the steel through the plain spout into an ordinary ladle, provided with pouring hole and stopper, and suspended from an overhead electric crane. When filled, the ladle will be raised sufficiently high to be poured either into the moulds standing on bogies, or into bottom-cast moulds, arranged elsewhere in the casting-house.

The regenerative chambers are arranged side by side in two pairs, one pair being at each end of the furnace, and extending under the charging platform. The portion of the charging platform in front of the furnace is upon solid ground, the valves standing above the level thereof, and being well out of the way at the back.

In previous designs the body of the furnace has been round or oval in section, and enclosed in steel plates, somewhat after the manner of a boiler. It has been found, however, that this method of construction leaves something to be desired in point of strength. In the present case the furnace body is roughly rectangular in section. The whole furnace is enclosed in a strong cage, constructed of plates, channel bars and angle bars, while stout tie rods bind the two ends together. There are also diagonal tie rods across the top, binding together the front and back, in such a manner as to prevent distortion and curvature. Indeed, the same mechanical principles that regulate the design of bridges and other structures are observed here. The stress on each member is carefully calculated and allowed for.

The furnace top, sides and the outer layer of the bottom, are lined with silica bricks. The inside or basic portion of the bottom is made with magnesite, which is burnt on in thin layers about 1 in. thick at steel-melting heat. It is laid on with a large spoon and smoothed down,



WELLMAN TILTING OPEN-HEARTH FURNACE.

works the open-hearth process is about to invade the field hitherto considered to belong exclusively to the Bessemer process, the manufacture of rails. Among the mechanical improvements and labor-saving devices which have rendered this possible, mechanical charging and the tilting furnace play an important part. The electric charging machine for open-hearth furnaces was fully dealt with by the late Mr. Jeremiah Head.†

The latest form of tilting furnace, as about to be installed at Ensley, Ala., embodies the result of all past experience. There will be 10 such furnaces in a row, each of 50 tons capacity, basic lined. If working with acid linings these would be rated as 60-ton furnaces.

The gas and air ports are of novel construction, designed to minimize the leakage of cold air inwards at the joint. The two passages leading from the regenerative chambers to the ports terminate in two water troughs, about on the level of the charging floor. As before, the brickwork of the ports is enclosed in a metal cage. But instead of being fixed, it moves upon flanged wheels running upon rails, which enable it to be moved a few inches toward or from the furnace end. The water troughs are so designed as to allow this small motion without breaking the seal. When melting is in progress the ports are moved up to the furnace, so that the face plates are in contact. When pouring is about to commence they are moved away so as to allow the furnace to tilt freely. The ports can be removed bodily for repairs.

It is intended that each furnace shall be provided with a casting ladle of a special design, attached to the front of the tapping hole, and forming in fact part of the structure. The ladle is provided with two pouring holes and stoppers. When the furnace is tilted for pouring, the metal, with the layer of slag on the top, flows in to the ladle, and stands

and when heated to the furnace temperature adheres to the next layer. Subsequent repairs are made with dolomite.

The air-reversing valves are of the usual butterfly pattern, which being always comparatively cool, do not give trouble by warping and consequent leakage. The gas-reversing valves consist of two mushroom valves machined on their bevelled edges, and resting on circular seats with sharp edges. Both valves and seats are internally water-cooled. The water enters the valve by a tube inside the hollow stalk by which it is raised and lowered, and leaves by the annular space. Such valves are free from leakage, and are found to work satisfactorily. There is a chimney stack to each furnace.

The furnace charging-doors are three in number, and are operated by pneumatic cylinders through wire ropes, the leads being arranged in such a way that the doors remain closed while the furnace is tilted. The doors are all 3 ft. 6 in. broad by 3 ft. high, which allows ample room for the insertion of the boxes of the charging machine. There are also small doors 18 in. by 2 ft. at each end.

The angle of tilt, which for pouring is 25° with the horizontal, is regulated by stops which come in contact with the upper covers of the hydraulic cylinders when the extreme angle has been reached. By a simple mechanism these stops can be thrown out of gear, and a further tilt permitted when it is desired to drain off the slag.

In the accompanying illustrations Fig. 1 shows a section of the furnace in normal position. Fig. 2 shows the furnace pouring into an ordinary ladle; while Fig. 3 shows the operation of pouring through a special ladle. Fig. 4 is a longitudinal section.

The advantages of the tilting over the fixed furnace may be summed up briefly as follows:

1. The slag, which—especially in the basic process—is somewhat abundant and troublesome, can be poured off at intervals during the melting process.
2. As the pouring hole of the furnace is above the level of the bath in

*Abstract of paper read before the British Iron and Steel Institute, May, 1899.

†See "Engineering and Mining Journal," June 5th, 1897, page 569.

the normal position, it is never closed up, but only loosely covered to exclude the air.

3. Since no injury is done to the pouring hole by opening and closing, the life of the furnace bottom is much prolonged.

4. The cold air which enters at the end ports when the furnace is tilted is an advantage, in that it chills the layer of slag on the surface of metal, which is effectually prevented from boiling and spurting.

5. In every fixed furnace small inequalities in the bed must exist in which pools of metal lodge, and can with difficulty be removed. In the tilting furnace every particle of metal and slag can be removed after each charge.

6. The tapping of the charge can take place at the exact moment when the metal is of the desired composition.

7. In case of any hitch or accident during pouring, the furnace can be instantly tilted back, and pouring cease.

8. The tilting furnace lends itself readily to the transfer of metal from an acid to a basic furnace, or vice versa.

9. The whole body of the furnace is easy of access for repairs or examination.

for the year just opening will be even more interesting. There are now building in our ship yards for the United States and foreign countries more than 50 naval vessels, valued at upward of \$40,000,000 exclusive of armor and armament, and more than 200 merchant vessels (no small craft of any kind included), the aggregate value of which exceeds \$30,000,000.

"There has been turned out in this single year an Atlantic coast fleet of respectable size, in which the Cromwell, Morgan, Ward, Merchants' & Miners', Old Dominion, Plant, Old Bay and almost all other principal coast lines, have been represented. For Pacific Coast service there are building more modern steel freight and passenger steamers than have been constructed in any three previous years combined. On the western rivers steel hulls have made their appearance, with promise of the river fleet being gradually rebuilt along steel lines. The ship-yards of the entire country have, in fact, orders sufficient on hand to keep them in operation for periods ranging from one to three years. The largest merchant vessels and vessels of war ever constructed on this side of the Atlantic are now on the stocks in American yards. All the yards, great and small, are developing and expanding. At Newport News, Va., alone, the improvements under way will entail an expenditure of \$2,000,000. A \$3,000,000 ship-yard is in process of establishment on the Delaware and another with a capital of \$1,000,000 is projected. The Maryland Steel Company reopened its marine plant in obedience to a

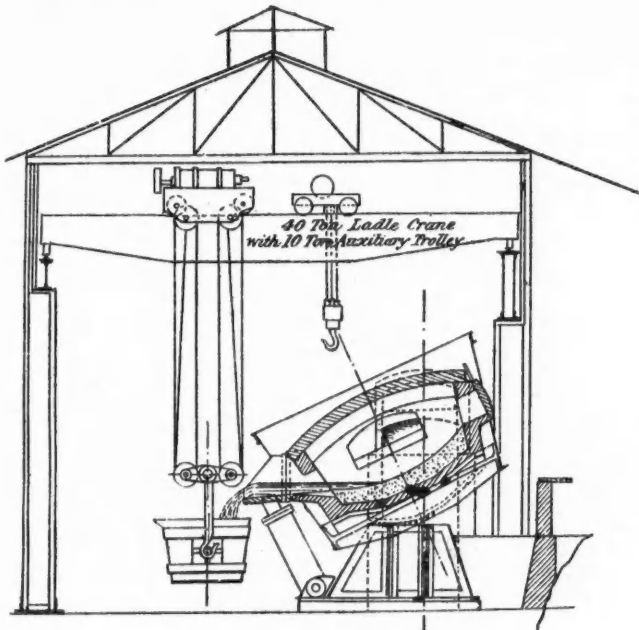


Fig. 2.

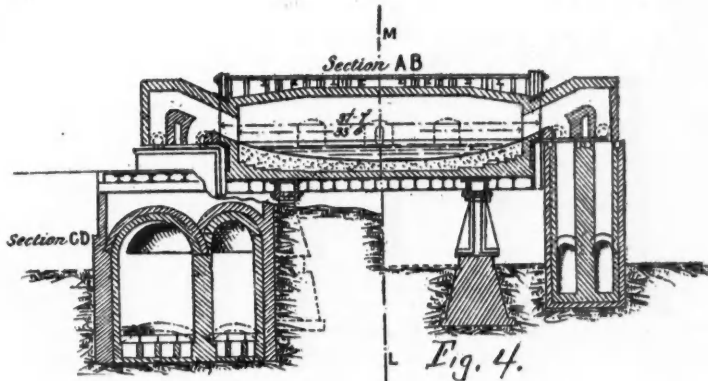


Fig. 4.

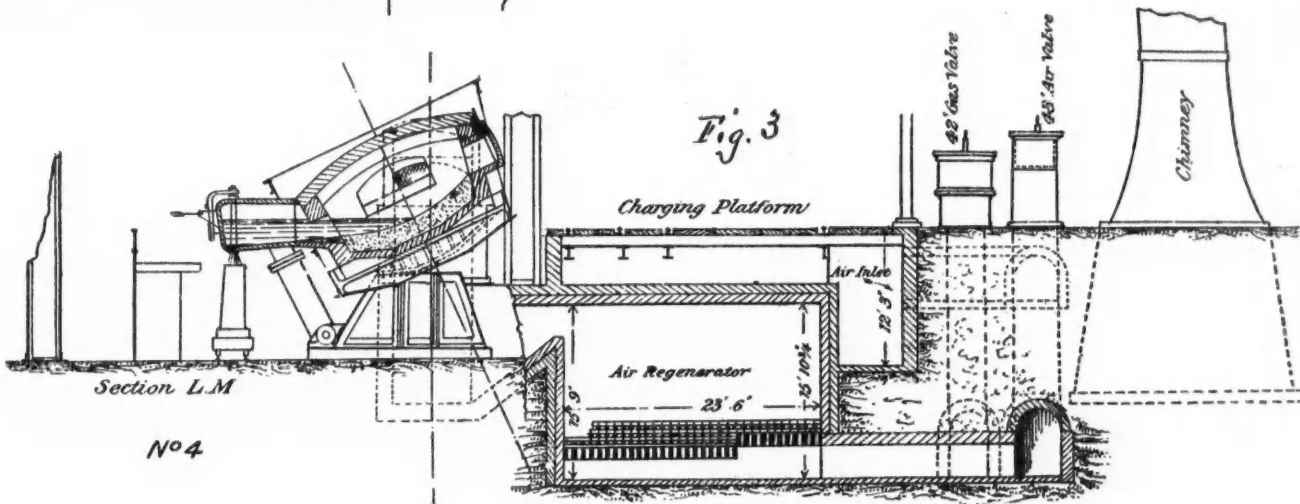


Fig. 3.

WELLMAN TILTING OPEN-HEARTH FURNACE.

10. The furnace bodies do not become deformed, as in the case of fixed furnaces, since as structures they are much stronger.

The objections to the tilting furnace are as follows:

1. It is somewhat more expensive than the fixed furnace.

2. The inlet of cold air during pouring tends to oxidize the manganese, which must be made up for by further additions in the moulds.

The balance seems to be largely in favor of the tilting form, which is meeting with general acceptance.

THE DEVELOPMENT OF AMERICAN SHIPPING.

One of the factors in the extraordinary demand which has arisen for iron and steel is the great activity in ship-building. How important this is, few who are not directly connected with the industry appreciate. An interesting summary has been issued by the "Marine Review" of Cleveland, Ohio, which will form part of the introduction to the yearly "Blue Book of American Shipping." The following extracts are from this review, and will show the work accomplished and in progress:

"The report of the commissioner of navigation for the Treasury Department fiscal year, ended June 30th, 1899, will show a growth unprecedented in the history of ship-building in this country, and the figures

rush of work that enabled it to, six months later, have seven steel steamers under construction. The William R. Trigg Company has converted Richmond, Va., into a ship-building port. The general extension of the use of pneumatic tools in the construction of steel vessels is a feature of the year's progress, as is also the more extended introduction of cantilever cranes and other equipment calculated to reduce costs by facilitating ship-yard operations.

"On the great lakes all the leading ship-building and dry dock plants have been merged into the American Ship-Building Company, one of the strongest of the recently formed industrial organizations, with a conservative policy, well defined, and with complete control still in the hands of the men who built up this industry in the lake region. This company already has in hand several orders for freight carriers of 9,000 net tons capacity on 18 ft. draft, that are not to be delivered until May, 1900, but on which work must begin immediately, as they are to cost approximately \$350,000 each, and with quadruple expansion engines and water-tube boilers will represent the best practice that is to be found in ship building anywhere in the world. A total value of about \$6,000,000 is represented by all new tonnage now under way in ship-yards of the great lakes, and there is every reason to expect that this aggregate will be kept up for a couple of years to come, notwithstanding the higher values now prevailing in labor, material and supplies of

all kinds. In short, it is the general opinion that under the influence of powerful corporations now controlling transportation affairs on the great lakes practically the entire fleet is to be rebuilt on lines of the modern steel vessel.

"The American 'tramp' steamer has made its appearance. New England districts are again witnessing quite a little activity in the construction of wooden vessels, even to the placing of an order for a six-masted ship that is to carry 5,500 tons dead weight. In this line of diversity may be mentioned also the light-draft, stern-wheel type of steamer, which has been constructed in quite large numbers on both coasts for service in shallow Alaskan waters; and on the great lakes the steamer, which has been constructed in quite large numbers on both special trade on the lakes, or may be transferred through the Welland and St. Lawrence canals to the Atlantic, where there is promise of profitable trade for a long time to come, not only between ports on the eastern seaboard but also between New York, Cuba and Porto Rico."

THE MINERAL PRODUCTION OF IOWA IN 1898.

Written for the Engineering and Mining Journal by S. W. Beyer.

The kindly reception accorded the mineral statistics of Iowa for 1897 lead the Iowa Geological Survey to undertake their collection for 1898. The prompt and hearty co-operation shown by the producers deserves, and has the fullest thanks of the Survey. Not a single important coal operator has failed to report, and it is believed that the coal output is correct within 3 per cent. The same is essentially true for clay and stone. One estimate is included with the totals for clay, but this plant was visited by the writer and the figures substituted are believed to be reliable.

The figures for the production of gypsum could not be obtained. The output for 1896 was \$34,020. The steady improvement of trade conditions and great increase in building during the past two years has perhaps doubled the output. The increased production of lead and zinc stimulated by the recent advance in the price of those metals is most gratifying.

In 1898 eighty-nine counties and nearly 700 producers were engaged in developing the mineral resources of the State. The value of the total mineral production in 1898 was \$7,426,722, distributed as follows:

	Value.	Number of producers.
Coal	\$4,759,967	174
Clay	2,059,365	349
Stone	563,568	161
Lead and zinc	43,784	19
Total	\$7,426,722	694

The output of coal for 1898 shows a decided falling off as compared with the production for 1897, both in tonnage and in cash value. The open winter of 1897 and 1898 greatly affected the local demands and the opening of new fields in the Southwest deprived Iowa of a portion of her railway sales in that quarter. While the average prices per ton ruled slightly higher, the total shrinkage in production was almost 500,000 tons. All of the great coal producing counties show a decrease, save Wapello and Boone; the latter county alone gives an increase; more than 65,000 tons. Of the total output 11 per cent. was sold locally and consumed at the mine, while 89 per cent. was shipped to various points in and out of the State, chiefly to the west and south of the producing areas.

Below is given the production and value of the leading counties: Mahaska 1,263,663 tons, value \$1,290,689; Polk 579,773 tons, \$710,624; Appanoose 560,808 tons, \$662,736; Monroe 480,830 tons, \$487,430; Boone 325,885 tons, \$466,175; Wapello 252,484 tons, \$258,561; Keokuk 228,345 tons, \$238,801.

The total production and value for recent years is given below:

Year	Tons.	Value.
1894	3,967,253	\$4,999,939
1895	4,156,074	4,982,102
1896	3,954,028	4,628,922
1897	4,611,865	5,219,503
1898	4,117,359	4,759,967

These figures include nut and slack. The price per ton is accordingly less than for lump alone. The number of men employed in the mines of Iowa for 1898 shows a falling off of more than 1,000, while the average number of days worked was greater than for any year since 1892. The number of men employed and the average number of days worked during the past six years, according to the best information available, were as follows:

Year.	Days active.	Men employed.	Year.	Days active.	Men employed.
1893	204	8,863	1896	178	9,672
1894	170	9,965	1897	201	10,703
1895	189	10,066	1898	218	9,671

The value of the clay products marketed during 1898 exceeded that of 1897 by nearly \$250,000 and was the greatest since 1894. There was a sharp falling off in the output and sale of paving brick and drain tile, but a marked increase in common brick. The greatest gain, however, was in the production of burnt clay, which has gained great favor in the southern half of the State as a ballast. More than \$200,000 worth of burnt clay alone was sold during the past year. In 1896 nearly 35 per cent. of the firms reporting were idle; in 1897 slightly more than 20 per cent., while in 1898 the percentage of firms not in operation was still less. The chief gain comes from the large number of small firms which have been revived or brought into existence by the betterment of general trade conditions, especially in the building trade.

Fancy wares and pottery show a slight decrease and it seems improbable that Iowa will ever become a dangerous competitor of the eastern Mississippi valley states in that line unless new deposits of clay are discovered or new methods of working introduced.

The returns show 349 plants in active operation, a gain of 19 over 1897, and give the total value of brick produced at \$1,417,525, and of all clay products, \$2,059,365, showing a gain of \$83,405 and \$238,138 respectively. There was produced of common brick 178,513 M., average \$5.88 per thousand; pressed brick 6,722 M., at \$8.14; vitrified brick 38,478 M., at \$8.01.

The stone trade for 1898 was encouraging. The producers reported almost without exception the demand for stone to run 14 to 20 and even 50 per cent. better than in 1897. The demand for lime shows very little improvement over the preceding year. The stone quarried includes limestone, dolomite and a small quantity of sandstone. Most of the quarries are small and improved machinery is to be found in but few. Returns were received from 161 producers and show that a total of \$563,586 worth of quarry products were marketed during the year. The production was distributed as follows: Limestone for building and road making, \$447,424; lime, \$109,600; sandstone, \$6,562; total, \$563,586.

The year 1898 was marked by more lead mining in Iowa than for some time past. The Halpin Mine was a large producer, yielding nearly 1,000,000 lbs. of ore. Aside from this a considerable amount was taken out of the Kane Bros. mine and smaller sales were made from other diggings. In all 1,856,427 lbs. of ore were sold for \$37,129. The Allamakee and Clayton County mines were not producing in 1898 and all of the ore came from the Dubuque region. It was all reduced by the Walters smelter, at which plant a certain amount of Illinois and Wisconsin ores were also run. There were no big ore discoveries during the year, though a number of small bodies were located, and early in 1899 several promising prospects were being explored.

The zinc mines were not active in the early part of the season. Small amounts of the carbonate or bone were taken out at Buena Vista, Durango and Dubuque. Late in the summer some of the larger Dubuque mines which had been idle for some years were opened up and as prices advanced during the winter mining became quite active. In all about 750 tons of the carbonate ore were sold at prices running from \$5 to \$9 a ton. The total value was \$5,005. The year was marked by the first shipments of the sulphide, or jack made from this region in recent years. The ore was sold by the Alpine Mining Company and brought from \$18 to \$22 per ton. The total shipments were 76.5 tons, which brought \$1,550.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

Specially Reported for the Engineering and Mining Journal.

MEANING OF "SOLID ROCK" IN WELL DRIVING.—The terms "solid rock" and "surface water" have a technical meaning in the trade of boring artesian wells. Solid rock means rock which will not cave when drilled, or yield or move under the drill.—Gregory vs. United States (33 Court of Claims Reports, 434); United States Court of Claims.

WHEN LEASE BECOMES BINDING.—Where a lease contains mutual covenants and is executed by the lessor only, by delivery to and acceptance by the lessee, it becomes binding upon the latter as well as the lessor, although the latter has not signed it.—Henderson vs. Viriden Coal Company (78 Appellate Court Reports, 437); Appellate Court of Illinois.

RIGHT OF STOCKHOLDER TO INJUNCTION AGAINST COMPANY.—If a corporation deprives a stockholder of his right to his proportion of an increase of stock it is liable to an action at law for damages; and where it is of sufficient responsibility to answer to such action the stockholder is not entitled to an injunction.—Meredith vs. New Jersey Zinc & Iron Company (41 Atlantic Reporter, 116); Supreme Court of New Jersey.

SALARY BASED ON PROFIT AND LOSS.—A corporate resolution provided that its secretary should receive 10 per cent. of the net profits and a salary of \$15 per week, and "that the 10 per cent. of the net profits shall be held to also mean 10 per cent. of the net mining losses." The court held that the latter clause was too ambiguous to create a liability on the secretary to pay 10 per cent. of the losses.—Lummis vs. Devine (9 Pennsylvania Superior Court, 349); Superior Court of Pennsylvania.

FOREIGN MINING COMPANIES IN ARIZONA.—The law of Arizona (Revised Statutes, 1887, section 348) requiring foreign corporations proposing to do business in that Territory to file with certain territorial and county officers the appointment of an agent upon whom process may be served, and sections 712 and 713, providing for service on such corporations by publications, are not exclusive, and are only designed to secure a special mode of service, when the corporation has ceased to do business in that territory, or has not appointed such local agent; and when a foreign corporation has officers in the territory carrying on its business there, service may be had under section 704, which provides for service of summons on corporations generally, by leaving a copy with specified officers or with a local agent.—Henrietta Milling and Mining Company (19 Supreme Court Reporter, 402); Supreme Court of the United States.

FREIGHT LIEN NOT LOST BY DELIVERY ON "SPUR" TRACK.—On an issue as to whether a carrier, by delivery to the consignee, had lost his lien for freight, it appeared that car loads of coal on which the lien was claimed were, on reaching their destination, placed on spur tracks on the premises of the consignee; he had furnished the ties while the railroad company had built the tracks and furnished the iron. The spur tracks were operated exclusively by the railroad company, and part of its charge was for placing the coal on the spur track. Before the consignee could handle the coal it was necessary to remove the cars from the spur track and move them along the main track, thence along a branch track on the premises of the consignee to his docks, and this was done by the employees of the railroad company and its engines were used, these being furnished by the superintendent of the railroad on request. The court held that placing the cars on the spur tracks was not a delivery of coal, so as to deprive the railroad company of its lien for freight.—New York Central & Hudson River Railroad Company vs. Davis (52 Northeastern Reporter, 1125); Court of Appeals of New York.

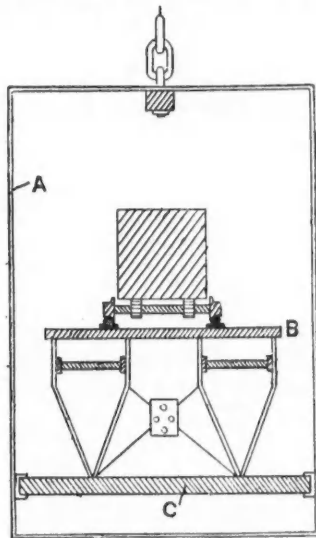
A SELF-DUMPING MINE CAGE.

The accompanying sketch shows roughly a self-dumping mine cage used in several coal mines near Sydney, Cape Breton. These cages each hold one tub. On reaching the surface the tub is not removed from the cage, but is emptied automatically. The platform on which the tub stands rotates through a small arc on a shaft, to which it is radially attached, and a catch holding the flap door in the end of the tub, being automatically released at the same time, the coal slides out into a large metal spout. Here it is weighed, and then passes on to a shaker screen and cleaning belt. It was stated that as much as 364 tons of coal in an hour had been raised and screened and cleaned in this way. There is, of course, a considerable saving in cost of labor compared with the ordinary system of banking, one attendant only being required. The cage weighs 4 tons without the tub. At the shaft bottom the loaded tub running on to the cage, lowers the stop holding the empty tub in position and pushes it off. In the sketch A is a vertical frame, running in guides; B a platform, rigidly connected with rotating shaft; C a shaft, rotating in bearings fixed to the vertical frame.

PREPARATION OF METALLIC TELLURIUM.*

By Victor Lenher.

In this paper the author describes a series of experiments on the extraction of tellurium, made at the Havemeyer Laboratory of Columbia University in New York. The first thing to do was to prepare tellurium by a well-known method and obtain a product that it would be possible to use in comparison. To this end 5 lbs. of residues were treated with concentrated hydrochloric acid (sp. gr. 1.20). An amber-yellow liquid



TIPPING CAGE FOR MINES.

was obtained and a residue which was highly silicious. It is possible to obtain a perfectly clear solution by filtration through asbestos wool, using a suction-pump. When sulphur dioxide is brought into contact with such a strong acid solution, selenium should be precipitated free from tellurium, according to Keller. When sulphur dioxide was introduced into this solution a red precipitate formed showing selenium was first precipitated. It appeared to darken, however, when the liquid was saturated. On boiling, the precipitate agglomerated into a mass which much resembled selenium, but on separating it by means of potassium cyanide, it was found to consist of 3.2 grams of selenium and 28.3 grams of tellurium. This seems to indicate that tellurium and selenium cannot be perfectly separated by sulphur dioxide in strong hydrochloric acid solution. The filtrate from the strongly acid solution was diluted with water and more sulphur dioxide passed through the liquid, when the rest of the tellurium was precipitated. The lump of metal which was formed by fusion was finely powdered and fused with potassium cyanide; purple telluride of potassium was formed. The solution was filtered and a current of air passed through. The tellurium which was formed was fused, then distilled in hydrogen gas. This material was considered pure. When treated with aqua regia, dioxide is formed and may be obtained by evaporation. Tellurium oxide is completely volatile at a low temperature in hydrochloric acid gas, no residue remaining. Pure tellurium is likewise completely volatile when heated in hydrogen.

Since it seems most natural to prepare a metal from its oxide, the tellurium oxide was subjected to a number of reduction tests. In recent years metallic magnesium and metallic aluminum have shown themselves to be of great value as reducing agents. When metallic aluminum and tellurium oxide are heated together in a crucible a violent reaction takes place; tellurium is formed, but immediately unites with the aluminum, forming aluminum telluride. Metallic magnesium, even in very coarse condition, when heated with tellurium oxide, gives a very explosive reaction. So very energetic is the action that it has not been possible to collect any of the products formed.

When dry glucose is heated with the oxide, a coke is formed which becomes coated with the metal and is difficult to fuse into a button. The same may be said of a dry fusion of asphaltum with the oxide. Ignition of the oxide with dry oxalic acid does, however, give metal readily, and fusion into a globule is an easy matter.

The next series of experiments was made with the sugars. Tellurium

oxide was dissolved in potassium hydrate, cane-sugar was added, and the solution warmed. When a saturated solution is used, purple telluride is formed, but boiling in contact with the air causes a rapid separation of black tellurium. After washing with water the precipitate can be dried and fused into a mass.

From a solution of an alkaline tellurite glucose precipitates black elementary tellurium. No intermediate formation of telluride could be noticed as with cane-sugar. Pure white, anhydrous grape-sugar was dissolved in water and added to a warm solution of the alkaline tellurite. Tellurium was precipitated in elementary form. During the process of washing, which always followed the precipitation, it was invariably noticed that grape-sugar was much more difficult to remove from the finely divided tellurium than any of the other sugars.

From these experiments it seemed natural to conclude that reducing sugars will give a very practical method for the preparation of metallic tellurium. Tellurium obtained by this method is completely volatile in hydrogen gas and its oxide is likewise volatile in hydrochloric acid gas.

Thanks to the kindness of Mr. Walker, of the Baltimore Electric Refining Company, who furnished the residues, and to Prof. P. de P. Ricketts, who in so many ways made the work possible, the author has been enabled to prepare a bar of tellurium by fusion of the finely divided material obtained by reduction of tellurium in alkaline solutions by means of sugar. This bar weighed 4 lbs. It was shown at the New York meeting of the American Institute of Mining Engineers.

THE LARGEST BLOCK OF MARBLE.—What is claimed to be the largest block of marble ever quarried was recently taken out of the Marble Hill Quarry near Marietta, Ga., owned by the Southern Marble Company. This block is 27 ft. 2 in. long, 4 ft. 4 in. thick and 4 ft. 3 in. wide. It contains 500 cub. ft., and weighs about 100,000 lbs. It was recently shipped from Marble Hill to Providence, R. I., over the Southern Railway. It was carried on a special car of that company which was built for carrying heavy guns. The company claims that this block exceeds in weight by nearly 40,000 lbs. any one heretofore quarried in this country.

MINERAL IMPORTS AND EXPORTS OF SPAIN.—The imports of fuel into Spain for the four months ending April 30th included 635,221 metric tons coal and 91,011 tons coke. The imports of iron and steel included 845 tons pig iron, 1,354 tons wrought iron, 7,788 tons steel and 589 tons tin-plates. Exports of minerals for the four months are reported by the "Revista Minera" as below, in metric tons:

	1898.	1899.
Iron ore	2,418,476	2,855,668
Copper ore	268,349	315,362
Zinc ore	19,466	30,370
Lead ore	2,590	3,574
Salt	79,344	91,423

Exports of metals included 13,042 tons pig iron (17,317 tons in 1898); 10,291 tons copper (10,702 tons in 1898); 57,911 tons lead (68,832 tons in 1898).

A PROPOSED RAILROAD IN PERU.—United States Minister Dudley sends from Lima, under date of May 11th, 1899, copy and translation of a Government decree under which bids are invited for the construction of a line of railroad from Oroya, the present terminus of the Central Railroad of Peru (the Trans-Andean line) to Cerro de Pasco, about 60 miles to the north. Cerro de Pasco has owed its existence to the silver mines of the vicinity, long the most productive in the world and still rich. Recent important discoveries of copper deposits in that region, coincident with the notable rise in the price of copper, have undoubtedly stimulated the project, by no means new, of securing cheaper and better transportation by means of an all-rail communication from Cerro de Pasco to the port of Callao.

The business of the Cerro de Pasco was, in fact, one of the chief reasons for undertaking the construction of the Lima & Oroya Railroad—one of the most difficult mountain lines in the world—some 25 years ago.

MICA FIELDS IN CHINA.—United States Consul Fowler sends from Chefoo, under date of March 20th, 1899, a letter from Mr. F. H. Chalfant of Wei-hsien, in regard to the mica fields in Shantung discovered by him. The letter reads, in part: "I inclose some samples—a few small bits clipped at random from a 50-lb. chunk in my possession. It is not the best, but some refuse rejected by the Chinese as too opaque for use for lanterns and transparent pictures, the only uses that the Chinese find for this valuable commodity. I am assured by the Chinese at the mica mines that they procure the stuff as 'clear as air.' In 1893 I first heard through the Chinese that mica was mined in Chu-Ch'eng. I at once sent a reliable man, with instructions to buy me a donkey load, but not to say it was for a foreigner. He happened to reach the place during the wheat harvest, when the people said it did not pay to work the mines. He bought me what they had left over, after the best had been picked out by petty dealers, at the rate of 5 cash per catty (about 25c. per 100 lbs). This was in the rough. I knew that it would never do to give the men an idea that there was any demand for the mica by foreigners, for then the price would jump up to a prohibitory figure. A year later, I arranged to forward a sample of the mica to the United States for inspection, but was again unfortunate in finding the mines idle. I fear the poor quality of the mica I was compelled to send discouraged the United States correspondents, for I never had a report upon it. Aside from this effort nothing has been done. In the summer of 1895 an Englishman, Captain O'Sullivan, went to Pekin and Tientsin and tried to get a permit from Li Hung Chang to open a mine. Nothing came of this. Next, the Germans occupied the country adjacent to the mica region. One of their mineralogists is about to investigate the mica region."

*Abstract of paper in the "Journal" of the American Chemical Society, April, 1899.

THE ELECTRO-DEPOSITION OF VANADIUM.*

By Sherard Cowper-Coles.

Vanadium has not received the attention it deserves at the hands of electro-metallurgists. Vanadium oxidizes slowly in the air, and has a very high melting point, about 2,000° C. (3,600° F.), and is neither volatile nor fusible when heated to redness in hydrogen. Vanadium is widely distributed (See "The Mineral Industry," Vol. VI.), but it is not often found in large quantities. It was first discovered by Seftström in 1830, in the iron obtained from the Taberg ores.

The metal is not readily attacked by hydrochloric acid, either when hot or cold, neither strong nor dilute sulphuric acid act upon the metal in the cold, but when heated with strong acid the metal slowly dissolves, giving a greyish-yellowish solution. Both hot and cold solutions of caustic soda are without action on the metal, but when fused with the hydroxide, hydrogen is evolved, and vanadate formed. Nitric acid of all strengths oxidizes the metal with violence, evolving nitrous fumes and forming a blue liquid. The specific gravity of vanadium at 50° F. is 5.5, being somewhat lighter than zinc and about twice as heavy as aluminum.

Metallic vanadium made by reduction from the dichloride in hydrogen, is a light whitish-grey colored powder, which under the microscope reflects light most powerfully, and appears as a brilliant crystalline mass, possessing a silver-white lustre.

Vanadium was originally found in Mexico. Recently it has been discovered in considerable quantities near Santa Marta in Spain. In the Spanish mines it is found associated with lead, tellurium, gold and silver. Some of the ore contains as much as 124 lbs. of metallic vanadium to the ton. Vanadium has also been mined on the elevated plains of the Andes, where anthracite mines exist, containing two parallel inclined beds of vanadium-containing coal, from 2 to 3 meters thick and 1,004 meters long. It is also found in Peru, in certain anthracite coals, which, according to analysis, contain about 4.5 per cent.

Gore has endeavored to deposit vanadium from aqueous solutions, but with unsatisfactory results. The electrolyte employed by him was one composed of vanadic acid, dissolved in pure dilute hydrochloric acid by means of an electric current, using a retort carbon anode and a platinum cathode; the gas set free at the anode was observed to have a smell of ozone. He also tried a solution of dilute sulphuric acid with pure vanadate of ammonia, and electrolyzed the solution with platinum electrodes. The electrolyte turned a bluish-black color at the cathode, and a jet black powder of some thickness was deposited upon it.

Schicht dissolved vanadium chloride in water containing hydrochloric acid and electrolyzed the solution. Inert deposition took place in the blue liquid, the vanadium acid being merely reduced to oxide.

The author has succeeded in obtaining brilliant metallic deposits of vanadium, the color being almost as white as that of silver, from a solution prepared as follows: The vanadic anhydride, V_2O_5 , was boiled with an excess of caustic soda, the sodium vanadate thus formed being decomposed by an excess of hydrochloric acid. The proportions were as follows: 1.75 parts of vanadic anhydride (equal to 1 oz. per gallon of solution) were dissolved in 2 parts of caustic soda and 160 parts of water, to which 32 parts of hydrochloric acid was afterwards added.

The best results were obtained with a current density of 18 to 20 amperes per sq. ft., the E.M.F. at the terminals of the electrolyzing cell being 1.88. The solution was worked at a temperature of about 180° F. If higher or lower current densities were used red-brown oxide was deposited along with the metallic vanadium. A reddish-brown non-adherent powder was deposited from cold solutions of the same current density. The solution when first made up was of a light greenish-yellow color. After boiling with a carbon anode for some time it became darker, and after passing a current it turned a rich dark green, after a good deal of metal had been taken from the solution it appeared bluish. When a solution containing 2 oz. of vanadium to the gallon was electrolyzed the deposit was not so white as that obtained from a solution containing 1 oz., the deposit having a steely appearance.

Vanadium is found to increase the tensile strength of iron, copper and aluminum when added to those metals, also the ductility. The present use of the metal is almost exclusively confined to converting aniline into fixed black dyes for indelible ink, and the coloring of glass.

The present price of vanadium oxide is about \$10 per lb. Sir Henry Roscoe some years ago produced a few grams of metallic vanadium. Now that the author has shown that it can be readily electro-deposited in a metallic form, it is to be hoped that new uses will be found for this interesting metal.

QUESTIONS AND ANSWERS.

(Queries addressed to this department should relate to matters within the special province of this periodical, such as mining, metallurgy, chemistry, geology, mineralogy, machinery supplies, etc. As it is manifestly impossible to devote space to all the questions and notes constantly received, preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot here undertake to give professional advice on problems requiring special investigation and which should be obtained from a consulting expert; nor can we undertake to give advice about mining companies or mining stocks. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers should send their names and addresses. Anonymous questions will not be answered.—Editor E. & M. J.)

Working Copper Ores in California.—I have a 6-ft. vein of ore situated in Siskiyou County, Cal., about 30 miles from railroad, but there is a good wagon road to the claim. It will cost me about \$9 per ton to ship it to the San Francisco smelter, which will charge me \$8 per ton more for working it and allow me about 12c. per pound for the copper, \$19 per oz. for gold, market price for silver after deducting 1 oz. of silver and 1.3 per cent. of copper. There is an abundance of iron, lime and silica near at hand; plenty of wood—a good proportion of which is oak; a good supply of water is convenient; have developed the ledge but

*Abstract of article read before the Institute of Mining and Metallurgy, London March, 1899.

little—only sunk 30 ft. on it. I would like it if you would advise me as to the best method of working this ore under these conditions—taking into consideration that my capital is a limited amount—provided upon reasonable development my ledge proves extensive enough to warrant putting up a water jacket furnace or a reverberatory furnace or whatever would be best. About what would be the cost of building as small a one as would be practicable to work, and about what cost of working same after erected. An assay made from what I think a fair sample showed gold \$6.28, silver \$2.43, copper 11.8 per cent. per ton. I have not had any experience with this kind of ore.—C. A. M.

Answer.—This is a case where it is easy to give advice. The first thing to be done is to go on with development until you can determine approximately how large a body of ore you have. Meantime consult an engineer of experience as to the best way to handle the ore.

FUEL EXPORTS OF GREAT BRITAIN.—The exports of coal, coke, cinders and briquettes from the United Kingdom during May were 3,542,121 tons, making the total for the five months of the year 17,088,826 tons, as compared with 13,800,818 tons in the corresponding period of 1898, and 14,312,954 tons in 1897. In May, 1898, the shipments were 2,691,020 tons, and in May, 1897, 3,502,240 tons.

COAL IN RUSSIA.—Extensive deposits of coal have been just discovered in the Valley of the Miass, in the neighborhood of Tcheliabinsk. Experiments which have been made with the newly discovered coal show that it is of good quality. It will not be adopted for metallurgical purposes, but it will be useful for steamers, as it only leaves 4 per cent. of ash. The discovery is also expected to give a stimulus to the gold mining industry of the Oural District.

PIG IRON PRODUCTION IN GERMANY.—The production of pig iron in Germany in April was 666,625 metric tons, being 42,414 tons less than in March, but 83,207 tons more than in April, 1898. For the four months ending April 30th the production was: Foundry iron, 478,021 tons; forge iron, 565,086 tons; Bessemer pig, 181,139 tons; Thomas (basic) pig, 1,434,206 tons; total, 2,658,443 metric tons. The total in 1898 was 2,392,943 tons, showing an increase of 265,500 tons, or 11.1 per cent. this year.

ON THE SLAG OF THE BASIC OPEN-HEARTH FURNACE.—Mr. O. Thiel, in a paper of which an abstract is given in the "Proceedings" of the Institution of Civil Engineers, says that the slag produced in the treatment of phosphoric pig iron by the basic method in the open-hearth furnace is, under ordinary conditions, of small value for agricultural purposes, containing less phosphoric acid and more silica and iron than that of the basic converter—the last constituent in particular being due to the long duration of the final dephosphorizing period. This difficulty may be overcome when the author's method (see "Engineering and Mining Journal," June 12th, 1897, page 600) of working the process in two furnaces is adopted—the proportion of lime or limestone added in the first furnace being kept below that required for perfect dephosphorizing, with the result of producing a slag high in phosphoric acid and silica, but comparatively free from iron, which, in consequence of its composition, contains a high percentage of phosphoric acid soluble in citric acid as required for fertilizing purposes. The method has been adopted with a series of charges, the details of which are given. The pig-iron treated contains from 1.6 per cent. to 2 per cent. of phosphorus, which is reduced by the addition of 18 to 22 per cent. of limestone and 16 to 25 per cent. of ore (Swedish magnetite and pyrites residues) to between 0.25 and 0.70 per cent., while the resulting slag contains from 16 to 22 per cent. of phosphoric acid, 16 to 21 per cent. of silica, and only 4.68 to 7.68 per cent. of iron. In the second furnace, by a further addition of 9 per cent. of limestone, the steel is finished, giving a slag with 9 to 11 per cent. of phosphorus, but in much smaller quantity—the proportion of the first being 21.7 per cent. and that of the second 8 per cent. of the weight of the metal charged. By comparison with the results obtained in several establishments working the basic Bessemer process, it appears that for equal richness in phosphoric acid there is a larger production of slag with a smaller addition of lime in the open-hearth furnace than in the converter. This is due to the large loss of phosphorus by volatilization which in a hot blow may be as much as 30 or 40 per cent., as well as to the mechanical loss of lime carried away by the blast in the latter method. Comparing the quantity and value of the two kinds of slags, the author considers that there is an advantage of between 35 and 75c. per ton of finished steel in favor of the open-hearth method in the value of the slag phosphoric acid.

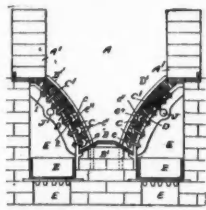
PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of the patents relating to mining and 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 June 6th, 1899.

- 626,276. TRAVELING CRANE OR CONVEYOR. Alexander R. Goldie, Galt, Canada. The combination with a traveling carriage, a track, a series of supporters and a returning-cable connected with said carriage for simultaneous movement therewith, means for connecting said supporters and carriage, and a cast-off at the end of the track or way for disconnecting said catches or shutters and cable.
- 626,279. GAS PRODUCER. George R. Hislop, Paisley, Scotland. A gas-producer composed of a brickwork chamber having a narrow central solid hearth combined with inclined gratings extending on either side to the brickwork sides of the chamber and having ash and water pan chambers formed under the gratings, there being openings c at the lower part of the inclined gratings only, and means for introducing air and steam to said chambers.



626,279.

626,281. ATTACHMENT FOR ORE ROASTING FURNACES. John T. Hutson, Columbia, S. C.—In a rake for an ore-roasting furnace, the combination of a body having a series of transversely-extending

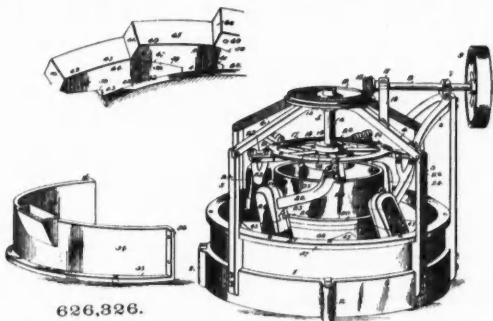


626,281.

grooves which open through the lower face of the arm and decrease in width inwardly from the forward side of the rake, and a series of teeth each adapted to be fitted into one of said grooves.

626,306. SEPARATOR FOR GRANULAR OR LIKE MATERIALS. Wilhelm Steltner, Schlan, Austria-Hungary, assignor to Hermann Kuhne, London, England. In combination, two series of bars extending transversely of the machine and of the line of travel of the material, the inclined projections on said bars extending laterally to form pockets, means for raising and lowering the bars alternately, and transporting-rods extending over the bars.

626,326. ORE CRUSHER. John F. Keyton, Baker City, Oregon. The combination of a drag-wheel involving a hub provided with slots, arms fitted into said slots, an annular band attached to said arms, the



626,326.

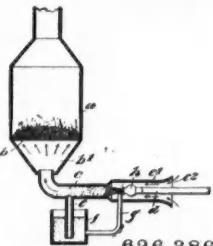
arms being bent or deflected outside the brace, drag-arms jointed to the deflected projections, and stamps or mullers.

626,330. PROCESE OF PRODUCING PEROXIDE OF LEAD. Carl Luckow, Cologne-Deutz, Germany. The process consists in using in connection with a lead anode an aqueous solution as electrolyte containing from 0.3 to 3 per cent. of the sodium, potassium or ammonium salts of sulphuric acid in mixture with the sodium, potassium or ammonium salts of chloric acid, and in passing a current through the solution.

626,348. MANUFACTURE OF SILVER-LINED GOLD TUBING. John J. Sommer, New York, N. Y. A silver-lined gold tube formed by bending a strip of the combined metals into the desired form and soldering them together.

626,361. METHOD OF AND APPARTUS FOR ELECTROPLATING. Alfred A. Blackman, New York, N. Y. The method of electroplating irregular-shaped articles by moving them continuously in one direction through the solution and changing their individual positions by continuous tumbling while subject to the electroplating-current.

626,386. APPARATUS FOR COMBUSTION OF FUEL. Franz Kluge, Barmen, Germany. Assignor to Emil Greeff, same place. The combination with a combustion-chamber, of means for forcing air and



626,386.

water into incandescent fuel in said chamber, comprising an air-duct in communication with the fuel, a water spraying or atomizing nozzle arranged in the air-duct to induce a current of air into the fuel whereby the water is sprayed by its own pressure and carried into the fuel.

626,426. CENTRIFUGAL PULVERIZING-MILL. Frank G. Johnson, New York, N. Y. Two or more vertical roller-shafts each having two horizontal rollers.

626,461. CONCENTRATING BELT. George Gates, Jackson, Cal. An endless traveling belt having a regular general inclination so that pulp delivered at the upper end will flow toward the lower end, broad flat tubular surfaces upon the top of the belt with intervening



626,461.

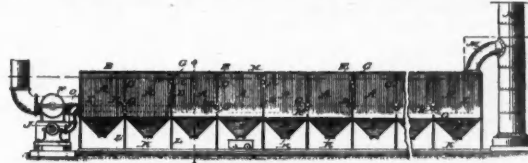
offsets, each of said surfaces declining toward the higher end of the belt and to the foot of the next offset whereby extended surfaces are formed for the settling of sulphurets and to allow pulp to flow over the surface of the sulphurets thus deposited.

626,511. PROCESS OF OBTAINING SILICIC AND HYDRO-FLUOSILICIC ACIDS. Emil Teisler, Wurzen, Germany. Assignor to Sholto

Douglas, Berlin, Germany. The process consists in heating the solution, so as to cause it to evolve a mixture of steam and gas-form fluosilicate, cooling the mixture so as to cause the fluosilicate to decompose into silicic acid and hydro-fluo-silicic acid, and separating these two compounds from each other.

626,547. PROCESS OF PRODUCING OXIDE OF COPPER. Carl Luckow, Cologne Deutz, Germany. The process consists in using an anode of copper an aqueous solution as electrolyte containing from 0.3 to 3 per cent. of the sodium, potassium or ammonium salts of chloric acid, and passing the electric current through the solution.

626,569. APPARATUS FOR CATCHING WASTE PRODUCTS FROM LEAD, SILVER OR OTHER SMELTERS. Walter Sergeant, El Paso, Texas. The apparatus consists of a passage composed of the settling-chambers arranged in succession and having hopper-



626,569.



shaped bottoms, baffle-plates extending alternately up and down between the settling-chambers, transverse air spray-pipes extending adjacent to the free edges of the baffle-plates, an exhaust-fan for forcing the fumes and waste products through the trail or passage, an air-main and fan for forcing the air through such main and air spray-pipes.

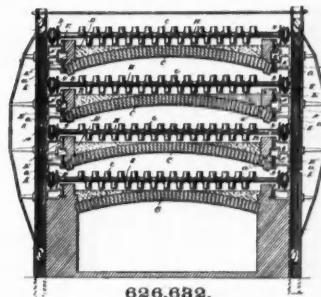
626,603. BLOWPIPE. Michael P. Freddy, Lena, Ill. Assignor of three-fourths to George Q. Roush, Allen Salter and Wallace E. Tucker, same place. A blowpipe, comprising a lamp, a reservoir for a vaporizing fluid, held adjacent to the lamp, a tube extended from said reservoir, a jet-tube connected to said tube and coiled around the same, and a block in said tube having a valve-regulated perforation.

626,609. MANUFACTURE OF ALLOYS. Charles E. Guillaume, Sevres, and Louis C. Dumas, Paris, France. Assignors to the Societe Anonyme de Commentry-Fourchambault, Paris, France. An alloy containing iron and nickel in the relative proportions of approximately 63 per cent. of iron and about 37 per cent. nickel. Combined with another metal or alloy of known expansibility, whereby a product of predetermined expansibility is obtained.

626,621. WIRE CABLE FOR CUTTING STONE. George L'Hoir and Jean B. Deham, Hornu Hainaut, Belgium. A cable for cutting stone, composed of strands of wire which are at intervals twisted in one direction and then reversed and twisted in the opposite direction.

626,635. PROCESS OF REDUCING ALUMINUM FROM ITS COMPOUNDS. Gustav Schwahn, St. Louis, Mo. As a process, subjecting a hot compound vapor containing aluminum to the action of a hot carbon-gas deoxidizer, in the presence of incandescent carbon, for an appreciable length of time, while substantially excluding the air.

626,632. HEATING OR ROASTING FURNACE. William E. Roberts, Butte, Mont. A calcining-furnace comprising a series of vertical or upright posts between the ends of the furnace and at suitable localities to insure the strength of the structure, brackets carried by



626,632.

said posts, longitudinal I-beams carried by the inner ends of said brackets, and distant from said posts, an arch of masonry carried by the said I-beams, side walls and hearth carried by suitable supports, longitudinal continuous slots through the side walls, and extending from end to end thereof and past the vertical posts, and means for closing said longitudinal slots when desired.

626,652. STEAM-PUMP-VALVE-ACTUATING MECHANISM. John K. Dean, Indianapolis, Ind. The combination with a pump, of an auxiliary steam-cylinder adapted to actuate the valves of the compressor-cylinder, with the necessary connections.

626,655. ALLOY OF IRON AND NICKEL AND ARTICLES MADE THEREFROM. Charles E. Guillaume, Sevres, and Louis C. Dumas, Paris, France, assignors to the Societe Anonyme de Commentry-Fourchambault, Paris, France. An article composed of glass and of an alloy of nickel and iron having the same coefficient of expansion as glass united thereto.

GREAT BRITAIN.

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

Week Ending May 6th, 1899.

13,133 of 1898. SLIMES SETTLING. W. Rothe, Gusten, Germany. Process for settling slimes by removing the air from the solution by a vacuum.

13,134 of 1898. TREATING PHOSPHATES. W. T. Gibbs, Buckingham, Canada. Obtaining phosphoric acid from phosphates by heating with felspar or some other silicious or aluminous mineral containing potash or soda.

18,424 of 1898. LEAD SMELTING. E. Ferraris, Zurich, Switzerland. In smelting lead sulphides in a blast furnace, introducing compressed air into the lead bath, so forming an oxide which reacts on the floating sulphide.

22,405 of 1898. COPPER COATING IRON. S. H. Thurston, New York, U. S. A. Covering iron with copper oxide by rubbing metallic copper into the iron surface and then heating.

25,158 of 1898. PLATINUM PREPARATION. M. Schroeder, Hamburg, Germany. Improved method of preparing finely divided platinum for use in the recovery of sulphuric anhydride by the catalytic method.

PERSONAL.

Mr. George B. Paxton of Joplin, Mo., is visiting New York.

Mr. W. M. Brook, who has sold his coast placer mines at Lituya Bay, Alaska, is now at Atlin, B. C.

Mr. Wm. H. Tonking has been appointed superintendent of the Franklin Iron Company's works at Franklin Furnace, N. J.

Mr. John H. Singleton, president of the Yellow Aster Mining Company of Randsburg, Cal., is on a visit to his old home in Tennessee.

Mr. C. Beverley, superintendent of the Geldenhuis Estate Gold Mining Company of Johannesburg, South Africa, has been in Los Angeles, Cal.

Mr. James Hutchinson, superintendent of the Trade Dollar Consolidated Mining Company's gold mines at Silver City, Ida., is visiting Pittsburg, Pa.

Mr. Charles F. Thompson, secretary and treasurer of the Lane & Bodley Company of Cincinnati, O., has resigned his position, to take effect July 1st.

Mr. Chas. W. Miller of Aspen, Colo., has succeeded Mr. N. T. Mansfield as general manager and superintendent of the Smuggler-Union Mines, Telluride, Colo.

Mr. Ross E. Browne, the mining engineer, who now makes his headquarters in London, is in San Francisco, Cal., on business connected with a foreign mining syndicate.

Mr. Albert Ladd Colby, formerly metallurgical engineer for the Bethlehem Iron Company of Bethlehem, Pa., has nearly recovered his health after a year's rest at Long Lake, N. Y.

Mr. Samuel S. Wells of Youngstown, O., superintendent of the electrical department of the Ohio works of the National Steel Company, has resigned to accept a similar position at the Homestead works of the Carnegie Steel Company.

Mr. E. E. Loomis, who, as superintendent of mines, succeeds W. R. Storrs, coal agent, in control of the collieries of the Delaware, Lackawanna & Western Railroad, is 34 years old and a native of New York. He had a good technical education, read law, and started railroad work in the transfer department of the Denver & Rio Grande. He was afterward superintendent of the Tioga Division of the Erie Railroad, and last January became superintendent of the New York, Susquehanna & Western.

Mr. James P. Harvey, for 2 years superintendent and manager in succession of the Republic gold mine at Republic, Wash., has passed in his resignation, to take effect July 1st. He will be succeeded by Mr. Bernard McDonald, who examined the Republic Mine for the Canadian syndicate previous to its transfer to the new company. Mr. McDonald is expected in Republic about July 15th, and Mr. Harvey will act for him in the interim. Mr. Harvey will retain the management of the properties controlled by the Patrick Clark syndicate, including the Lone Pine-Surprise Consolidated, Rebate, No. 6 and Jim Blaine.

OBITUARY.

Richard Parks Bland—better known as "Silver Dick" Bland—died at his home in Lebanon, Mo., June 15th. He was born in Kentucky in 1835, received a common school education and at 20 removed to Missouri. A little later he moved to California, and then to that part of Utah Territory which is now Nevada. He practiced law during this period, but was also interested in mining operations. He was treasurer of Carson County, Utah Territory, from 1860 until the organization of the State government of Nevada. In 1865 he returned to Missouri, and finally in 1869 settled at Lebanon, where he practiced law. Lebanon remained his residence until his death. He was elected to Congress in 1872 and was re-elected continuously until 1894, when he was defeated; but he was again elected in 1896 and 1898. He was widely known as the most active and persistent advocate of the free coinage of silver.

Capt. W. E. Dickinson, well known among iron-mining men in the Lake Superior country, died at Florence, Wis., on June 15th, aged 75 years. He was born in New York City and educated at Litchfield, Conn. He was admitted to the Connecticut bar when 21 years old, and practiced law at Stonington. When the copper mining excitement was on in 1850, he went to the Lake Superior country, where he remained till 1865, when he went to Boise, Idaho, to take charge of a gold and silver mine. He soon returned to Michigan, and in 1870 had charge of some iron mines on the Marquette Range near Ishpeming. He took charge of the iron mine at Commonwealth, Wis., on the Menominee Range, in 1881, and remained there until 1889, when he took charge of the Colby on the Gogebic Range near Bessemer,

Mich. In 1890 Capt. Dickinson went to Cuba for the Spanish-American Iron Company, and on his return in 1894 resumed the practice of law in connection with the manufacture of powder. He left a widow and 8 children.

SOCIETIES AND TECHNICAL SCHOOLS.

Montana Society of Engineers.—At the regular meeting at Helena on June 10th the secretary was instructed to send out ballots that members might vote on an amendment to the constitution transferring the headquarters of the society to Butte. The death was announced of Henry C. Relf, resident engineer of the Northern Pacific Railroad, by drowning in the Clark's Fork River near Plains, on June 9th. A special meeting of the society will be held in Butte on July 8th.

Engineers' Society of Western Pennsylvania.—At the regular monthly meeting on June 20th, it was decided to arrange for an outing for the Society in the early part of July. A report was presented from the Smoke Committee as regards the rating of boilers and the best means of preventing smoke.

The paper of the evening, by Mr. F. E. House, General Superintendent Pittsburg, Bessemer & Lake Erie Railroad Company, Pittsburg, Pa., was received with much interest. He described the building of a tunnel, in which the methods were unique in several ways, especially in that a great portion of the rock was removed with steam shovels worked by compressed air, the shovels being cut down so as to enter the tunnel.

Michigan College of Mines.—At a recent meeting of the Board of Control Prof. Fred W. McNair was unanimously elected president of the institution. Professor McNair has been for some years in charge of the department of Mathematics and Physics and has identified himself with the work and growth of the College, showing fine executive ability, besides being an energetic and successful teacher. He has been Acting President since the resignation of Dr. Wadsworth.

A. E. Seaman has been appointed Professor of Mineralogy and Geology. He was formerly Assistant Professor in these subjects. The summer courses in surveying, shop practice, ore dressing and mechanical laboratory practice began June 12th. The course in field geology will begin July 24th.

American Association for the Advancement of Science.—The 48th annual meeting will be held at Columbus, O., August 21st to 26th. A preliminary announcement states that the secretary of the local committee who has charge of matters relating to transportation and accommodations, is Prof. B. F. Thomas, of the Ohio State University. The register for the Columbus meeting will open at University Hall on August 17th. The Central Passenger Association, covering the territory from Toronto, Chicago and St. Louis and north of the Ohio, has granted a rate of 1 fare for the round trip, while the Trunk Line Association has granted a 1 1/3 rate on the certificate plan. The day sessions of the meeting will be held in the university buildings, while the night sessions will be held at the Board of Trade Auditorium, while Chittenden Hotel has been chosen as headquarters. It is intended to make excursions to the mounds at Fort Ancient, the coal fields of the Hocking Valley and the natural gas fields, while the arrangements are under way for excursions at the close of the meeting to points of interest on the upper great lakes. Programs of the papers to be presented before the various affiliated societies are in course of preparation.

INDUSTRIAL NOTES.

The Jeanesville Iron Works Company of Jeanesville, Pa., has received an order from British Columbia for 3 compound mining pumps.

The Weimer Machine Works Company of Lebanon, Pa., is having some good foreign orders, building for Germany 8 of its 200 cu. ft. patent cinder cars, for Russia 2 cars and for England 5 cars.

The Keystone Iron Works, Ft. Madison, Ia., builders of the Lamos gas and gasoline engines, has made recent shipments of its engines to Dallas City, Ill.; Aberdeen, S. D.; Weaver, Ia., and Cahokia, Mo.

Graham, Garrett & Company, mining promoters, of Spokane, Wash., are about to open offices in Wall Street, New York City, which they expect to have in working order within a few days. Mr. John H. Garrett of the firm will be in New York about the 20th.

At a meeting of the stockholders of the Chateaugay Ore and Iron Company at Lyon Mountain, N. Y., the following directors were elected: Smith M. Wood and Frank E. Smith, of Plattsburg; Robert M. Olyphant, C. Adolphe Low and Talbot Olyphant, of New York. James N. Stower and Walter F. Davidson were elected inspectors.

It is stated that the Thomas Furnace Company of Duluth, Minn., has leased for 3 years the docks and 120 coke ovens, formerly the property of the Lehigh Coal & Iron Company at West Superior. Only 70 ovens are in repair, but the rest will be put into shape and 100 more constructed. The plant is to furnish coke for the furnace at West Duluth.

It is stated that the Niles-Bement Pond Company is about organized under New Jersey laws by men prominent in the Niles Tool Works Company to include the Niles Tool Works Company, Hamilton, Ont.; Bement, Miles & Company, Philadelphia; Pond Machine Tool Company, Plainfield, N. J.; Philadelphia Engineering Works, Philadelphia.

The assignee of A. J. Boyce, at East Liverpool, O., has sold the Industrial Foundry and Machine Works there to a syndicate of manufacturing potters for \$16,675. The syndicate also has an option on the Patterson Foundry and Machine Works, in East Liverpool, and it is expected that both plants will soon be manufacturing potters machinery.

The Union Steel and Chain Company at a recent meeting in New York City elected directors as follows: Perry Belmont, J. W. Hinkley, H. L. Horton, Thomas S. Holmes, Henry W. Poor, Frank Rockefeller and William Rotch. The board will be increased later. Charles R. De Freest is secretary, and the company's offices are in the Empire Building.

Messrs. R. W. Davies of Warren, O.; Jas. V. Rose of Sharon, Pa., and Fred Russell of Pittsburg, have organized a company to run the shops of the Sharpville Foundry and Machine Company, at Sharpville, Pa. The new concern will be called the Sharpville Foundry Company, Limited, and will manufacture the Davies pig casting machine.

The Russian Government has ordered from the Link Belt Engineering Company of New York City hauling and elevating apparatus, with electric appliances for driving it. Four equipments are to be erected at various points along the new Siberian road for hauling logs, etc., for the railroad. The contract calls for considerable machinery of the Link Belt type.

The Diamond State Steel Company of Wilmington, Del., is about ready to begin work on an open-hearth steel plant, with both acid and basic furnaces, with a capacity of 400 tons per day; as well as a blooming mill and a universal plate mill, built on modern lines with full hydraulic and electrical equipment, after plans by Robert Aiken of Pittsburg. It is expected to have the improvements ready January 1st, 1900. The present plant is running night and day and upward of 1,200 men are employed.

A press dispatch from Pittsburg, Pa., states that one of the largest soda ash plants in the world is to be built at once by the controlling stockholders in the Pittsburg Plate Glass Company at a cost of about \$3,000,000. It is probable that the works will be located at Barberton, near Akron, O. Stockholders have formed the Columbia Chemical Company, and a charter will be applied for in Pennsylvania. The directors will be: John Pitcairn, Henry C. Frick, Andrew W. Melton, George T. Perkins, William W. Heroy and W. L. Clause.

The Armstrong Manufacturing Company, of Bridgeport, Conn., has found its business increasing so rapidly that another addition to its plant has been found necessary, the second since January 1st. New machinery is being added and the company has built a large fire-proof warehouse for the shipping department. The company reports an increase of 30% in export business within the past few months. No less than \$125,000 worth of pipe threading machines have been exported to Germany since January 1st. This amount is said to be greater than the entire production of Germany.

C. E. Baird & Company of Philadelphia have bought the Elmira Iron and Steel Company's plant at Elmira, N. Y. The iron department contains 17 puddling furnaces and 6 trains of rolls, while the steel department contains 2 basic open hearth furnaces and a universal plate mill. The new owners have begun work, and will soon have the entire plant in operation. It is said the Elmira Steel Company is to be organized and extensive improvements and additions made as promptly as possible. Two more open-hearth furnaces and a large tin plate plant will be installed. This plant will employ 1,000 men.

The Raritan Copper Company will erect a new furnace building at Perth Amboy, N. J., and has placed the contract with the Berlin Iron Bridge Company of East Berlin, Conn. The building is 90 feet wide, 130 feet long and 22 feet high, constructed entirely of steel with traveling cranes, runways, etc. The Berlin Company has also the contract for an extension to a factory building for the Port Chester Bolt and Nut Company, Port Chester, N. Y. The extension is 32 feet wide and 125 ft. long. The construction is to be similar to the building erected by the Berlin Com-

pany a short time ago. The supporting trusses and columns are of steel; the roof is of weave shed form, having a glass exposure on the north, which insures a large amount of light from the proper directions.

The duplex vertical high pressure air compressor at 24th Street and 11th Avenue, New York City, is the largest of its kind ever erected. It will supply over 40 street cars. Cars operated by air went into regular service on the 23d Street line of the Metropolitan Street Railroad last week. The General Liquid Air and Refrigerator Company of New York City has a straight line compound class "A" air compressor; a straight line class "A," 3-stage compound compressor and liquefying apparatus, which is said to have liquefied air at the rate of 1 gal. a minute, exceeding the highest calculations of the inventors, Messrs. Ostergren & Burger. All the compressor machinery for these two plants was furnished by the Ingersoll-Sergeant Drill Company of New York.

The Westinghouse Electric & Manufacturing Company of Pittsburg, Pa., has a contract from the San Gabriel Electric Company, at Azusa, Cal., for an additional rotary converter of 500 H.P., which will supply current at 16,500 volts to the street railroads of Los Angeles. Another contract has been received from the Big Creek Power Company of Santa Cruz, Cal., for a 250 H.P. generator and 4 raising and lowering transformers of 400 H.P. The company has also the contract for 2 1,000 H.P. generators and 2 large exciters, with traveling crane for handling the machinery for the Hartford Electric Light Company of Hartford, Conn. The Jackson Milling Company of Centralia, Wis., has contracted for its power plant on the Wisconsin River, at Stevens Point, 1 650 H.P. 2-phase generator, with transformers.

The National Tube Works of Pittsburg, Pa., has completed the shipment of some remarkable orders for pipe for the Rand Mines, South Africa. The order was taken in competition with other United States, German and English plants. The engineers of the National Company argued that the 28-in. lap-welded pipe would deliver as much water as 30-in. riveted pipe. The order was given on February 14th, and the first plate was received by the National Company on February 27th. A furnace was started on the order on March 23d, the first shipment made 2 days later and the furnace completed the order on June 5th. The average weight of each plate was 2,573 lbs., and the number of pieces shipped was 2,872. The total length of the pipe 53,520 ft., and the total weight about 4,600 tons. It was the largest order of lap-welded pipe ever made.

Mr. Alfred C. Torbert and Frederick A. Peckham have formed a partnership under the firm name of Torbert & Peckham to carry on business in the Monadnock Block, Chicago, Ill., as general purchasing and selling agents for contractors' and railroad supplies, mining and general machinery, both new and second-hand. The firm states that Mr. Torbert has had many years experience in engineering and contracting work. He has been for the past 8 years general purchasing agent for the McArthur Brothers Company of Chicago. Mr. Peckham has for 11 years been connected with the regular staff of the "Engineering News" of New York City, being for 3 years in the editorial department and for several years the manager of its Western branch with headquarters at Chicago.

TRADE CATALOGUES.

The Detroit Lubricator Company of Detroit, Mich., states that it has just got out a new line of glass body oilers and glass body oil pumps. The oilers, while simple in design, are equipped with all the latest improvements, including the set feed and stop feed features, and are well and strongly made, with cast tops and bottoms. The firm has issued pamphlets describing these devices, which will be sent on application.

Reciprocating electric pumps are described in circular No. 17, 8 pages, issued by the Commercial Electric Company of Indianapolis, Ind. The pumps shown are made in a variety of sizes and styles from a small house pump with a capacity of 100 gal. per minute, to a heavy mine pump with a capacity of 2,000 gal. per minute against 125 ft. head. The mine pumps, it is stated, have iron-clad enclosed type motors, have special protection against damage by water or falling slate and are specially insulated to avoid liability to grounds.

Herman Kohlbusch, of New York City, manufacturer of balances and weights, sends out an illustrated price list of 38 pages of balances for druggists, jewelers, chemists and assayers. An assay balance for traveling and a pocket assay balance, both of neat design and low price, were illustrated in a recent number of the "Engineering and Mining Journal." The manufacturer claims high quality for his balances as the result of 50 years' experience; also calls especial attention to the merits of his platinum plating,

which, he states, does not peel off, as in some other methods.

The Laughlin-Hough Company of New York City, manufacturer of patent mathematical draughting tables and supplies, issues a 16-page pamphlet. The draughting board described has an outer frame provided with a stationary protractor, while the inner board to which the paper is fastened revolves on its center, enabling the draughtsman, it is stated, to note any desired class of drawings without the use of T squares, angle squares, protractors, parallel rules, dividers or sectors. A great saving of time is claimed in consequence, besides greater comfort for the draughtsman. The tables are made in various styles, the simplest being designed especially for the use of students and mechanics.

Caillets "Monorail" is described in a 52-page catalogue issued by Laurence Poutney Lane, of Cannon street, London, E. C. This very portable system of transportation consists of a single rail of light section supported by steel sole plates laid direct on the ground without sleeper or ballasting. The cars and trucks, which are made in a great variety of styles for different uses run on 2 wheels of small diameter and are kept upright and propelled by means of a rod projecting from the car at right angles to the track. Among advantages claimed for the system are the cars cannot upset nor easily run away, the line is quickly and cheaply moved, and its first cost is very low. It has been tried in France, Mexico, French Guiana and in Egypt. The catalogue is well illustrated with numerous half-tone cuts.

MACHINERY AND SUPPLIES WANTED.

If any one wanting machinery or supplies of any kind will notify the "Engineering and Mining Journal" 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; and the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying and selling goods of any kind.

GENERAL MINING NEWS.

Many rumors have been current about the reorganization of the Standard Oil Company. At a meeting of the stockholders of the Standard Oil Company of New Jersey last week, it was voted to increase the capital of that corporation from \$10,000,000, the present figure, to \$110,000,000. The New Jersey company is primarily a refining company, but has other extensive charter privileges. The most reliable information is to the effect that the long-delayed liquidation of the old Standard Oil Trust is about completed and that the control of all the Standard Oil properties will pass to the New Jersey company by an exchange of stock. The present constituent companies will not lose their identity, but will retain their present forms. This is necessary on account of the varied nature of these companies and the different State charters under which they operate. There is nothing, however, to prevent stockholders in the present companies from selling or exchanging their stock for stock of the New Jersey company, thus giving the latter control of all, and this is supposed to be the plan.

ALABAMA.

Graham County.

Arizona Copper Company.—This company reports for May an output of 1,035 tons black copper. For the 5 months ending May 31st the total was 4,555 tons black copper.

ALASKA.

Ruby Sand Gold Mining Company.—W. M. Brook, with his partner, has transferred all the property at Lituya Bay belonging to this and the Fairweather Mining Company to the Lituya Bay Gold Placer Mining Company, that has been incorporated under California law with \$10,000,000 capital.

CALIFORNIA.

Amador County.

(From Our Special Correspondent.)

Bunker Hill and Mayflower.—These mines have been sold by order of the court, for account of the Spring Garden National Bank of Philadelphia, which company loaned \$300,000 9 years ago. They were bought by C. R. Dawns, E. C. Voorhies, W. F. Detert and W. J. McGee for \$20,500. About \$1,000,000 have been taken out since 1880. The machinery cost over \$200,000. The mine is at Amador City.

Ivanhoe.—The new shaft at this mine, 2½ miles northeast of Plymouth, is down 80 ft. The 20-stamp mill is kept running on ore from the shaft. The ore is fair grade, carrying both free gold and sulphurets. About 30 men are employed.

Lucas.—At this mine, near the Mokelumne River, sinking will continue. The result of the 2 months' run of the 10 stamp mill was very satisfactory. The ledge is 7 ft. wide. Mining and milling is said to cost about \$1 per ton.

Shenandoah Development Company.—This company is sinking a shaft on the ledge about 300 ft. from the old workings at the Easton Mine, about 2 miles northeast of Plymouth, and some good rock has been cut. The vein is about 7 ft. wide.

Wildman & Mahony.—The 3-compartment shaft at Sutter Creek has reached the 500-ft. level. Power drills will soon be put in.

Calaveras County.

(From Our Special Correspondent.)

Utica Gold Mining Company.—This company has ordered from the Westinghouse Electric and Manufacturing Company 4 static transformers, 2 of which are 150 k. w. each. In addition the firm has ordered a 150 H. P. motor to assist in mine work, such as hoisting, running ventilating fans, and in the general operation of the works. The order also includes 11 Wurts non-arc lighting arresters for the company's lines.

Ford Gold Mining Company.—At a special meeting of the stockholders the superintendent made a report of the work since March 1st, when the 10-stamp mill started. This report showed a small deficit. He satisfied the stockholders that the mine contained valuable ore and can be made to pay handsomely. On the 300-ft. the ore looks well, and assays from the south drift go from \$30 to \$50 per ton free gold, besides the sulphurets, which show as high as \$126.

Hazel Dell.—The shaft on this property, on Prussian Hill, near Railroad Flat, is down 60 ft. and will be continued. The 3½-ft. ledge prospects well, and the ore will be milled at the 5-stamp mill of the Prussian Hill Mine. This latter mine cleaned up \$1,200 from a 12-day run.

Shoestring.—At this gravel mine, on the Calaveras River, near McQuaid's place, the old tunnel has been cleaned out and retimbered, the water has been pumped out of the 45-ft. winze. There are 2 old river channels—an upper and lower one. The upper is a good hydraulic proposition, while the lower would require drift work.

Inyo County.

(From Our Special Correspondent.)

Surething.—A shipment of ore is going to the smelter. Assays are said to run very high.

Copper Queen.—The shaft at this mine, near Citrus, is down 30 ft., with encouraging results.

Mono County.

A consolidation of the interests of the Montecito, Sterling and Goleta mining companies of Jordan District, into the Goleta Consolidated Mining Company was perfected in San Francisco, June 15th, by the election of a board of directors and officers for the new company. Of the directors elected, James F. Tichenor, F. L. Underwood and James A. Alexander reside in New York, and William McM. Weigel, George H. Folsom, Leander Shores and D. M. Kent in San Francisco. James F. Tichenor was chosen president; William McM. Weigel, vice-president; D. M. Kent, secretary; E. R. Grant, treasurer and transfer agent in New York; Hugh W. Nelson, superintendent. The capital stock is \$300,000, divided into 300,000 shares of the par value of \$1 each.

(From Our Special Correspondent.)

The cyanide plant at Lundy will be in operation in a few days. A 10-stamp mill will be run in connection with it.

Nevada County.

(From Our Special Correspondent.)

Gold Run Copper.—This mine, above North Bloomfield, owned by the McKilloan Estate, has been bonded, and Otto Woehler will take charge of development. A tunnel has been run to the ledge, and drifts will be run both ways.

North Bloomfield.—An incline shaft is being sunk from the end of the tunnel, which is in 800 ft., to reach the recently discovered channel in this hydraulic property, in North Bloomfield. This part of the mine will be worked by drifting, and mules will be used to haul the gravel up the incline.

Omaha, Lone Jack & Homeward Bound.—This group of mines, just south of Grass Valley, is to be developed on a large scale. By November the ground will be sufficiently opened up to put a large force of men at work.

Sazarac.—At this gravel mine, near Rough & Ready, which has been worked under lease by Gluyas, Smythe, Dibble & McMath, pay gravel has been struck after running a drift 150 ft. in the rim rock. It will be necessary to drift 150 ft. to the low bedrock to work to advantage.

Slide.—Webb, Baldwin & Marony, who are interested in this property, 1½ miles east of French Corral, are making arrangements to put in a 50-stamp mill, concentrator, and other machinery. Other improvements will be made in the near future.

Placer County.

(From Our Special Correspondent.)

Jupiter.—Work at this mine, near Iowa Hill, is progressing rapidly. The shaft is down 200 ft., and will probably reach the channel in another 200 ft. The working force is to be increased to 15 men.

Plumas County.

(From Our Special Correspondent.)

Shenandoah.—Development work is to be resumed at this mine, at the head of French Ravine, 12 miles northwest of Spanish Ranch. A force of 15 men will be put on, and the ledge uncovered. The old workings include 3 tunnels on the vein. The 10-stamp mill was run by water, obtained from Clear Creek, by a ditch 1½ miles in length.

Shasta County.

(From Our Special Correspondent.)

The Afterthought Copper Mine, 15 miles north of Redding, 1 am inforced, will soon be in operation after an idleness of many years.

Thirty copper claims are being developed under bond by Simonds of New York and Malm of San Francisco within 6 miles of Kennett.

From 80 to 120 tons of ore per day are transported by cable tramway from the Garfield, Mammoth and Evening Star mines 2 miles to Copley, thence shipped 6 miles by rail to Keswick.

Near Shasta, F. Hurst is developing a property under bond from which he hauled 50 tons 4 miles to the smelter; the ore yielded from \$14 to \$22 per ton. The possibility of good returns without erecting costly reduction works causes much development, but there are claims that would justify the erection of such works.

Resumption of work on claims abandoned 10 and 15 years ago is quite general, particularly so within 15 to 20 miles of the Mountain Copper Company's smelter at Keswick.

Mountain Copper Company, Limited.—This company has increased the wages of most of its employees. The railroad men will not be benefited by the order, which goes into effect at once.

Sierra County.

(From Our Special Correspondent.)

Golden King.—At this group of mines, on the South Fork of the Kanaka Creek, 3 miles east from Alleghany, operations are to be resumed by the owners. A large amount of development work has been done.

Siskiyou County.

(From Our Special Correspondent.)

Salmon River.—This hydraulic mine, on the North Fork of the Salmon River, 5 miles north-east of Sawyer's Bar, will be able to run all summer with a full supply of water. The management expect to clean up a large amount of gold dust this season. The property is well equipped with machinery.

Trinity County.

(From Our Special Correspondent.)

Trinity Gold Placer Syndicate.—The hydraulic and drift property owned by this company, at the head of Coffee Creek, extending for 7 miles along the creek, is being worked under the management of William Maitland; 10 men are employed sluicing, etc. The property will be in good shape by next season. The South Fork of the Coffee Creek, gives about 3,000 in. of water.

Tuolumne County.

(From Our Special Correspondent.)

Laurel Gold Mining Company.—This company is transferring the hoist pump, buildings, etc., of the Junction Mine, near Soulsbyville, to its property, near Arrastraville. In a few days everything will be in shape, and a large force of men will begin development.

Shawnut-Eagle.—The rights of way for the big pipe line will be secured soon. The line, which will tap the Tuolumne County Water Company's ditch, on the Tim Willy Ranch, near Algerine, will be 2 miles long. Water enough will be secured under 1,000 ft. pressure, to generate power for all purposes.

Tarantula.—At this mine an incline shaft is down 940 ft., and a station and a chute on the 900-ft. level is being cut. This property is 1 mile southwest of Tuttle town, 2 miles from Table Mountain.

COLORADO.

The far-reaching effects of a shut-down of the smelters on all industrial activity in Colorado is so impressive that neither employers nor employees have maintained an aggressive attitude, nor has there been any disorder. The strike of the coal drivers and day laborers was followed by a strike among many of the coal miners. The precious metal mines and mills are variously affected. Cripple Creek has felt the conflict but little, as wages in the mines there have been higher generally than anywhere else in the State, ordinary miners receiving \$3 a day, and the bulk of the Cripple ore does not go to the

smelters. In Boulder County the miners in many properties continued at work at \$2.50 for 8 hours, but the men enter and leave the mine on their own time. In Fremont County the Colorado Fuel and Iron Company's coal mines are closed. In San Miguel County some of the mines continue to run as before the law went into effect; at others the men work 8 hours, taking time at the breast. The camps producing smelting ore in large amounts are most affected. A committee of prominent citizens has attempted to bring about a settlement between the American Smelting and Refining Company's officials and the employees. This attempt seemed early in the week to promise success at once, but a demand by the Denver Federation of Labor for recognition of the Smelter Men's Union nearly wrecked negotiations. President Nash, of the American Smelting and Refining Company, however, offered to make a fair compromise with the men. The demand for a speedy settlement has now become so strong that matters may be compromised any day.

The question of the constitutionality of the 8-hour law is still to be decided. It is pointed out that the Colorado constitution contains no specific clause giving the State the right to regulate employment in mines. The constitutionality of the Utah law rests upon a clause of this nature in the State constitution.

The Guggenheims' Philadelphia Smelter at Pueblo has continued in blast, the men accepting an 8-hour day with a compromise on wages.

Boulder County.

Village Bell.—This mine, at Eldora, now owned by New York men, recently shipped some high-grade tellurium on to the smelter, and has a considerable amount of low-grade ore on hand awaiting the completion of the chlorination plant at Eldora.

Gilpin County.

(From Our Special Correspondent.)

Ore Shipments.—During May the shipments from the Black Hawk depot to the smelters and outside points consisted of 344 cars, or 6,364 tons, of smelting and crude ore and concentrates. In comparison with May, 1898, the shipments show an increase of 2,268 tons, over 50%.

Concrete.—This mine produced 191 cords, or 1,575 tons, of ore in May. S. V. Newell is manager.

Boston & Denver Mining Company.—This company, according to reports, has secured the old Bobtail Mine, at Black Hawk, and will start work on it.

East Whiting.—A good strike has been made in the 320 east level; the ore carries values of close to \$200 per ton. The mine is producing 30 tons of ore, mostly milling, daily. Ohio parties are the new owners. F. H. Clark is manager.

Kansas-Burroughs Consolidated Mining Company.—The output for May was 479 cords, or 4,070 tons, a daily production of 131 tons. P. McCann is manager of this, the heaviest producer in the county.

Topeka.—At this Russell Gulch mine an 18 in. seam of white quartz, mining high in free gold, has been opened.

Lake County—Leadville.

(From Our Special Correspondent.)

Smelter Strike.—There is practically no change here in the smelter situation. Fully 1,500 miners have been laid off. This, with the 900 smelter employees, gives a conservative total of 2,400 idle men. The railroad employees, timber cutters and haulers, and others, will bring the number still higher. The Stars and a few iron leasers are still shipping small quantities to the Guggenheim plant. The Garden City is still shipping manganese to the steel works at Chicago, but the bulk of manganese tonnage which came from the Catalpa-Crescent has stopped, as lead ore and iron were mined together. The Big Four and the Fanny Rawlings are still working, with full forces, the only 2 gold properties in the camp producing, because their leases expire this year, and the lessees are taking out all the ore they can. The Ibez, Resurrection, Monarch, President, Ballard, Big Six and other gold-belt producers have laid off about two-thirds of their men, and are doing a little development work and keeping their pumps going. The Moyer, Mab, Mahala, Mari-an and many other sulphide producers have laid off most of their men, while a number of leases have shut down entirely. The downtown mines continue pumping, although the Northern and Star stopped hoisting. The shut-down is a severe blow, following the hard winter. The first full pay-roll since January was the first week of June, when over \$250,000 was paid out. It is to the credit of the workmen that they have behaved well and no trouble of any kind has occurred.

Bon Air.—The Snow sinking pumps at the Bon Air have been recovered, and are working satisfactorily.

Dewey District.—The New Years has its concentrating mill ready for a big tonnage. The Monte Cristo is taking out a steady tonnage.

The Dundee shows shaft is being timbered, preparatory to sinking deeper. A little ore is being taken from the Belle of Granite, while its mill dirt is handled through the Parker mill at Granite.

Dinero.—This property, on Sugar Loaf, is worked by 5 sets of lessees. The mine is in charge of C. E. Mulloy.

Gazelle.—The ground including the old Pocahontas, Grey Eagle, Gazelle and others will start up in a short time under lease secured by a new company headed by Mr. Sam Nicholson.

Golob-Colley Zinc Mill.—The old Tabor Mill, in California Gulch, has been refitted and will make a first run on Maid of Erin ore. The stuff is run over a Wilfley table and showed a clean product of 47% zinc. At first the mill will handle 15 tons every 24 hours.

Greenback.—The main drift is within 50 ft. of the ore shoot, at the 1,100-ft. level. The big hoist is being put in.

Home Mining Company.—At the annual election this week the old board of directors which was chosen selected Major A. V. Bohn as manager. Reports showed that work was going ahead satisfactorily, and that the \$50,000 subscribed had been used in development and drainage work.

Revenue Mining Company.—This Boston concern has work under way. No. 1 shaft is down 100 ft., and No. 2 shaft has started, but awaits some Oregon pine for the gallow's frame.

Ruby.—In this property, in Weston Pass, owned by Eastern people, another good strike shows about 4 ft. It runs much better in silver and lead than the original body. This makes three distinct shoots that have been opened in this mine and in the Colin-Campbell adjoining.

La Plata County.

(From Our Special Correspondent.)

Porter Coal Mine.—The mine closed indefinitely on June 13th. Manager Herr states that this step is due to the local smelter going out of commission, for most of the coal went to the coke ovens and the railroads. About 200 men lose employment.

Mineral County.

Mining Conditions.—The 8-hour law went into effect June 15th with no reduction in wages, but the men enter and leave the mill on their own time. Over 700 men are idle at Creede on account of the shut-down of the smelters.

San Juan County.

(From Our Special Correspondent.)

Sunnyside.—The first mine of the Silverton section to adopt the 8-hour shift was the Sunnyside, where the new law was practically put into effect 3 weeks ago.

Wages and Hours.—In San Juan miners' wages have ruled at \$3 per 10-hour shift. Some of the mine owners believed this is the maximum that low lead-silver properties could stand, as they are told that freight and treatment charges cannot be further reduced. However, the majority of the owners seemed to have been in favor of paying \$3 per 8-hour shift, provided the men gave 8 hours' actual work.

Teller County—Cripple Creek.

(From Our Special Correspondent.)

Smelter Strike.—The strike of the smelter employees and the shut-down of most of the smelters in the State, while harming this district to some extent, will not do any further harm, at least at present. The chemical mills are still running, and it is reported they have contracted for some of the ore heretofore treated by the smelters. About 75 per cent. of the ore of this district is usually treated by the mills.

Elkton Consolidated Mining and Milling Company.—At the annual meeting in Colorado Springs the following directors were elected: Geo. Bernard, Sam Bernard, W. S. Jackson, J. H. Avery, J. W. Graham, William Shimwell and Richard Clough. They chose the following officers: Geo. Bernard, president; W. S. Jackson, vice-president; J. H. Avery, secretary and treasurer, and Daniel Thatcher, assistant secretary and treasurer. The president's report shows the condition of the mine to have been encouraging, though not quite up to expectations. A large tonnage was shipped, which did not run as high as expected. The net earnings were \$170,000, of which \$120,000 was paid in dividends and over \$65,000 was also paid out on the purchase of the Katherine and Apple Ellen lodes. There is now in the treasury \$89,896. There remain 460 ft. to be driven to bring the fifth level up to the north line, and if the ore shoot continues it will be over 1,500 ft. long. The shaft is being sunk 200 ft. The water has nearly drained off, leaving little more than enough to supply the mill, etc. The superintendent's report shows that considerable ore is being taken out of the upper levels of the Walter claim by lessees, from which the company is receiving a fair profit. Indications in the fifth level are promising, the vein having been opened on a continuous ore shoot of about 1,100 ft. During the year, 193,100 ft. of ground were stoped out,

and 2,811 ft. of drifts, 726 of crosscuts, 780 ft. of upraises made. The product was 22,252 tons of the average value of about \$23, besides about 1,100 tons of low-grade ore taken from the Apple Ellen. The outlook for the ensuing year is bright.

IDAHO.

Idaho County.

Washington.—This mine, at Idaho City, has been pumped out after lying idle for 8 or 9 years. The shaft is 300 ft. deep. The 10-stamp mill is running steadily.

Shoshone County.

Mining Conditions.—The Helena & Frisco Company resumed work at its property at Gem with a force of 25 men on June 14th and is employing all members who apply for work. This is the only property at work up Canyon Creek, as the Standard and Hecla have not resumed yet. Preparations for the trial of some 250 men who are held prisoners at Wardner progress. Charges of murder and arson are to be preferred by the State. The grand jury returned true bills against all the participants in the riot of April 29th that have been identified, a large number of others who have been identified as participants have been indicted under fictitious names, their real names being unknown to the jury.

Agents of some of the companies have been engaging men to take the place of the striking miners from the zinc-lead district about Joplin, Mo.

Bunker Hill & Sullivan.—The new concentrator at Wardner will be essentially like the one destroyed, but will have a 50 by 80-ft addition for a vanner and round-table room. The capacity of the mill will be increased from 550 to nearly 800 tons daily.

Tiger-Poorman Consolidated Mining Company.—It is stated that Messrs. F. L. Clark and Chas. Sweeney, of Spokane, Wash., have taken an option on the Glidden interests in the stock of this company, about 600,000 shares out of the total \$1,000,000, at a reported price of 24c. per share, or \$240,000 for the mine. S. S. Glidden, of Spokane, is president of the company, and Frank Culbertson secretary and general manager. The mines are at Burke, and the re-organized company paid its first and only dividend in January. The mines and mill have employed about 150 men, and the average output of late has been 1,500 tons, until the Canyon Creek mines all closed. Joseph McDonald, of the Helena-Frisco, is reported to have a large interest in the deal.

MAINE.

Oxford County.

Northern Mica Company.—This company was recently organized at Rumford Falls, with \$250,000 capital. The company controls leases on over 12,000 acres of land in this country, supposed to contain valuable deposits of mica. W. Scott Robinson is the promoter of the company. The officers are: President, W. V. Lander, Rumford Falls, Me.; vice-president, Winnifred Robinson, Hartford, Me.; treasurer, J. J. Lander, Bingham, Me.; mining manager, W. Scott Robinson, Norway, Me. The above and W. N. McCrillis, North Rumford, directors.

MICHIGAN.

Iron—Menominee Range.

Sheridan.—At this mine, at Iron River, several carloads of ore have been shipped from the stockpiles, and hoisting will soon begin. The shaft is to be sunk another level.

MINNESOTA.

(From Our Special Correspondent.)

The depth of water at the Sault is growing better and there will be no trouble soon for vessels to load to 18 ft., enabling them to carry many hundred tons of cargo extra per trip, as each inch adds 75 to 80 tons capacity. The record from the Duluth & Iron Range docks was broken recently by the schooner "Fritz," of the Bessemer Company, which loaded at Two Harbors 6,800 gross or 7,616 net tons. This was in tow of the steamer "Morse," with a cargo of over 6,000 gross tons, making about 13,000 gross tons of ore carried by one engine, and the "Morse" moved this tremendous load at an average speed of 11.2 miles per hour for the entire distance, including locks and rivers. The largest load ever carried down was from the Duluth docks of the Duluth, Missabe & Northern road last fall by the schooner "Roebling," of the Bessemer fleet, with 7,866 net tons.

Ore shipments are much heavier than in any month of any preceding year, averaging over 100,000 gross tons daily from the upper lake region. It is probable that June's total shipments will be not much under 3,300,000 gross tons. Last week one day the Duluth, Mesabi & Northern road shipped 54,000 gross tons, and the Duluth & Iron Range is doing from 40,000 to 50,000 a day frequently. The two Marquette roads are shipping at the rate of about 1,000,000 tons each for the season, and the Escanaba docks are very busy. At the Superior docks of the Eastern

Minnesota, there has been considerable trouble from delays since the beginning of the season, but of late the Mahoning has been shipping as high as 6,000 tons a day, and the Penobscot some 700 to 800 tons.

Secretary of War Alger and party were over the Minnesota iron ranges with president Great-singer, of the Duluth & Iron Range road. Those who accompanied them were Congressman Morris, of Duluth, President Ordean, of the First National Bank, A. B. Wolvin, of the transportation interests of the American Steel and Wire Company, and D. E. Woodbridge.

Iron ore freight rates are still 60, 65 and 70c. from the various ports, but an advance to \$1 is expected within 60 days.

Iron-Mesabi Range.

(From Our Special Correspondent.)

Auburn.—This Minnesota Iron Company's mine has a steam shovel in the milling pit, and is mining both by it and mills. The shovel loads from the ore bed, 120 ft. below surface into tram cars, which run on a belt line through a drift to a pocket at the shaft, where the ore goes to surface in 6-ton skips. The mine is loading about 15 tons per shift per man on the ground, and this year's output will be about 450,000 tons. This mine has been stripped and mined by milling down about 100 ft. from the top of the ore, there being about 30 ft. of stripping at one side the pit. There is a very good depth of ore under the present bottom of the mine, and a very large area south and east that will probably have to be handled underground. Auburn ore is mined at low cost, with a royalty of 25c., and runs about 64% iron and .044 in phosphorus.

Commodore.—This mine, at Virginia, is shipping 750 tons daily, with 200 men on the payroll.

Lake Superior Consolidated.—This company is to ship the Day stockpile, about 85,000 tons. At Pillsbury 60 men are working, with room for as many more. Sellers shipped some 300 cars from stock last week, and work is going on steadily. Rust is shipping about 500 tons a day, and is rapidly reducing its 50,000-ton stockpile. C. H. Munger has resigned management of one of these Hibbing properties, and has taken charge of the Sparta Mine, at Sparta.

Mesabi Iron.—At the annual meeting, in Duluth, the old officers and directors were re-elected. The company was a pioneer among Mesabi interests, but unfortunately made its selections east of where good ore has been found. It has 9,000 acres of land. An option was given a few days ago, and exploration will soon begin.

Ohio.—This Lake Superior Consolidated Company's mine at Virginia is using one shovel at the foot of a 40 to 45-ft. ore bank. Laborers with pickaxes pick the ore and let it run down to the shovel, where it is dipped into cars. The writer recently saw 6 cars of 27 gross tons capacity each loaded in just 12½ minutes. Stripping at Ohio extends clear across through the Oliver formation, and there is a solid bed of ore exposed perhaps half a mile long and probably 1,200 ft. wide. At the east of this and its continuation is the Norman, now idle, and adjoining it is the end of the Ohio pit, where stripping is now under way to extend the ore exposure. Scarcely anywhere except on the Mesabi range could such a sight be seen as at this opening.

Penobscot.—This mine is shipping about 800 tons a day, mostly from stock. The mine is short-handed, and is not raising over 150 tons a day.

Iron—Vermilion Range.

(From Our Special Correspondent.)

Minnesota Iron Company.—Stockpiles at Tower have been pretty well cleaned out, and the mine is shipping very rapidly. There is little in stock now but crushed Vermilion grades.

Explorations have been started by S. Owens on Sec. 36, T. 63, R. 16, an island in Vermilion Lake, where there are indications of ore that are promising, though the extent of the deposit is of course unknown.

D. E. Woodbridge and others have a lease on half of Sec. 36, T. 64, R. 10, where there are promising indications east of Vermilion, and explorations will begin there very shortly. The Duluth & Iron Range has located a survey for the eastward continuation of its road along the range, across this location.

MISSOURI.

Jasper County.

(From Our Special Correspondent.)

Joplin Ore Market.—The week ending June 17th saw another decrease in sales and another cut in prices. So far the ore buyers have paid the scale of the Missouri Zinc Miners' Association, but this week they cut it \$1, and many big producers refused to sell at the prices offered. The association price was \$43 per ton for 60% zinc ore, but the ore buyers offered only \$42, and it is estimated that the surplus ore will now reach 4,000 tons. The fancy ore of the Eagle Mines, at Belleville, and the Pleasant Valley

Mines, at Carthage, sold at \$44 per ton and 2 cars of Joplin ore brought \$42.50, but outside of these sales the top price was \$42. Twelve cars sold at \$42, but the bulk of the ore brought from \$38 to \$41 per ton. Lead still remains steady at \$26 per 1,000. During the corresponding week last year top grade zinc ore sold at \$28 per ton and lead sold at \$23.25 per 1,000, the turn-in of lead was greater than this week by 144,520 lbs.; the zinc sales were less by 613,690 lbs. and the value was less by \$67,693. For the first 24 weeks of 1898 the lead sales were greater than this year by 4,507,120 lbs.; the zinc sales were less by 44,320,360 lbs., and the value was less by \$2,516,370. As compared with the previous week, the lead sales were greater by 99,700 lbs.; the zinc sales less by 613,690 lbs. and the value less by \$28,498. Following is the turn-in by camps.

	Zinc, pounds.	Lead, pounds.	Value.
Joplin	1,907,700	283,110	\$46,469
Carterville	1,127,990	264,040	29,425
Webb City	573,050	37,240	12,429
Oronogo	719,240	8,160	14,825
Duenweg	100,080	60,800	3,190
Galena-Empire	2,868,070	275,000	58,775
Central City	521,930	19,210	10,416
Stotts City	84,770	40,000	2,735
Aurora	1,165,000	20,000	18,722
Belleville	245,370	3,340	5,620
Hells Neck	77,010	62,930	3,354
Granby-Newton Co. ..	285,000	15,000	4,950
Carthage	80,000	.....	1,760
Aikensville	36,810	.....	639
Total for weeks.....	9,792,020	1,088,830	\$213,369
Total 24 weeks.....	236,209,670	21,103,460	\$5,355,188

Mining Conditions.—The feature of the week is the opening of the fight between the ore producers and the ore buyers, which bids fair to be to a finish. The metal men claim that lower prices for spelter are due to natural causes, a lighter demand and too large a stock of spelter, while the miners claim that the metal market is being manipulated and that quotations are falsified. As the result of the refusal of the smelters to pay the price set by the Missouri & Kansas Zinc Miners' Association, at the regular monthly meeting of the association, it was decided to begin negotiations at once for shipping several thousand tons of ore weekly to foreign smelters and to export every pound of high-grade ore that could be purchased, leaving only low-grade ore for the home smelters. It was also voted to raise the assessment levied on members from 25c. per ton to 2½% of the gross receipts for all ore sold. The association now controls about 40% of the output of the district and expects to have 60% under its control inside of 10 days. There seems little doubt that the prices offered are the result of a deliberate attempt on the part of the metal manufacturers to restore old conditions and to dominate the ore markets, but fully 80% of the ore is now cleaned by machinery and the business is concentrated in fewer hands than formerly and a continued refusal of the association to sell ore to the local smelters would make the situation serious for them. The result of the present situation may revolutionize the method of selling ore in the district and the outcome will be awaited with interest.

Mining Land Sales.—There have been numerous transfers, the biggest being the sale of the Gaddis Mine, at Oronogo, and the Beulah C., on the land of the Missouri Zinc Fields Company, at Carterville, through W. S. Crane to Gov. W. C. Renfrew for the American Zinc, Lead and Smelting Company, of Boston. The price was \$90,000. Ex-Sheriff W. S. Crane purchased 560 acres of the Kost Estate, north of Joplin, this week, paying \$80,000 for the property, which he will develop with a steam drill. The Stout Estate, comprising 200 acres of land just south of Carterville, was sold last week to Wm. Thompson, of Fayetteville, Ark., for \$20,000. Fifty acres of the Proctor Smith Estate, east of Alba, were sold this week to J. C. Hodson, of Kansas City, for \$12,000. A ¾ interest in the Rinker tract of 73 acres at Aurora was sold this week to Chicago parties for \$15,000 cash. Adkins & King, of Lima, O., who have operated in the Ohio oil fields for years, purchased an undivided ½ interest in 160 acres of land at Neck City, belonging to James Luke, of Carthage, for \$8,000. Col. Jas. O'Neill, of Webb City, has purchased the Trasher farm of 170 acres of land at Spurgeon, Newton County, for \$6,000 and will prospect the tract with a drill. Lot 38 on the Three Friends lease, northwest of Belleville, was sold this week to Carthage parties for \$4,000. The 20 acres known as the Big Four lease, southeast of Galena, was sold for \$4,000. Conrad Sherman, of Toledo, O., and John T. Wilhelm, of Alliance, O., purchase a ½ interest in the 60-acre lease of the Silver Side Mining Company, 3 miles southwest of Joplin, for \$2,500. Capp & Wilkerson sold a ¼ interest in the Emma Mine, on the Aldrich lease, this week to Eastern parties for \$1,000.

On June 16th, while drilling an 8-in. hole for water on the land at Hells Neck, belonging to Morgan & Johnson, of Muncie, Ind., the drill went into rich ore at 292 ft. and was still in it at 324 ft. There were large deposits of ore at 2 levels in the shaft and a mill is being erected, but as there was not water enough to run the mill, the 8-in. hole was started.

MONTANA.

Cascade County.

Diamond R.—Contracts have been let for building the foundations of the new concentrator near Clancy and also for 2 miles of flumes to bring in water from Belt Creek. The mill is to have a capacity of 300 tons daily. The work is to be pushed.

Grey Eagle.—This mine at Barker, owned by Messrs. B. Marquis, H. Stevens, C. Okerman and R. Hughes, has about 100 tons of good ore ready to ship as soon as the roads permit. The shaft is down 300 ft. The mine employs 13 men.

Wright & Edwards.—This mine near Neihart is reported still working under the lease of the American Smelting and Refining Company, with C. A. McLean as superintendent. About 30 men are employed.

Lewis & Clarke County.

Montana Mining Company.—The May returns of the mine at Marysville state that the total output was 3,570 oz. gold and 23,840 oz. silver from 7,128 tons of ore crushed, 12,160 tons of tailings from the dams. The estimated net value of the tailings is \$49,500 and their treatment cost \$17,944. The total value of the month's output was \$88,700 and the expenses were \$64,600, leaving a net profit of \$24,100.

Flathead County.

Big Claim.—This claim, on Lake Creek, 40 miles west of Libby, has been purchased by J. L. Scarlet from William Beager. The new owner will put up a 5-stamp mill and a Wilfley table.

Jim Hill.—High-grade ore is reported struck in this claim, at Sylvanite, owned by S. H. West, of Arrowsmith, Ill.

Keystone.—This mine, at Sylvanite, has started work. A small force is drifting south from the 125-ft. upraise on the lower level.

Silver Bow County.

Anaconda Copper Company.—This company of Anaconda has just placed an order with the Mine and Smelter Supply Company of Denver, Colo., for 23 Wilfley concentrators.

(From Our Special Correspondent.)

Gold Coin Mining and Milling Company.—This company's plant, 16 miles west of Anaconda, is reported about to start work again. English parties own it, and last summer about 60 men were employed. The ore is free milling, and is treated by a 30-stamp mill. The most work has been done on the Red Rose claim, where there is a 300-ft. tunnel. George T. Ingersoll is manager.

Alice.—The Boston mine, which some 2 months ago started up, has been abandoned again. The Boston some years ago produced some very rich ore. Quite a number of men are leasing on various portions of Alice ground, and a large amount of ore is being taken out. A few are working on the Blue Wing at day's pay, but a large per cent. of the working force were discharged a short time ago. The Alice Company held a meeting here last week, but the result of their conference has not been made public.

Ella.—This mine, east of Butte, is now one of the best silver producers in the State. The company owing to the quicksand has had great difficulty in sinking, having a short time ago lost a shaft with its equipments. This compelled the company to resume work at the original shaft, when it discovered ore which runs 80 ozs. in silver to the ton, with a small per cent. gold. The management intends shortly to sink deeper, being confident that copper will be found. The Ella is the mine discovered by John Bordeaux, and was supposed to be owned by the Boston & Montana Company.

Parrot.—The company has closed its mine, the Parrot proper, indefinitely, to re-timber the shaft, which is badly in need of repair. When work is again resumed the shaft will be sunk an additional 500 ft. It is highly probable that all ore from this company's mines will be shipped to Anaconda for treatment when the mine starts.

On June 16 a meeting of the stockholders was held in Butte. Marcus Daly could not be present. He is in New York. It is rumored that Mr. Holter has disposed of his stock. Out of 230,000 shares 145,677 were represented. A new board of directors consisting of Chas. D. Burrage, Sydney Chase, Arthur Bemis, Boston; Walter Windsor, Mass.; John Judson, Fred J. Cairns, Conn., and Nathan Leopold, of Chicago, were elected.

NEW MEXICO.

Grant County.

Santa Rita.—Lessees and miners on this group of claims, recently bought by Eastern parties, have been notified to cease work at the end of 60 days. This throws nearly 400 men out of work, but it is said the new company will employ even a larger force.

PENNSYLVANIA.

Anthracite Coal.

Pennsylvania Coal Company.—The company has virtually abandoned its fight with the flood in the Schooley Mine, at Sturmerville, finding attempts to keep back the water of no avail. The connection between the flooded vein and the Pittston vein has been walled up, and the water will be kept out. About 200 men are out of work, and the loss to the company is heavy.

SOUTH DAKOTA.

Custer County.

(From Our Special Correspondent.)

Etta.—Herman Reinbold has closed a deal with the receiver of the Harney Peak Tin Mining Company for 400 tons of spodumene rock from this mine. It is found associated with casiterite.

Golden Slipper.—M. E. Pinney, of Keystone, has taken a bond on the Golden Slipper, east of Hill City.

Lizzie.—Development continues in this mine east of Custer. A crosscut is being run at the bottom of the 285-ft. shaft.

May.—The purchasers of this claim, also known as the Carr strike, on Lightning Creek, are opening up the ledge, which is from 2 to 10 in. wide, and shows free gold as far as stripped.

Moscow Mica Mine.—It is expected that work will begin soon at this mine, 3½ miles southeast of Custer, owned by C. J. Shoemaker. The mica is near a 20-ft. dyke of granite, and quite pure in most places. The mica books in some places split up into 8-in. squares.

Lawrence County.

(From Our Special Correspondent.)

Double Standard.—This old mine will be started up at Terry by Henry Schnitzel, of Lead, on a lease.

Galena Mining and Smelting Company.—Work has begun under the new general manager, H. H. Armstead, of New York. The old Eureka hoist has started, and work will also start in the Hoodoo tunnel. Development work will be done on the most promising claims in the Galena and Strawberry Gulch districts.

Harrison.—Ore is taken from the Harrison Mine, in North Lead Mining District, and treated in the Cris Ruth stamp mill, in Sawpit Gulch. The ore is concentrated for its wolframite contents.

Minerva Mine and Mill.—An Eastern company has purchased the old Minerva property near the mouth of Blacktail Gulch. It has been idle some years. The mill is to run 20 stamps on cement ore from the mine, which is said to average about \$10 a ton gold. Titus Corkhill, of Central City, is general manager. The company has also taken options on the Guston and Bessie groups, which adjoin the Minerva.

TENNESSEE.

Cumberland County.

The Tennessee Central Railroad Company is rapidly completing its line from Nashville to Knoxville, and expects to have trains running through by November. The company recently bought a large tract of coal land near the line from St. Louis parties, and is completing arrangements to open coal mines and build a number of coke ovens on this tract.

UTAH.

(From Our Special Correspondent.)

Local Smelter Conditions.—The second large stack at the Mingo is being put in blast, and it is rumored that the Hanauer plant will go in service shortly. The Salt Lake copper plant, owned by the Lewisohn Brothers, is being overhauled, and there is talk of its going into commission, though that is hardly probable. Unless the trouble in Colorado is adjusted speedily it will help these smelters. The Silver King, Utah's largest custom shipper, ships to the Guggenheims at Pueblo, who have made satisfactory arrangements with their men.

Ore Supply.—June production will be the first this year to exceed 1898 figures. Bingham, Tintic and Park City will each show better tonnage for the remaining 6 months. At Alta snow has hung on, so that shipments are only just beginning. With no labor troubles or other disturbing influences, the mines should make a better record than for any season since the closing of the India mints to silver.

Bullion and Ore Shipments.—For the week ending June 17th the eastbound shipments were: 20 cars, or 820,317 lbs., of lead-silver bullion; 1 car, or 41,461 lbs., copper bullion; 83 cars, or 3,389,830 lbs., silver-lead ores.

Juab County.

(From Our Special Correspondent.)

Tintic Shipments.—During the week ending June 17th there were sent forward from the 3 railroad points of the district 112 cars of ore, 5 cars of concentrates and 5 bars of bullion. The ore was contributed by the following mines: Grand Central, 35 cars; Bullion-Beck, 20 cars; Centennial-Eureka, 11 cars; Humbug and Uncle

Sam, 5 cars; South Swansea, 5 cars; Star Consolidated, 5 cars; Gemini, 3 cars; Sunbeam, 3 cars; Lower Mammoth, 2 cars; Joe Bowers, 1 car; Sioux Consolidated, 1 car, and the Dragon Iron sent out 21 cars of hematite for flux. The Bullion-Beck shipped 5 cars of concentrates and the Mammoth 5 bars of bullion.

Grand Central.—Some of the ore marketed carries over \$100 gold, 80 ozs. silver and from 5 to 10% copper. Several men who have been underground lately state that a production of 5,000 tons monthly can be maintained.

La Reine.—The main tunnel has cut an ore body that has caused a stir. Definite particulars are not given.

South and West Mammoth.—Jesse Knight has paid David Evans \$45,000 for an undivided half of the South and West Mammoth, Black Jack and Trail claims, on which systematic exploration has started.

Plute County.

(From Our Special Correspondent.)

Sevier.—Messrs. John Dern and E. H. Airis are to examine the property under an option.

Wedge.—At the bottom of the winze the vein is 11 ft. wide. Snow has prevented the first shipment, which Mr. H. L. Mills, one of the owners, says will exceed \$400 gold per ton.

Salt Lake County.

(From Our Special Correspondent.)

Ben Butler.—Eighty-seven is a new claim, just purchased. On June 17th an assessment of 2c. per share was levied. Development is to be resumed at once.

Dalton & Lark.—On June 16th a second pump started, and Mr. Whittemore expects the mines will be unwatered within 10 days.

West Mountain Placer.—Manager Watson reports good progress in washing gravel from upper stratum, carrying good values.

Summit County.

(From Our Special Correspondent.)

Bullion Shipments.—For the week ending June 17th the total smelter products sent forward through the McIntosh sampler were 3,238,150 lbs., as follows: Ontario crude, 614,060 lbs.; Anchor concentrates, 419,500 lbs.; Daly-West crude, 1,320,010 lbs.; Silver King concentrates, 379,630 lbs.; Silver King crude, 704,370 lbs.; Girard concentrates, 27,680 lbs.; Wright concentrates, 20,110 lbs.; Daly Lease crude, 41,790 lbs.

Ontario.—The annual report is just out. During 1898 the only mining was above 600-ft. level, from which enough ore was sold to keep the company's properties in good repair. There is considerable more of this ore left, which will be removed before that part of the mine is abandoned. Supt. Chambers says of the 1,500-ft. level: "Nothing done here this year. It will furnish good stopes. Near the face of the west drift the ore is some 10 ft. wide and high-grade. This whole level is promising, and indicates the ore will hold out to a greater depth. The mine generally is in good condition for working any time a full force may be put on." From June to January 11,916 net tons of the large tails dump at the Ontario mill—averaging 10.62 oz. silver per ton—were treated by the Russell leaching process in the Marsac mill, from which was realized from silver bullion sold \$32,726, with a produce worth \$34,000 on hand. From ore sales during the year \$114,615 were realized; from bullion sales \$32,726. Outlays for the year were: mine account, \$58,012; mill account, \$11,911; and for general expenses, \$28,227. The cash balance on hand December 31st, 1898, was \$161,012.

Anchor.—The first Utah mine to be affected by the Colorado smelter troubles is the Anchor, whose concentrates are shipped to the Philadelphia smelter at Pueblo.

Creole.—A deal is pending for the control of the company's stock on a basis of \$75,000 for the property. E. W. Berry, the chief owner, intimates that the real purchaser is probably the Silver King company, whose ground joins on the south.

Tooele County.

(From Our Special Correspondent.)

Chloride Point.—A shipment of cyanide was made 2 days ago, the first since the mill resumed. Conditions at mines and mill are reported favorable.

De La Mar Mines.—An apparently authentic London cable, received at Salt Lake City on June 16th, states that Capt. De La Mar has just sold his Mercur properties to a French-English syndicate for \$14,000,000. A similar report was current several months ago, with the statement that the transfer would be made when cyaniding of the base ores was a practical success. Before leaving in May, Mr. Clement said that all mill treatment difficulties were surmounted, and that a metallic gold extraction above 90% was achieved. Beginning with July, the monthly yield from the mines will be about \$160,000 gross, which will hardly afford 10% per annum dividends on \$14,000,000.

Northern Light.—The mill, in commission after a long vacation, is handling about 100 tons daily. Manager Legg reports a good saving, while considerable high-grade shipping ore is mined.

Omaha.—Probably it will not be known before July 1st whether the option will be taken or not. Meanwhile exploration goes on.

Rover.—On June 15th the \$75,000 option held by Capt. De La Mar on this 108-acre tract joining De La Mar territory, on the northwest, was taken up. Col. George W. Dorsey, E. H. Airis and John Dern were the chief owners of the Rover.

WASHINGTON.

Ferry County—Republic.

(From Our Special Correspondent.)

Big Chester.—This claim shows a 4-ft. vein of quartz, bearing gold, silver and copper, 18 in. being high grade.

Black Tail.—Work is stopped on the cross vein. When the crosscut from the tunnel is completed an upraise will connect the two workings. A sample from 6 ft. of quartz in the south shaft, at 20 ft., shows gold values of \$104 per ton.

Cache.—This group consists of 4 claims on a granite and limestone contact, on the north fork of Trout Creek, northwest of Republic and 3 miles northeast of Sheridan. The granite is part of the belt on west of the ore bearing porphyrites of Republic camp. The vein shows an "iron cap." The ore has not been developed. It assays well in copper, with \$1.50 gold and 14 oz. silver per ton. A tunnel south of the outcrop is in 90 ft. East of the vein 75 ft. is another 25 ft. wide. The former assays \$16 and the latter \$2 in gold per ton.

Last Chance.—This claim, one of the Lone Pine group, shows a vein from 4 to 6 ft. wide at the grass roots.

Fresno.—The combination shaft is down 18 ft., the vein 12 to 14 in. wide.

Golden Lion.—The tunnel is in over 300 ft., where work has stopped. A drift at 175 ft. in from the mouth of the tunnel runs south on a stringer of quartz.

Horseshoe.—The 4 ft. lead looks very well, but no assays are reported.

Kitty Clyde.—The shaft on this Sheridan claim is down 50 ft. on the vein, which shows chalcopryite, borite and galena.

Liberty.—This claim shows a 6-ft. lead and will be developed under a working bond for the present.

Little Jim.—This claim shows a 3-ft. vein, with 14 in. of high grade ore. Active development will start immediately.

Lone Pine.—The east drift is up to the east side line of the Insurgent, and an upraise has started on the pay shoot towards surface. When this is completed the Insurgent Company will run the drift through their own ground, 125 ft., when the Lone Pine will continue it through Last Chance ground.

Mountain Lion.—The incline shaft is down 128 ft. The new vertical, 2-compartment shaft is down 36 ft.

Pearl.—The shaft is down 29 ft., the quartz assaying from \$5 to \$18 per ton.

Quilp.—The crosscut, in 265 ft., shows the vein 26 ft. wide with an average value of \$11.77 per ton. The 5 ft. of quartz next the hanging carries only \$2.06 per ton, but the 5 ft. next the foot carries \$47 per ton. A new crosscut has been started 50 ft. south, where the quartz assayed \$57.87 in gold per ton.

Trade Dollar.—The winze is down 12 ft. below the tunnel level, on the vein. The average value of the ore at the bottom is \$40.31 in gold per ton. A selected sample recently assayed 345 ozs. of silver and 107.26 oz. of gold to the ton.

619.—The tunnel is in 283 ft., with the face in sandstone and broken porphyry, the latter well impregnated with iron sulphides.

Okanogan County.

(From Our Special Correspondent.)

Grand View.—This property consists of 8 claims west of Palmer Lake, near Loomis, showing gold and copper ore. The Iron Hat claim has been opened at 2 points, showing a 4-ft. vein, which assays \$11. The ore is called free milling. Two mill sites are located on the lake 4,500 ft. from the lower opening.

Iron Dollar.—The shaft shows a 4-ft. ledge, which assays \$16 to \$22 in gold.

Wehe Group.—Gray copper has been struck at 75 ft. More men go on at once and a steam hoist will be put on.

WEST VIRGINIA.

Kanawha County.

Mr. E. B. Pedlow, superintendent of the Columbus & Hocking Coal & Iron Company, New Straitsville, O., with some other men, has leased 1,000 acres of coal land from Capt. W. R. Johnson, on Blake's Branch of Smither's Creek. The company is making arrangements to open and operate the No. 1 and No. 2 seams of coal, known

also as the Eagle and Gas seams, and will ship by the Kanawha & Michigan Railway.

WISCONSIN.

Iron—Menominee Range.

Florence.—At this mine, at Florence, Wis., things are now running smoothly, though there is a lack of miners and trammers. About 60 men in all are now employed under Superintendent Beattie.

FOREIGN MINING NEWS.

AFRICA.

Rhodesia.

The Rhodesia Chamber of Mines reports a total production of gold in April amounting to 5,755 oz., making a total of 25,164 oz. for the 4 months ending April 30th.

ASIA.

India—Mysore.

The output of the Colar gold field for May is reported at 35,637 oz. gold, the highest for any month this year, but 2,834 oz. less than in May, 1898. For the 5 months ending May 31st the total was 169,753 oz., against 170,873 oz. last year and 154,664 oz. in 1897. The field has now pretty well recovered from the alarm of plague, which drove off many workmen early in the year.

AUSTRALASIA.

New South Wales.

Broken Hill Proprietary Company.—This company reports for the 4 weeks ending May 25th a total of 24,473 tons ore smelted. The output of the refinery was 562 oz. gold, 352,197 oz. silver, 2,925 tons lead and 44 tons hard (antimonial) lead.

New Zealand.

The Mines Department reports the exports of gold and silver as follows for the three months ending March 31st, in crude ounces:

	1898.	1899.	Increase.
Gold.....	69,168	92,818	23,350
Silver.....	52,505	85,501	32,946

The exports in March were 36,843 ozs. gold and 30,514 oz. silver.

Queensland.

The Mines Department reports for April a total production of 72,125 oz. gold, of which 70,471 oz. was from quartz mines and 1,654 oz. from alluvial workings. There was a decrease of 1,706 oz., or 4.6%, as compared with May, 1898.

Mount Morgan Gold Mining Company.—This company reports for the month of April 16,089 tons of ore treated, the yield being 10,917 oz. gold, an average of 0.68 oz. to the ton.

Tasmania.

Mount Lyell Mining Company.—This company reports 16,825 tons ore smelted for the 4 weeks ending May 3d, the result being 526 tons copper, 80,885 oz. silver and 1,731 oz. gold. The average yield was 3.13% copper, 4.81 oz. silver and 0.10 oz. gold to the ton.

CANADA.

British Columbia—Nelson.

Hall Mines, Limited.—The results of this company's smelting operations for the 4 weeks ending June 2d are reported as follows: 1,792 tons of Silver King and 1,173 tons of custom ores were smelted, yielding (approximately) 26 tons of copper, containing 26,930 oz. silver; 378 tons of lead bullion, containing 366 tons of lead, 75,870 oz. silver and 578 oz. gold.

British Columbia—West Kootenay District.

(From Our Special Correspondent.)

Rossland Ore Shipments.—The shipment for this year to June 15th amounted to 57,000 tons.

Rossland Miners.—No difficulties have arisen about labor and none are expected for the present. The mining companies are paying union wages for an 8-hour day, \$3.50 and \$3, with muckers \$2.50.

Center Star.—The 6 new ore bins are nearly completed and ore goes from the new workings over the train to the new bunkers, from which 14 ton cars are being hauled to the Trail smelters.

Hall Mines.—This company is employing non-union men at its property about Nelson, though union and non-union men have been employed alike. The system is piece work, while wages are \$3 and \$2.50 for an 8-hour day.

Provincial Seal.—The Provincial Government has decided to authorize the Provincial Assayer to affix the Provincial seal to bricks of gold examined by him, as an official mint has been refused by the Ottawa Government.

Slocan Miners' Strike.—The lockout is now complete in the Slocan Division and all the mines without exception are closed down.

Virginia.—The shaft at this Rossland Mine is down 500 ft., and drifting has progressed south for 150 ft., at least, without encountering any ore body. The dump confirms the poorness of the ledge.

War Eagle.—The new hoist and workings go slowly in operation. Several 14 ton cars have been loaded over the new train.

Nova Scotia—Cape Breton.

Cape Breton Copper Company.—The annual meeting of the company was held in Boston recently. Treasurer Dore's report showed receipts of \$62,100 from sales of treasury stock and disbursements and indebtedness amounting to \$47,520, with \$14,580 cash on hand. The directors recommend offering the public 30,000 shares of treasury stock at \$10 per share, proceeds to be devoted to a plant to mine, concentrate and smelt 200 tons of ore per day into a 55% matte. Work on the areas at Eagle Head has not progressed far enough to judge of the value of that property. Meeting adjourned until July 10th without election of directors.

Dominion Coal Company.—Eleven miners were suffocated by gas in the Caledonia Mine, at Glace Bay, on June 17th. The colliery is equipped with improved machinery, and its output was about 2,000 tons daily, much of which went to the company's by-product coke ovens at Everett, Mass. The fire, which caused the explosion, spread rapidly afterwards, and the pit will probably have to be flooded. The mine is not a gassy one, and there have been few deaths from explosions before.

Ontario—Rainy Lake District.

(From Our Special Correspondent.)

A third interest in locations A., L., 181 and T. 167 has been bought by 4 Duluth men, who have advanced money for developing the properties.

Sawbill Gold Mining Company.—This company has begun work. The main shaft is down 260 ft., and on the bottom level a 5-ft. vein is opened nearly 100 ft. The 10-stamp mill starts up this week for a steady run. The mine is in the hands of a Toronto syndicate.

It is stated that agents of the Carnegie and Federal Steel companies are in the iron range around Atikokan Lake, picking up iron ore properties to hold for future developments.

Ontario—Rat Portage District.

(From Our Special Correspondent.)

Regina.—Work is suspended except in the main shaft. The management intends to obtain more capital.

Sultana.—It is again rumored that this property has been sold in England for £275,000.

Triggs.—A mill run of 86 tons at the Keewatin Reduction Works yielded 1.3 oz. per ton in gold. Work is being pushed on the property in Witch Bay and the vein is showing up well.

Yukon District.

Gold from the Klondike diggings is arriving at Pacific coast ports, the actual amounts being greatly exaggerated by the newspapers. At the same time miners who have nothing to show for hardships undergone are returning. They report Dawson City full of idle men, while wages are down to 35c. an hour.

MEXICO.

Sonora.

(From Our Special Correspondent.)

Las Cruces.—J. B. Magruder is pushing work upon his mines and reduction works at Las Cruces. His ores will be lead and iron, which he will use for flux. The mines in the neighborhood will supply the smelting ore.

Seven Stars.—Heavy shipments are being made to the smelter at Silver City, N. M., from this property. The ore is high grade, the last carload bringing returns of over \$30 per ton. Either a stamp mill or concentrator will be erected on the mine this summer.

NEW CALEDONIA.

The exports of ores from New Caledonia for 1897 and 1898 are reported to us as below by Messrs. Reichenbach & Stilling, the chief exporting house in the colony, representing there the Metallgesellschaft, of Frankfurt-on-Main, Germany. The figures are in metric tons:

	1897.	1898.	Changes.
Copper ore	3	1 D.	2
Lead ore	2	5 I.	3
Nickel ore	57,439	74,614 I.	17,175
Cobalt ore	5,393	2,373 D.	3,029
Chrome ore	9,054	7,712 D.	1,342

In 1898 the exports of nickel ore were divided as follows: To England, 34,594 tons; France, 32,124; Germany, 7,896 tons. Of the cobalt ore France took 1,314; England, 528, and Germany, 531 tons. Of the chrome ore, 7,134 tons went to England and 578 tons to France.

For the two months ending February 28th, 1899, the exports were: Copper ore, 919 tons; nickel ore, 20,452 tons; cobalt ore, 1,376 tons; chrome ore, 1,908 tons. The shipments of copper ore this year were large; they all went to Australia.

SOUTH AMERICA.

British Guiana.

The gold returned to the Mines Department for the month of May, on which royalty was paid, was 11,884 oz. This compares with 11,114 oz. in May, 1897, showing an increase of 770 oz., or 6.9%, this year.

COAL TRADE REVIEW.

New York. June 23.
Anthracite.

Sales agents continue to assert that an advance of 25c. per ton is sure to come July 1st, but buying at seaboard points remains rather light. At Boston a considerable amount of coal is going at retail at the low prices prevailing, but there are no reports of coal being sold ahead at these figures. In the West, as money is abundant, the producing interests are preparing to sell a lot of coal there this fall. At present demand is kept down by warm weather. Owing to the late opening of navigation and to labor troubles at Buffalo and some of the upper Lake ports the press for cargo room down the Lawes is now so great that many large carriers are likely to go back light rather than delay for coal to be carried at low figures. The vessel men apparently control the situation, and rates as high as 40c. to Duluth are spoken of, and a 50c. rate is not improbable.

There is some coal going into storage at Eastern points, but so far there is no apparent attempt to force coal on the market, and prices hold up well. If another month passes without a break, fall trade should be satisfactory to everybody. There seems little likelihood of any serious labor troubles; collieries are busier than usual at this time of the year.

Quotations at New York are still at the May figures.

Notes of the Week.

Drexel, Morgan & Company have taken up their option on 75,000 shares of Lehigh Valley Railroad stock. The price paid was \$25 per share for 37,300 and \$27.50 for the remainder. At the time it was given the Packer estate was heavily indebted and certain improvements were necessary which would increase the earnings of the road. Drexel & Company and J. P. Morgan & Company undertook to float an issue of \$5,000,000 of collateral trust bonds out of an authorized issue of \$15,000,000. The Packer estate gave an option on its holdings of 150,000 shares, which carried a voting power, and in April, 1897, Edward T. Stotesbury, of the Drexel Company, and Charles H. Coster, of J. P. Morgan & Company, became members of the board of directors. The loan was due several months ago, when the trustees paid a portion of the obligation, and an extension was granted for the balance.

Bituminous.

The seaboard bituminous trade continues excellent. A considerable number of producers have been forced to decline transient orders, having all they can do to take care of contract business. Demand from the far East is about as good as last week, but the most pressing calls for coal are from the all-rail trade. This heavy demand at this season of the year is due especially to the great boom in the Pennsylvania iron trade, mills and shops using up a lot of coal.

The threatened strike in the Georges Creek region is reported off, the leaders of the strike movement apparently realizing that it was too late in the season to expect the companies to pay higher prices, most business being covered by contracts. In other West Virginia regions the chances for any serious troubles are very slight. Many Clearfield miners are out, but the strike seems to be much less serious than at first reported. Transportation from mines to tide is fair, but car supply on some roads is very poor. This is due, apparently, to the heavy movement of coal to the lower Lake ports.

Spite of reports of higher prices asked for Clearfield coal by reason of the strike, seaboard prices are unchanged, though any outsider wanting coal in a hurry would have to pay more than a month ago. Bids sent in for some Government orders recently were very low indeed. With so much coal under contract, selling prices are likely to stay down.

Birmingham, Ala. June 19.

(From Our Special Correspondent.)

There is no falling off in the work at the coal mines in this State. The demand is lively, notwithstanding the warm weather, and it is stated that more coal than is being mined could find a sale. The matter of a contract between the operators and the miners is the next important subject for this district, the present contract expiring June 30th. The miners are now holding their convention here, representatives of 5,000 miners belonging to the organization being present, and a new scale is being discussed. There is absolutely no talk of a strike on the part of the miners, and it is believed that a new scale will be signed without any friction. The Walker County mine operators have a good thing in the Mississippi River trade. They are not disturbing any other trade and are keeping out of the market for the other counties. There is no advances made in the prices of coal, as far as can be learned. It is reported that one of the larger coal companies has made a contract covering its output for some time. A railroad company, formerly in the coal business in an adjoining State, has made the contract.

Chicago. June 21.

(From Our Special Correspondent.)

Anthracite coal has been in somewhat better demand, and with increased inquiry there is a decidedly better outlook, though the July prices cause as yet a feeling of uncertainty. Out-of-town business is rather dull, with a carload or two considered large shipments. The July circular is looked for anxiously, and upon it remains the course of the market; an increase in price doubtless will cause a poor market.

Bituminous coal is in good demand, but the rush of soft coal to this market has been so large that the rails and yards all over the city are overstocked, and in consequence prices have fallen off. Manufacturing and other lines are buying heavily, getting coal at low prices.

Coke is in demand at prices somewhat above those of a month ago.

Pittsburg. June 21.

(From Our Special Correspondent.)

Coal.—There have been no new shipments of coal since our last. The amount of coal loaded in the ports is small. Most of the towboats that left on the last rise have returned with empties. The amount of coal from the Monongahela ports into the Pittsburg harbor for the week aggregate 2,277,000 bushels.

Pittsburg capitalists have purchased several hundred acres of good coking coal land, just west of Latrobe, and will erect 400 ovens within the next few months. A railroad to connect with the Unity Branch will be built. It is proposed to erect 200 ovens at the junction in the fall. Oliver Brothers have taken an option in three valuable coal farms near Pleasant Unity, with a view of establishing coal works and building coke ovens.

At Mt. Pleasant, Pa., a 9-ft. vein of coal was struck at W. I. Rainey's new Acme Mine. Work was commenced last March and continued night and day until last Thursday, when coal was reached. The coal is good. The shaft is 186 ft. deep. About 150 miners will be employed when mining is begun, which will be in about 10 days. Two hundred coke ovens have been built and 60 blocks of houses are under erection. A company store will also be established.

At Washington, Pa., June 20th, E. T. Hitchman, of the Canonsburg Coal Company, completed options on a block of coal land, comprising 6,000 acres, lying along the Chartiers Valley road, between Canonsburg and Hill Station. The contract calls for cash payments amounting to \$300,000.

Connellsville Coke.—The region is breaking all records. Many more ovens than were ever before in operation are now in full blast, and the production is far in excess of anything ever before thought possible.

The active list of ovens in the region shows a large increase. Nearly 800 cold ovens were fired up. The great demand for coke has led to the postponement of repairs and the firing up of ovens that were not in the best condition. A system of rebuilding and overhauling ovens by the Frick and other companies is to be started at once.

The Lake Shore Railroad is receiving a big order of steel cars that have been turned into the coke trade. The order was for 1,000 cars, and all the cars will be given over to the coke trade as fast as finished. The railroads were all short of cars, and the shipments show a decrease of nearly 100 cars. The demand for coke was all that could be desired. Had cars been more plenty it is safe to say the shipments would have gone away above 10,000 cars. Summary for the week shows 18,917 ovens in blast and 1,529 idle.

The shipments of coke were 9,744 cars, as against 9,841 cars the previous week, a decrease of 97 cars. Shipments were: To Pittsburg, 3,317 cars; sent West, 4,879 cars; sent East, 1,548 cars. Total, 9,744 cars.

San Francisco. June 15.

(From Our Special Correspondent.)

The coal receipts at San Francisco by water in May were 114,316 short tons, against 105,257 tons last year. For the five months ending May 31st, the receipts were: Eastern anthracite and Cumberland, 13,186; Washington, 270,761; Oregon, 25,355; British Columbia, 177,853; Australia, 59,585; Great Britain, 31,593 tons. The statement does not include receipts from California mines, nor from Wyoming mines by rail.

The total receipts were 578,333 tons, against 544,304 tons in 1898; showing an increase of 32,029 tons, or 5.9%, this year. The gain was chiefly in Washington coal, British Columbia showing a decrease of about 19,000 tons, and other sorts little change.

Shanghai, China. May 15.

(Special Report of Whelock & Co.)

Coal.—Large quantities of Japan coal continue to come into the market, although sales are few, as lower prices are anticipated. Cardiff has declined considerably, and quantities could now be bought as low as 15 taels per ton, if not lower, as the market is very dull. The syndicate in Sydney Wollongong coal that has been in existence for the past three years is now dissolved,

which may account for lower prices, though they have not as yet declined to any material extent; sales have been made at 14 taels per ton, but as our stocks have been reduced considerably there is no reason for a further drop, and if deliveries continue as usual, before the next arrival the market will be quite bare. We hear of a charter of about 3,400 tons reported to have been sold at 33s. 6d. per ton. Arrivals of all kinds of coal for the fortnight amount to 23,540 tons. We quote: American anthracite, 15 taels per ton, no stock; Welsh Cardiff, 15 taels; Australian Wollongong, steamer cargo, 13 taels, and other sorts, 6.25@7.50 taels; Japan, all contracted for; Chinese Kaiping, lump, 7 taels; dust 5.60 taels, and mixed, 5.60@6.50 taels.

Kerosene Oil.—In American oil there has been only a hand-to-mouth business, at a slight advance in prices, small sales having taken place at 1.64 taels per case, the market closing dull. Arrivals were 217,300 cases, making stocks 766,588 cases. For Russian Batum there is very little inquiry, and prices have suffered a considerable decline, small parcels having been sold as low as 1.49 taels per case for Anchor Chop and 1.47½ taels for other chops. We omitted in our last to return the cargo of 112,500 cases (this was included in our stocks). Since then 125,000 cases arrived, making stocks 406,000 cases. In Sumatra Langkat nothing of importance has been done, and stocks are 85,000 cases. We quote, per case, as follows: American, Devoe's, 1.64 taels; Russian Batum, Anchor Chop, 1.49 taels; other chops, 1.47½ taels; Langkat, 1.43 taels.

SLATE TRADE REVIEW.

New York. June 23.

The list of prices per square for No. 1 slate standard brand f. o. b. at quarries is given below.

Prices of Roofing Slate.

Size, inches	Monson or Br'n ville.	Bangor.	Bangor Ribbon.	Alb'n or Jackson Bangor.	Lehigh.	Peach Bottom.	Sea Gr'n.	Unfad'g Green.
24 x 14...	6.10	3.40	3.00	3.50	3.50	4.85	2.65	3.50
24 x 12...	6.60	3.40	3.00	3.50	3.50	5.00	2.75	3.50
22 x 14...	6.10	...	...	...	...	5.00	2.60	3.50
22 x 12...	6.60	3.40	3.00	3.50	3.50	5.00	2.75	3.50
22 x 11...	6.50	3.60	3.25	3.50	3.75	5.00	2.75	3.75
20 x 14...	6.40	...	...	...	...	...	2.60	3.50
20 x 12...	6.90	3.60	3.25	3.50	3.75	5.00	2.75	3.75
20 x 11...	6.80	...	...	...	...	5.00	2.75	3.75
20 x 10...	6.80	4.25	3.25	3.75	3.80	5.10	2.90	4.00 10.50
18 x 12...	6.80	3.60	...	...	...	5.00	2.75	3.50
18 x 11...	7.00	...	...	...	...	5.00	2.75	3.75
18 x 10...	7.20	4.25	3.25	3.75	3.80	5.10	2.90	4.00 10.50
18 x 9...	7.10	4.25	3.25	3.75	3.80	5.10	2.75	4.00 10.50
16 x 12...	6.80	3.60	...	...	...	...	2.60	3.60
16 x 10...	7.10	4.00	3.25	...	3.80	...	2.60	4.00 10.50
16 x 9...	7.00	4.00	...	...	3.75	3.80	5.10	2.60 4.00 10.50
16 x 8...	7.20	4.25	3.25	3.75	3.80	5.10	2.60	4.00 10.50
14 x 10...	6.60	3.60	3.25	3.35	3.75	5.00	2.50	3.75 10.50
14 x 9...	6.50	...	...	...	...	3.40	4.85	2.50 3.75 10.50
14 x 8...	6.60	3.60	3.25	3.35	3.40	4.85	2.50	4.00 10.50
14 x 7...	6.40	3.60	3.25	3.35	3.40	4.85	2.40	4.00 10.50
12 x 10...	5.80	...	...	...	...	4.60	2.40	3.25
12 x 9...	5.60	...	...	...	...	4.60	2.40	3.25
12 x 8...	5.60	3.25	...	3.35	3.25	4.60	2.40	3.25 9.00
12 x 7...	5.60	3.25	...	3.35	3.25	4.60	2.40	3.25 9.00
12 x 6...	4.80	3.25	...	3.35	3.25	4.60	...	3.25 8.50

A square of slate is 100 sq. ft. as laid on the roof.

In Brownville and Monson delivery quotations can be had somewhat lower than above, which is also true of other brands. No. 1 Bangor are 50c. extra when full 3-16 in. thick, and Peach Bottom 25c. extra per square. Purple sizes run 24x12 and 14x7, and vary from \$3.75 to \$4 per square. Variegated purple, \$2.25@2.90 per square, according to size. Intermediate red, 14x7 and larger, \$6; 12x7 and 12x8 in., \$5 per square net. Intermediate sea green, \$2.15@2.35 per square according to size.

Indications point to better prices for roofing slate, and it is said an advance in the present schedule is likely July 1st. Stocks are still limited, especially of the desirable sizes. The export business last month took a large quantity. In this trade, however, slate is moving at low contract prices. The roofing slate sent to Great Britain from New York last month had an average invoice value of \$4.96 per square, or about 20c. less per square than for April. The lowest value in May was \$4.20 per square (to Leith, Scotland), and the highest, \$6.37 (to Cardiff, Wales). The roofing slate shipped to Germany from this port in May had an average invoice value of \$3.94 per square, against \$3.29 in April. Copenhagen, Denmark, imported in May roofing slate valued at \$5.28 per square, as against \$5.67 in March. The school slates exported from New York in May had an average invoice value of \$3 per case. The mantels sent to London, Eng., were valued at \$3 each. The slabs forwarded to Belgium were invoiced at \$10.77 per box, against \$10.52 in March, when the last shipment was made from this port.

The production of slate in Pennsylvania is on the increase. The shipments of roofing slate this month are expected to exceed those for May. For the first half of June Slatington moved nearly 13,000 squares, Walnutport about 150 squares and Danielsville over 2,700 squares.

Slatington also moved a large quantity of school slates and blackboards, nearly 60% more than in the first half of May. Danielsville's shipments included, besides blackboards, an increased quantity of flagging. We understand also that the Vermont producers are shipping as rapidly as their output will permit, as they have many orders on hand which have been delayed. Exports from Baltimore this week were 34,264 pieces (101 short tons) to Dublin, and 52,717 pieces (142 short tons) to Belfast, Ireland.

Freight rates from New York are nominally as follows: To London, 12s. 6d. (\$3), or about 86c. per square roofing slate; Liverpool, 12s. 6d.; Manchester, Bristol, Leith and Glasgow, 15s. (\$3.60), or \$1 per square; Hamburg, 12s. 6d. prompt, and 15s. near future; Copenhagen, 16s. 3d. (\$3.90), or \$1.11 per square; Newcastle and Hull, 17s. 6d. (\$4.08), or \$1.17 per square; Denmark, Stettin, 17s. 6d., all with a 5% primage per ton weight. To Bremen the rate is 15s. net (\$3.60), or \$1 per square. To Sydney, New South Wales, 15s. net is asked for roofing slate in cases or in bulk.

CHEMICALS AND MINERALS

(For further prices of chemicals, minerals and rare elements, see page 752.)

New York. June 23.

Heavy Chemicals.—Demand is good, but available stocks of American goods, particularly alkali and caustic soda, are small, and sales being made for immediate delivery are at rather higher prices. For future business first hands quote prices unchanged. Bleaching powder shows a better inquiry, while chlorate of potash is in fair request. Domestic receipts were 980 sacks soda ash, 80 bbls. and 145 drums caustic soda, and 48 casks and 180 kegs potash. Small exports of bicarb. soda were made to Nova Scotia.

Quotations are as below, per 100 lbs.

Articles.	Domestic.		Foreign, In New York.
	F.o.b. Works.	In New York	
Alkali, in bags.	62½@65c.	80@85c.	75@80c.
Caustic Soda, high test ...	\$1.42½@1.45	1.66@1.65	\$1.60@1.70
98% powd. ...	\$2.75@3.00		
Sat Soda conc. ...	1.00@1.35		1.60@1.65
Bicarb. Soda ...	1.12½@1.25		2.12½@2.25
" extra	3.25@3.50		
Bleach, Pdr., Eng. prime ...			1.42½@1.50
other brnds.			1.25@1.35
Chl. Pot. Cryst.		9.00@9.25	9.25@9.50
powd.		9.50@9.75	10.00@10.25

Prices are generally for large quantities, and in many cases depend upon make, test and package.

Acids.—The warm weather has increased contract deliveries of sulphuric acid. Further exports of blue vitriol are noted. Acetic is also in better request.

Quotations are in large lots delivered in New York an vicinity, per 100 lbs. unless otherwise specified.

Acetic, com. No 8.	\$1.50	Nitric, 38%	\$3.75@ 3.80
Blue Vitriol, best.	5.25@ 5.50	Nitric, 40%	4.0@ 4.05
Chamber, 50% ton.	11.50@12.00	Nitric, 42%	4.62@ 4.65
Muriatic, 16%	1.10@ 1.15	Oxalic	6.25@ 6.50
Muriatic, 20%	1.20@ 1.25	Sulphuric, 66%	1.10@ 1.15
Muriatic, 22%	1.35@ 1.40	Sulphurous, 100%	
Nitric, 36%	3.50@ 3.55	SO ₂ , anhydrous.	8.0@100.

Brimstone.—Arrivals at this port aggregate 1,500 tons. Spot best unmixed seconds, \$21.50@ \$21.75 per ton; futures about \$1 less; thirds \$2 less. Reports are current of coming dissolution of syndicate, which unsettle shipments.

Imports of sulphur to Great Britain for the 5 months ending May 31st were 8,647 long tons, against 6,556 tons in 1898. Imports of iron and copper pyrites, valued chiefly for their sulphur contents, were 284, 248 tons, against 288,742 tons last year.

Pyrites.—Good demand and prices firm. We quote American pyrites as follows: Mineral City, Va., lump ores, \$3.25 per long ton (basis 42%), and fines, \$3; Charlemont, Mass., lump, \$5.50, and fines, \$4.75; Pilley's Island, lump, \$6.50, and fine, \$4.50 per long ton, delivered in New York. Spanish pyrites, 12@14c. per unit, according to percentage, delivered ex-ship New York or other Atlantic ports. Spanish pyrites contain from 46% to 51%, the American from 42% to 44% and Pilley's Island, N. F., 50%.

Fertilizing Chemicals.—There has been a fair spring demand, but prices are rather above consumers' views. Offerings of leading animal ammoniates are still limited by packers. Sulphate of ammonia, gas liquor, has advanced to \$3.50 per 100 lbs. for spot and \$3.20 for futures; a few sales are reported at these figures. It is said there are no stocks of gas sulphate of ammonia in Great Britain, and that many of the German beet growers have replaced nitrate of soda by sulphate of ammonia. In 1898 Germany imported 8,703,912 qtls. of nitrate of soda, which made it the largest consumer of that article. Imports this week included 4,000 bags muriate of potash, 1,750 bags manure salt, 250 bags sulphate of potash and 2,000 bags potash not specified; all from Germany.

Articles.	F. o. b. Wks.	In N. Y.
Potash, muriate, 80@85% 100 lbs.	.....	\$1.78
" sulphate, 9% "	.....	1.81
" d'ble m're salt, 48@53% 100lbs	.....	1.98½
" kainit, 12.4% long ton.	.....	2.10½
syvanit. per unit.	.....	66c.
Sulph. Am. gas (25%) 100 lbs.	.....	87.0@89.95
bone	.....	89c.
Blood, dried, h-gr. Chi. per unit	.....	37@38c.
N.Y.	.....	3.50
Azotine .....	.....	3.00
Bone black, diss., 17@ 8% ..ton	.....	1.85@1.90
Fish scrap, acid. "	.....	1.85@1.95
dried "	.....	16.0@16.50
Tankage h. gr. Chicago. "	10.50@11.00	12.50
concentrated. unit.	19.50@20	21.50
bone. " .. ton.	17@17.50	21.00
Bone, ground	1.90@1.95	1.90@1.95
	.....	20.00@21.00
	.....	23.50@25.00

The quotations on potash are on the basis of foreign in voice weights, tares and analysis, in quantities of not less than 500 tons bulk salts or 50 tons concentrated salts.

Nitrate of Soda.—Buying is limited, while the market remains firm. Spot is worth \$1.62½@ \$1.65 per 100 lbs., and futures, \$1.57½@ \$1.60, according to position.

Phosphates.—The market continues strong. High grade Florida rock producers are about sold up for 1899, and are taking orders for 1900 and 1901. The European market is strong, and manufacturers' stocks are reported low. In Germany there has been a great increase in the number of superphosphate works. The present year's shipments of high grade Florida rock will be largely in excess of any previous year. For the first six months of this year the total shipments from all ports amount to about 250,000 long tons (about 40,000 tons for June alone), against 158,795 tons in the corresponding period in 1898. The demand for this rock in the coming year promises to show an increase. The Florida land pebble producers are well sold up for the remainder of this year. Peace River and Charleston hot-air dried rock will be advanced July 1st. Tennessee phosphate is quoted unchanged, though it is said export rock can be had at as low as \$3.50 per ton, f. o. b. M. Pleasant. Charters recently taken include British steamers of 1,095 tons from Tampa to Helsingborg, at 20s. 6d. (\$4.98); one of 2,225 tons from the same port to Trieste, at 18s. 9d. (\$4.50); and another of 2,077 tons from the same port to Certe, France, at private terms. Imports at New York were 3,375 bags phosphate from Antwerp, Belgium. Latest quotations for American phosphates, delivered c. l. f. United Kingdom or North Sea ports, per unit, are as follows: Florida, hard rock, 77@80%, 9¼d. (about \$14 per long ton), for all positions up to and including 1901; Florida, land pebble, 68@73%, 7¼d. (\$10.50 per ton); Florida, Peace River, 58@63%, 7¼d. (\$8.40 per ton); Tennessee, 78@80%, 7¼d. (\$11.85 per ton); while Algerian, 63@70%, is quoted at 7¼d. (\$8.40 per ton).

We quote: Florida high grade, 75@80% rock, \$10 per long ton f. o. b. Fernandina. The freight rate to New York is about \$2 per ton. Florida land pebble, 68@73%, quoted at \$7@7.50 per ton delivered in New York; South Carolina ground rock, \$6 per short ton, delivered in New York; sun dried, 3 per 2,240 lbs. f. o. b. Ashley River; hot-air dried, \$3.25 f. o. b. same place, and \$3.45 f. o. b. Charleston, S. C. Tennessee phosphate rock, \$3.50@4, f. o. b. mines for export, guaranteed 78% bone phosphate of lime and 3@4% iron and alumina, ex-vessel New York \$9 @ \$10 and \$3@3.50 for domestic brown, and \$1.90@2 f. o. b. for blue or Hickman County rock. Domestic Tennessee rock averages 75%, while for export it runs as high as 83% bone phosphate. The difference in the price of this phosphate and Florida high grade is owing to the higher percentage of iron and alumina in the Tennessee rock. Concentrated phosphates, 13@15% av. P₂O₅, 60@62½c. per unit at sellers' works. Acid phosphates, 60c. per unit at sellers' works in bulk.

Liverpool, June 14.

(Special Report of Joseph P. Brunner & Co.)

There is a fair volume of trade passing in most lines of heavy chemicals and in some cases manufacturers are so well sold that they are refusing fresh orders for prompt delivery.

The following are particulars of exports of alkali and bleaching powder for May, as taken from Board of Trade returns:

	Alkali, cwt.	Bleaching powder, cwt.
Total exports to all quarters, including U. S.	360,315	108,569
Exports to United States alone.	41,620	43,376

As compared with May, 1898, the total shipments of alkali show an increase of 12½%, in spite of a decrease of 38% in exports to the United States, and as regards bleaching powder there is an increase of 19½% in total exports, while to the United States alone the increase is no less than 49%. These returns are certainly satisfactory, as showing a general improvement, taking the export trade in the aggregate.

Soda ash is in good demand and dearer for some markets, although the maximum range for tierces is unchanged, as follows: Leblanc ash

48%, £4 5s. @ £4 10s; 58%, £4 10s. @ £4 15s. per ton net cash. Ammonia ash 48%, £4 @ £4 5s.; 58%, £4 5s. @ £4 10s. per ton net cash. Bags are 5s. per ton under prices for tierces.

Soda crystals, with decreased production owing to hot weather, coupled with good inquiry, are firmly held at £2 17s. 6d. per ton, less 5% for barrels, although special quotations are made for certain favored quarters. Bags are 7s. per ton under price for barrels.

Caustic soda is moving off freely and with light stocks buyers in some instances are finding a difficulty in placing orders for prompt delivery. Quotations are firm, as follows: 60%, £6; 70%, £7; 74%, £7 10s; 76%, £7 15s. per ton, net cash.

Bleaching powder is steady at £4 15s. @ £5 per ton net cash for hardwood packages.

Chlorate of potash is in fair request and held for 3½@3¾d. per lb. for crystals and 3½@3¾d. per lb. for powdered as to quantity.

Bicarb soda is in moderate compass, while prices are unchanged, varying according to market from £5 5s. to £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages.

Sulphate of ammonia has gone slow and is now nominally quoted at about £12 10s. @ £12 12s. 6d. per ton, less 2½% for good gray 24@25% in double bags f. o. b. here.

Nitrate of soda is quietly steady at £8 5s. @ £8 10s. per ton, less 2½% for double bags f. o. b. here, as to quantity and quality.

Valparaiso, Chile. May 20.

(Special Report of Jackson Bros.)

Nitrate of Soda.—In our last circular we advised a brisk business in 95% for season delivery, as high as 4s. 10¼d. steamer terms being paid; the enquiry, however, only lasted for a very short time, and since May 8th the lower limits received from Europe have curtailed transactions. On the other hand, producers show no inclination to accept lower prices, but maintained the former figures paid. For the refined quality sellers ask premiums so out of proportion to the price of 95% that prohibit all business. The production for April is advised as 2,556,000 qtls., making a total of 9,324,000 qtls for the first 4 months of this year, as against 8,985,000 qtls. in 1898. We quote 95%, May-June, 4s. 8d.; June-July, 4s. 9d.; August-September, 4s. 9¼d.; September-December, 4s. 10d., and 96%, May-June, 4s. 11d. and July-September 5s. 2d., all ordinary terms, sellers. The price of 4s. 8d. with 2s. 6d. all round freight stands in 6s. 6¼d. per cwt. net cost and freight, without purchasing commission. Sales reported during the fortnight aggregate 612,000 qtls., of which only 22,000 qtls. were 96%, which sold at 5s. ¼d. alongside.

IRON MARKET REVIEW.

NEW YORK, June 23, 1899

Pig Iron Production and Furnaces in Blast

Fuel used	Week ending			From Jan., '98.	From Jan., '99.
	June 24, 1898	June 23, 1899.	Tons.		
An'racite	26	15,084	38	34,150	620,125
Coke.....	144	173,354	166	218,075	4,954,157
Charcoal.	20	5,934	16	5,225	141,069
Totals..	190	194,352	220	257,450	5,715,351

The general features of the market remain unchanged. The pressure to buy continues, and contracts for raw material are being made freely for the last half of the year. Prices continue to rise, and it is quite possible that they have not reached a limit. With Bessemer pig selling at \$19 in Pittsburgh and No. 1 Alabama foundry at \$14.50 in Birmingham, buyers have had to change their ideas radically. It is quite possible that we may see \$20 and \$15, respectively, for the grades of iron named.

As to current business, it is not easy to fix the actual quotations. The prices paid depend upon the delivery wanted, and the urgency of the buyer, and may range considerably above the general average. Thus still billets have sold in Philadelphia as much as \$2.50 above price at which mills were willing to contract for October-December delivery. Then exceptional prices are very apt to be told on the market, and increase the excitement.

The old contracts, made six months or more ago at low prices, are now nearly all worked off, and the raw material going to the mills is now, or very soon will be, paid for at the higher prices. The rise in finished material in many cases represents a profit to the mill no greater than the lower rates of January last. The advances, however, are being made steadily, and all sorts of finished material will soon be high enough to cover the advances in raw iron and steel pretty thoroughly.

Some of the careful ones are asking how long this condition is going to last. The majority, however, do not trouble themselves much about the future. They have, as a rule, a year's business in sight at high prices, and do not yet worry themselves about what may be coming later.

It is of interest to note that export inquiries are still coming in, in spite of the high prices.

A good many sales may be made, provided the material can be spared.

The order for ship-plates for two large Atlantic steamers, to be built at Cramp's yard, in Philadelphia, has gone to Chicago, no Eastern mills being able to guarantee delivery. Plates are especially scarce and hard to get.

The starting of the new Lorain furnaces is now set for late July. The iron from these big stacks is all contracted for already up to the end of the year.

The American Tin Plate Company has declined to accept the tin-plate schedule offered by the Amalgamated Association. There will be further negotiations, but plants may be closed down for a time.

Birmingham, Ala. June 19.

(From Our Special Correspondent.)

The pig iron market this week is very sensational. The jump from \$13.25 to \$13.50 and then \$1 above that price for No. 1 Foundry, was something most remarkable, and goes only to show what demand can do. The demand continues, too, and before the end of another week there are no doubts that another advance in quotations will be noted. The furnaces here are as busy as they can be, and iron is growing scarcer every week. Furnacemen are jubilant over the conditions and say that it is remarkable. Some of the furnace companies are not accepting any orders for delivery within any reasonable time, while it is stated that one or two concerns have sold up to the end of the year. There was not much iron to leave the warrant yards last week, and there was none to go in; there will not be any for three months or more. The demand is for immediate consumption.

The following are the quotations given this week: No. 1 Foundry, \$14.50; No. 2 Foundry, \$14; No. 3 Foundry, \$13.50; No. 4 Foundry, \$12; Gray Forge, \$11.75; No. 1 Soft, \$14.50; No. 2 Soft, \$14.

There is a little feeling as to the supply of raw material in the district. The ore miners at Ishkooda, furnishing ore to the Bessemer and Oxmoor furnaces have been out on a strike since the first part of last week and there are no indications of a settlement yet.

The purchase of the Sheffield Coal and Iron Company's property, consisting, among other things, of three good furnaces in blast, by the Tennessee Coal, Iron and Railroad Company, is being widely discussed in this district. The story has been denied by officials of the Tennessee Company, but on the outside it seems to be certain. The Sheffield Company's properties are located in the northwestern part of the State and right on a water course.

The foundries continue to do well. The repairing of a number of furnaces which have been out of blast for a long while has given them plenty of work to do. The foundrymen, however, complain of the high quotations of pig iron and say that their profits are cut very close, as they have not been able to make their advances coincide with the advance in iron.

Figures which are being prepared show that the export movement of iron from this district is very good, averaging about 20,000 tons a month. It is stated that for the five months of this year there were shipped for export purposes from this State 40,000 tons of iron more than was shipped the first five months of last year.

The advance in freight rates on iron on the Southern railroads goes into effect on Wednesday of this week. It is given out that bills of lading have been filed, for protection against this advance, on no less than 102,000 tons of iron, which means that there will be delivery at the old freight rate for months to come. This iron is said to have been sold, or the bills of lading have been filed between May 20th and June 9th. The railroads have their hands full in handling iron now, and the filing of way bills for future delivery, guarantees that they will have plenty to do in the future.

Buffalo, N. Y. June 20.

(Special Report of Rogers, Brown & Co.)

The pig iron market continues in an excited state, with a still further advance in prices. Where a few cents per ton separated the different brands in times past they are now separated by dollars. Many have asked prices for delivery into next year, and quite a few have contracted as far into next year as furnaces are willing to sell at the present time. Lake Superior charcoal is very scarce, and there are only a few grades that can be obtained at any price. It is becoming more evident that there will be no stock of Lake Superior charcoal stored here this fall, as has been the general custom. We quote for cash f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, \$18@20; No. 2 strong foundry coke iron, Lake Superior ore, \$18@20; Ohio strong softener No. 1, \$19.50; Ohio strong softener No. 2, \$19; Jackson County silvery No. 1, \$23; Southern soft No. 1, \$20; Southern soft No. 2, \$19.50; Lake Superior charcoal, \$21@22; coke malleable, \$20.

Chicago. June 21.

(From Our Special Correspondent.)

Pig Iron.—Plenty of business is being done in both local and Southern pig irons, orders being refused by furnaces, as they are filled up for months ahead, and cannot give early delivery.

All concerns using iron are buying heavily. Prices are on the up-grade, Lake Superior charcoal having brought as high as \$20.50. Inquiry is large, most of it being for delivery 6 months or a year ahead, but furnaces are slow to make contracts. Southern freight rates have advanced 50c. per ton. Quotations are as follows: Lake Superior charcoal, \$19@21; local coke foundry No. 1, \$17.50@18.50; No. 2, \$17.50@18; No. 3, \$17@17.50; local Scotch foundry No. 1, \$18@18.50; No. 2, \$16.50@17; No. 3, \$16@16.50; Southern coke No. 1, \$18@18.50; No. 2, \$17.50@18; No. 3, \$16.75@17.25; Southern No. 1 soft, \$17.50@17.75; No. 2 soft, \$17.25@17.50; Southern silveries, \$17.50@17.75; Jackson County silveries, \$20@21; Alabama car wheel, \$19.50@20; coke, Bessemer, \$19@19.50.

Bar Iron.—Business continues good, buying being heavy by implement makers and car builders, iron and soft steel bars being bought largely, with steel ahead in part of aggregate sales. Mill shipments of common iron are quoted at 1.80c.; soft steel bars, 1.90@2.15c.

Steel Rails.—Small lots are characteristic of the market nowadays. Prices are likely to advance soon. Prices quoted on standard sections now are \$26@30. Light rails are in good demand at from \$30 to \$36.

Cleveland, O. June 19.

(From Our Special Correspondent.)

Iron Ore.—There are only a few odd lots of ore to be offered for sale, but with this limited supply there may be said to have been a good business done. The ore men are convinced that they made a blunder in selling so early in the season, and will not be keen to repeat last year's action. They predict that this will retard business another year at the opening and make business brisker all through the summer. It is indeed heard on many hands that not so much contracting need be expected, as the ore-men say they will be willing to risk their chances on the wild rate later in the season.

The shipments of ore from the upper lakes are very heavy. It is said indeed that no year in the recent past can vie with this in the volume of ore that has been sent down. The ore carrying rates are at living height and the vessel-men being unable to force other shippers up to a basis that is commensurate with the ore rate, a large number of vessels, both contract and wild, are being brought into the ore-carrying industry. This is having the effect of bringing an unprecedented amount of ore down the lakes early in the season. It is predicted that the end of June will find that 3,000,000 tons have been carried down the lakes. This, added to the 2,200,000 reported down during May, will make over 5,000,000 tons down before July 1st. In view of the fact that but a little over 12,000,000 tons have been contracted for with the vessel owners, thus would indicate that the ore merchants are being more successful than any other shippers in having their commodity handled. While the freights remain the same as they have been for the last few weeks, there are persistent rumors that before September the ore rate will be \$1 from Duluth. The rates paid are 65c. per ton from Escanaba, 70c. from Marquette, and 75c. from the head of Lake Superior.

The quotations are as follows: Specular and magnetic ores, Bessemer quality, \$4@4.25; specular and magnetic ores, non-Bessemer, \$3.25@3.75; red hematite ores, Bessemer quality, \$3.75@4.25; red hematite ores, non-Bessemer quality, \$2.75@3.25.

Pig Iron.—Speculators have been busy with pig iron during the week, and the fact that they have been after the iron that is loose on the market has caused the purchasers to look well to their interests and see that the speculators be foiled in their endeavors. This has had a tendency to make the market very strong. Rush orders have been filled at inflated prices. It is reported that small orders of Bessemer have been filled at \$20, and that similar orders on No. 2 foundry have been filled at \$19 and \$19.50. There is a very strong feeling generally. The prediction that all grades of iron will be selling at \$20 before July is in part borne out by the frequent sales of rush orders at the inflated prices.

The following are the quotations for iron f. o. b. Cleveland: Lake Superior charcoal, \$20; Bessemer, \$18.65; No. 1 foundry, \$18.65; No. 2, \$18.15; No. 1 Ohio Scotch, \$18.65; No. 2, \$18.15; gray forge, \$16.15.

Philadelphia. June 22.

(From Our Special Correspondent.)

Pig Iron.—Practically no change has taken place in the crude iron situation beyond a general though nominal advance in iron quotations, in which No. 1 X foundry leads off at \$19; No. 2 X at \$18; forge at \$16.50@17. These quotations will answer as well as any for the time being. Higher prices have been paid in exceptional cases for special accommodation, and there is a strong upward tendency, which may land prices at \$20 before we have time to think. There is great feverishness, some wild talk and a good deal of disappointment on both sides. A good many old contracts are about executed, and new

ones will have to be made, and at a time when makers have everything their own way. Efforts to obtain large supplies from Southern points have failed. The course of Bessemer continues to be an unsettling factor. Mill men are also anxious buyers, even in the face of summer.

Billets.—No one can give any reliable information about billets. Private information to-day by wire is unsatisfactory. At \$34 offered billets could not be had, and as high as \$35 was asked tentatively. There are several large Eastern consumers who are anxious to buy.

Merchant Bars.—The situation is about this: The efforts of urgent buyers to secure absolutely necessary iron has forced prices up to the 2c. basis for refined, but large buyers say these isolated transactions ought not to be taken as fixing the price of large lots. A good deal of rolling mill capacity will now add its quota to the market, but everything is sold up, and more iron is wanted than can be had.

Nails.—Nails are selling fast in a retail way.

Sheets.—Large contracts are now in the way of being placed for corrugated and galvanized. The country trade is very active and mills are obliged to book orders. No. 28 is 3.30c. and advancing.

Pipes and Tubes.—The condition of business is about the same. There is a struggle to get orders in.

Merchant Steel.—Agents say they are sending in more and larger orders than at any time for two months.

Plate Iron.—Quotations have been advanced close to 3c. for most kinds, where reasonably early deliveries can be promised. Nothing can be added to the previous reports. There is quite a list of buyers who will have precedence as soon as manufacturers are in a condition to make dates for delivery. A good deal of firebox and boiler plate is being ordered just now.

Structural Material.—Quotations are 1.85@2c. and business is beyond capacity. Bridge work and ship work is very urgent.

Steel rails are advancing. To-day prices might be given at \$28, but changes are pending. Makers have declined both home and foreign business this week.

Old Rails.—Old rails are again asked for, and current quotations—\$18@19—would be promptly paid.

A great deal of steel scrap is wanted and the market is bare.

Pittsburg. June 21.

(From Our Special Correspondent.)

So far as relates to iron and steel, products both raw and finished are certainly in very good shape; prices are steadily advancing. While some parties continue to report pig iron all sold up every week, we find the situation different. Our reports of Bessemer amount to 29,500 tons, Pittsburg delivery, \$18.75, the highest point yet reached; at the present rate of advance \$20-Bessemer will soon be reached.

Steel billets are still climbing; prices advanced \$2, with sales at \$3.50. Compared with June one year ago, the advance is \$18.50, a ton; the week's sales reach 18,500 tons.

Much bar sold last June at \$18. To-day's report furnishes sales at \$34.75; advance, \$16.75. While the advance in raw material is unprecedented, the advance in finished products is much larger on all kinds of material.

Some attempts are being made to cry down the market, on the ground that the high prices now ruling will check consumption, but it certainly has not done so yet. On general principles, however, and based on experience in the past, it is difficult to controvert this view of the situation; but as a matter of fact, prices keep on advancing, and the demand keeps on increasing, so that words of warning have had no effect so far. Prices are not abnormally high, however, although plates and billets look very high compared with the prices realized for them, say one year ago, when they were a trifle less than one-half of what they are today.

Finished Material.—There is no slackening in the demand, so that the mills in all departments are running to their full capacity, and are still unable to come anywhere near meeting the calls that are made on them. At the advance recently made prices are very firm. There never has been such a demand.

Muck Bar.—Prices are advancing under an increased demand; prices rule the highest for years.

Sheet Bars.—The market is very firm; prices still on the up-grade, with sales at \$33. Stocks are light.

Charcoal Iron.—The market shows increasing firmness. Sales show an advance in warm and cold blasts.

Skelp iron and steel are very firm. Sales of iron, grooved, \$2.15; sheared, \$2.30. Steel, grooved, \$2.10; sheared, \$2.25.

Steel Rails.—Prices advanced to \$28@30 for heavy sections.

Pipes and tubes advanced 25c. during the week. The demand far exceeds the supply. Plants all crowded.

Ju
Jon
It has
idle f
Lat
produ
High
the m
a sec
vicini
with
to wa
the ir
COKE
Tons.
6,000 B.
5,000 B.
3,000 B.
3,000 B.
2,000 B.
2,000 B.
2,000 B.
2,000 B.
1,500 B.
1,500 B.
1,000 M.
1,000 H.
1,000 N.
600 Mil
500 Mil
500 B.
400 Mil
200 No.
200 No.
150 No.
100 No.
100 Wh
50 No.
40 Mil
ALCOHOLS
5,000 Bill
3,500 Bill
3,000 Bill
2,000 Slat
1,500 Bill
1,500 Bill
1,000 Bill
1,000 Bill
Whet
puzzles
prices a
have m
actions
shipmen
and \$10
vana; s
working
000 wort
ments of
to Havi
plies for
loads of
Russia;
and mac
Pig Iron
Consum
is no rel
to buy a
to quote
No. 1 X
No. 2 pl
delivery;
\$18.25; N
\$18; basi
The low
the week
er grades
No. 2 Ala
3 has kep
forge, \$11
Bar Iron
and quot
quote ref
and comm
Plate.—
but the d
with ord
tide-wate
2.65@2.75c.
2.85c.; flax
box, 3@3.
Steel I
are nomin
ard sectio
and a ver
nally quo
30-lb., \$32;
advance f
pend on s
wanted, 2
bolts, 2.25
size of or
Structur
high rang
ber of ord
very firm;
water; Be
angles, 2c.
Wrought
prices cont
at 50 and
Nails.—
up pretty
large lots c

Jones & Laughlin started the Soho Plate Mill. It has a capacity of 200 tons daily. It has been idle for many years.

Latest.—So far as relates to iron and steel products there is little to add that is new. Higher prices are the rule all along the line, and the main thing is to get the iron, prices being a secondary consideration.

COKE SMELTED LAKE AND NATIVE ORE.

Table listing various types of coke and their prices per ton, including B. A. to S., J. to A., J. to O., and others.

MUCK BARS.

Table listing muck bars in different sizes (Neutral, P.) and their prices per ton.

SHEET BARS.

Table listing sheet bars in different sizes and their prices per ton.

CHARCOAL.

Table listing charcoal in different sizes (W.B. No. 2, 3, etc.) and their prices per ton.

OLD RAILS.

Table listing old rails in different sizes and their prices per ton.

BLOOMS, BILLETS, SLABS.

Table listing blooms, billets, and slabs in different sizes and their prices per ton.

New York. June 23.

Whether or not prices are going higher yet puzzles the iron trade. Many dealers feel that prices are high enough, but consumers seem to have money to spend and the volume of transactions remains good.

Fig Iron.—The demand for iron continues good. Consumers who have held off realize that there is no relief for the next 6 months, but continue to buy as a rule in a small way.

The lower grades of warrant irons rose during the week. There isn't much trading in the higher grades and prices have been about stationary.

Bar Iron.—The demand continues very strong, and quotations have climbed still higher. We quote refined iron 2.08c. in large lots on dock, and common 1.75c.

Plate.—The local demand remains only fair, but the demand at other points keeps mills filled with orders for months ahead.

Steel Rails and Rail Fastenings.—Prices are nominally somewhere around \$28 for standard sections f. o. b. mills, with a light demand and a very firm market.

Structural Material.—Business, considering the high range of prices, continues fair and the number of orders placed remarkable.

Wrought Iron Pipes.—Discounts from list prices continue to grow less and are now quoted at 50 and 70% on all sizes for large lots on dock.

Nails.—The market is firm, and demand holds up pretty well. Cut nails are \$2.30@2.35 for large lots on dock, and wire nails are \$2.60@2.65.

METAL MARKET.

NEW YORK. June 16, 1899. Gold and Silver.

Gold and Silver Exports and Imports At all United States ports in May and year.

Table showing gold and silver exports and imports for May 1898 and 1899, and for the year 1898 and 1899.

This statement includes the exports and imports at all United States ports, the figures being furnished by the Treasury Department.

Gold and Silver Exports and Imports, New York

For the week ending June 22d, 1899, and for years from January 1st, 1899, 1898, 1897, 1896.

Table showing gold and silver exports and imports for New York for the week ending June 22d, 1899, and for the years 1898, 1897, and 1896.

The gold exported went chiefly to London, and the silver also went there. The gold imported was from the West Indies; the silver from South America.

The United States Assay Office in New York reports the total receipts of silver at 231,000 oz. for the week.

Prices of Foreign Coins.

Table listing prices of foreign coins including Mexican dollars, Peruvian soles, and Spanish pesetas.

Average Prices of Silver per oz. Troy.

Table showing average prices of silver per oz. Troy for months from January to December for the years 1899, 1898, and 1897.

The New York prices are per fine ounce; the London quotation is per standard ounce, 925 fine.

Average Prices of Metals per lb., New York.

Table showing average prices of metals (Copper, Tin, Lead, Spelter) per lb. for months from January to December for the years 1899, 1898, and 1897.

The price given in the table is for Lake Copper. The average price of electrolytic copper in January was 14.26c; in February it was 17.02c; in March, 16.35c; in April, 17.12c; in May, 17.20c.

Financial Notes of the Week.

Business is settling down for the hot season, but general trade continues in very good condition and of large volume. The course of business in fact is not much affected by the dullness in the stock markets which has naturally followed the over-speculation in industrials, and the excessive investment in new securities.

There were no shipments of gold early in the week, but it is generally understood that some \$2,000,000 or \$3,000,000 will go out on Saturday's steamers. The movement seems to have no special importance.

Imports and Exports of Metals

Large table showing imports and exports of various metals (Aluminum, Antimony, Brass, Copper, Iron, Lead, Manganese, Nickel, Tin, Zinc) for New York, Baltimore, Philadelphia, Galveston, Boston, Newport News, Norfolk, and New Orleans, comparing weekly and yearly data.

*New York Metal Exchange returns. †By our Special Correspondent. ‡Not specified. §Week ending June 16th.

The duties on metals under the present tariff law are as follows: Antimony, metal or regulus, 3/4c. a lb. Lead, 1 1/2c. a lb. on lead in ores; 2 1/2c. per lb. on pigs, bars, etc.; 2 1/2c. on sheet, pipe and manufactured forms. Nickel, 6c. per lb. Quicksilver, 7c. per lb. Spelter or zinc, 1 1/2c. per lb. in pigs and bars; 2c. on sheets, etc. Copper, tin and platinum are reformed.

ment. Moreover, a great many people are going abroad for the summer, and will need large remittances to cover their expenses.

The silver market has been very steady and dull, without special feature. The strike situation in Colorado seems to be working towards a basis of settlement, but conditions are still uncertain.

The statement of the United States Treasury on Thursday, June 22d, shows balances in excess of outstanding certificates as below, comparison being made with the statement for the corresponding date of last week:

	June 15, 1893.	June 22, 1893.	Changes.
Gold	\$235,128,494	\$235,572,095	I. \$443,601
Silver	5,237,579	5,499,593	I. 262,014
Legal tenders	14,934,939	25,094,739	I. 15,159,791
Treas. notes, etc.	927,432	961,156	I. 33,724

Totals \$256,228,444 \$257,157,574 I. \$929,139
Treasury deposits with national banks amounted to \$78,956,154, a decrease of \$1,390,804 during the week.

The statement of the New York banks—including the 66 banks represented in the Clearing House—for the week ending June 17th, gives the following totals, comparison being made with the corresponding weeks in 1892 and 1891:

	1891.	1892.	1893.
Loans and discounts	\$518,559,800	\$610,336,500	\$773,310,200
Deposits	592,528,200	739,976,400	907,770,000
Circulation	13,992,700	14,686,700	13,587,100
Reserve:			
Specie	90,050,200	182,905,500	197,157,900
Legal tenders	106,472,800	59,111,400	59,787,800
Total reserve	\$196,523,000	\$242,016,900	\$256,945,700
Legal requirements	148,132,050	182,744,100	226,942,500

Balance, surplus.... \$48,390,950 \$59,272,800 \$30,903,200
Changes for the week, this year, were increases of \$15,902,600 in loans and discounts, \$9,938,400 in deposits, and \$170,500 in legal tenders; decreases of \$22,700 in circulation, \$7,005,800 in specie, and \$9,319,900 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding dates last year:

Banks.	1892.		1893.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Assn.	\$182,905,500	.....	\$197,157,900	.....
England	\$190,780,635	.....	155,136,955	.....
France	375,059,840	\$246,953,130	370,883,600	\$243,872,400
Germany	146,940,000	75,700,000	150,935,000	77,755,000
Aus.-Hun.	174,170,000	62,965,000	181,020,000	63,655,000
Spain	49,170,000	21,049,000	59,295,000	65,635,000
Neth'lands	14,300,000	34,825,000	19,170,000	33,060,000
Italy	75,500,000	9,605,000	76,745,000	11,605,000
Russia	553,475,000	21,820,000	477,160,000	26,575,000

The returns for the Associated Banks of New York are of date June 17th, and the others are of date June 15th, as reported by the "Commercial and Financial Chronicle" cable. The New York banks do not report silver separately, but the specie carried is chiefly gold coin. The Bank of England reports gold coin only.

Shipments of silver from London to the East for the week ending June 8th, 1893, are reported by Messrs. Pixley & Abell's circular as follows:

	1892.	1893.	Changes.
India	£2,768,940	£1,958,800	D. £810,140
China	310,956	617,761	I. 306,805
The Straits	101,062	24,907	D. 76,155
Totals	£3,180,958	£2,601,468	D. £579,490

Arrivals for the week this year were £187,000 in bar silver from New York, £18,000 from the West Indies, and £4,000 from Australia; total, £209,000. Shipments were £133,000 in bar silver to Bombay, £62,300 to Shanghai, and £9,483 to Hong Kong; total, £204,783.

Indian exchange continues steady, and the demand for Council bills in London is very good, considering that the dull season in Indian trade has now set in. The sales of bills in London amounted to 50 lakhs, and the average price was 15.97d. per rupee.

The foreign merchandise trade of Great Britain for the five months ending May 31st is given by the Board of Trade returns as below:

	1892.	1893.
Exports	£119,451,042	£132,497,828
Imports	£196,986,703	£198,403,349

Excess, imports..... £77,535,661 £65,905,521

There was an increase of £1,416,646, or 0.7%, in imports, and of £13,046,786, or 10.9%, in exports. The movement of gold and silver for the five months is reported as follows:

	Imports.	Exports.	Excess.
Gold:			
1892	£11,926,407	£9,746,225	Imp. £2,180,178
1893	22,572,817	14,398,605	Imp. 8,174,212
Silver:			
1892	4,956,426	5,784,708	Exp. 828,282
1893	6,108,363	6,477,754	Exp. 369,391

Of the silver receipts this year the United States furnished £3,796,249, or 62.2% this year, against £3,486,813, or 53.4% in 1892.

Other Metals.

Daily Prices of Metals in New York.

June.	Sterling Exchange.	Silver.				Copper.				Tin.	Lead.	Spelter.
		Fine oz.	Lon. P'nce	Lake, cts. p' lb.	Elec-tro-lytic, p' lb.	Lon-d'n stand-ard, p' ton.	cts.	cts.	cts.			
17	1.87 3/4	60 3/4	27 3/4	17 3/4	16 3/4				25 5/8	4.42 1/2	5.85	
19	1.87 3/4	60 3/4	27 3/4	17 3/4	16 3/4	75 15 0	2 3/4	4.4 3/4	5.85			
20	1.87 3/4	60 3/4	27 3/4	17 3/4	16 3/4	75 7 6	2 3/4	4.42 3/4	5.75			
21	1.87 3/4	60 3/4	27 3/4	17 3/4	16 3/4	75 12 6	2 3/4	4.42 3/4	5.65			
22	1.87 3/4	60 3/4	27 3/4	17 3/4	16 3/4	75 15 0	2 3/4	4.42 3/4	5.62 1/2			
23	1.87 3/4	60 3/4	27 3/4	17 3/4	16 3/4	76 2 6	2 1/2	4.42 3/4	5.62 1/2			

The quotations given for electrolytic copper are for cakes, ingots and wirebars; the price of electrolytic cathodes is usually 0.25c. lower than these figures.

Copper.—The market was very dull during the greater part of the week and there was little disposition on the part of consumers to buy anything at present values. Towards the close there is a slightly better feeling; that is to say, there is somewhat more inquiry, but not much business has been transacted. With the present high level of prices, manufacturers operate with the utmost reluctance and only buy their absolute wants. Some transactions took place in Lake copper at 17 3/4c., while electrolytic copper in cakes, bars or ingots, has been selling at 16 3/4c. and cathodes at 16 1/2c.

The speculative market in London gave way early in the week and spot sold as low as £75 7s. 6d., but afterwards a somewhat better feeling prevailed and the loss was recovered, prices closing at £76 2s. 6d. @ £76 5s. for spot, and 2s. 6d. lower for three months.

For refined and manufactured we quote: English tough, £77 15s. @ £78 5s.; best selected, £80 @ £80 5s.; strong sheets, £86 @ £86 10s.; India sheets, £84 @ £84 10s.; yellow metal, 6 3/4 @ 7d.

Imports of copper into Great Britain for the five months ending May 31st included 29,021 tons ore (19,887 tons in 1892); 32,099 tons matte and precipitate (34,519 tons in 1892); 26,094 tons fine copper (26,841 tons in 1892). The totals this year were equal to 45,046 long tons fine copper, against 46,090 tons in 1892. The United States supplied this year 352 tons ore, 3,283 tons matte and 12,296 tons fine copper; the total equal to 13,973 tons fine copper.

Tin.—Nothing was pressed for sale and prices have been rather firm. Towards the end of the week, in sympathy with the rise in London, values are somewhat better. We have to quote 25 1/2 @ 25 3/4c.

The tendency in London was rather firm, values varying but slightly, closing at the best, £118 17s. 6d. @ £119 for spot, and 12s. 6d. higher for three months.

Imports of tin into Great Britain for the five months ending May 31st were 11,590 long tons, against 10,984 tons last year.

The production of Banca tin for the year ending April 30th is reported at 9,620 long tons, against 8,713 tons the preceding year. The production of Billiton tin for the year was 5,406 long tons, against 5,166 tons in the preceding year.

Lead.—The strike in Colorado continues, and although great efforts are being made by the authorities to bring about an understanding, no headway appears to have been made, as both employers and men seem unwilling to recede from their demands. Considering that the main supplies are thus practically shut off, it is remarkable that prices show such slight variation. The large stocks in New York press heavily on the market and the metal has still to be quoted here 4.42 1/2 @ 4.45c. On the other hand, prices in the West are comparatively higher and the St. Louis market has advanced to 4.35 @ 4.40c., with very little offering.

From Europe a firmer market is reported. Spanish lead is about 2s. 6d. higher, being quoted £14 6s. 3d. @ £14 17s. 6d., and English lead 5s. more.

Imports of lead into Great Britain for the five months ending May 31st were: Spain, 43,780 long tons; Australasia, 30,064 tons; United States, 12,434 tons; Germany, 3,349 tons; other countries, 1,687 tons; totals, 91,314 tons, against 77,220 tons in 1892, an increase of 14,094 tons, or 18.2%. The increase in receipts from Australasia was a special feature this year.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is steady and fairly active. Sales are being made on a basis of 4.35c. for common metal, and 4.37 1/2c. for corroding lead. The Colorado strike does not frighten consumers to any material extent, and trading is largely of a retail character and for near-by delivery.

Spelter.—The decline continues and the market is quite demoralized. Refiners appear anxious not to see stocks accumulate and every order is eagerly competed for. It was hoped that Europe would send orders over here, but that has so far not been the case, and the market from abroad is also reported to be on the decline. Under the circumstances, prices have necessarily shown great irregularity and business has been reported at from 5.85c. in the beginning of the week down to 5 1/2c. for June-July

shipment, while later deliveries are practically to be purchased at 5 1/2c. New York.

In London, good ordinary brands have declined to £25 12s. 6d. and specials 5s. higher.

Imports of spelter into Great Britain for the five months ending May 31st were 30,822 long tons, against 33,369 tons last year.

Antimony shows no change. Prices, however, remained unchanged at 10 1/2c. for Cookson's; 10c. for Hallett's, "C" and U. S. Star.

Nickel continues on unchanged lines, and no alteration in prices can be reported. We quote for ton lots, 33 @ 36c. per lb., and for smaller orders 35 1/2 @ 38c. London prices are 14 @ 16d. per lb., according to size of order.

Platinum.—Demand is active and prices continue high. For large lots \$15.50 per ounce is now quoted in New York; for smaller orders, \$16 @ \$17. The London quotation is 62 @ 64c. an ounce.

Quicksilver.—The New York quotation remains \$42 per flask. The London price is steady at £8 5s., with £8 4s. quoted from second hands.

Imports of quicksilver into Great Britain for the five months ending May 31st were 2,458,504 lbs. (2,899,066 lbs. in 1892). Exports were 939,620 lbs. (926,446 lbs. in 1892), leaving 1,518,884 lbs. consumed or added to stocks, against 1,972,620 lbs. in 1892.

The Minor Metals.—Quotations are given below for New York delivery:

	Per lb.	Per lb.
Aluminum.		
No. 1, 99 1/2 ingots.	35 @ 37c.	Bismuth \$1.45 @ \$1.50
No. 2, 99 1/2 ingots.	31 @ 34c.	Magnesium..... \$2.75 @ \$3
Rolled sheets.	38c up	Phosphorus..... 40 @ 50c.
Alum.-bronze.	29 @ 23c.	Tungsten 70c.
Nickel-alum.	33 @ 38c.	Ferro tungsten, 60%..... 60c.

Variations in price depend chiefly on the size of the order.

LATE NEWS.

Dispatches from Johannesburg give the gold production of the Transvaal, as reported by the Chamber of Mines of the South African Republic for May and the five months ending May 31st. The statement is as follows, in ounces of bullion:

	Witwaters-rand.	Other Districts.	Totals.
January	410,145	20,865	431,010
February	404,355	20,831	425,186
March	441,578	22,458	464,036
April	431,111	21,238	450,349
May	444,833	21,519	466,352
Totals	2,140,102	106,911	2,247,013
Totals, 1892	1,616,994	106,723	1,723,717

The Witwatersrand shows this year an increase of 523,108 oz., or 32.2%, while the other districts increased 188 oz., or 0.2%, the result for the whole Transvaal being a gain of 523,296 oz., or 30.4%. The total production this year, at the usual rate for Transvaal bullion, was equal to 1,842,551 fine oz. gold, or \$38,085,529.

Elsewhere will be found some account of the contest between the miners and smelters in the Joplin zinc region. On June 22d the Missouri & Kansas Zinc Miners' Association issued the following address to the producers:

"The board of directors of the Missouri & Kansas Zinc Miners' Association, on account of the zinc smelters having created an apparent surplus of zinc ore in this district by refusing to purchase the weekly output, deem it advisable and essential to the maintenance of profitable prices that the production of zinc ore be suspended for two weeks; therefore, it is urgently requested that every plant in this district be shut down from June 24th to July 10th, 1893. By a strict compliance with this recommendation the directors feel certain that former prices may be restored and maintained. The board begs to advise you that they have perfected arrangements for exporting ore, and that within a very short time shipments will be made. These shipments, aided by a shut-down of the plants, will increase the value of your product."

By Telegraph.

(From Our Special Correspondent.)

Leadville, Colo., June 23.—The current newspaper reports sent abroad that the smelters have settled their troubles here and will resume at once are without foundation. I conversed with Manager Weddle of the Arkansas Valley, and Superintendent Nutting of the Bimetallic Smelter, this evening, and they state that no agreement is yet reached and that they have not decided what action should be taken. The Eilers plant at Pueblo is doing some cleaning up and has started the roaster, but it is not yet decided whether it will blow in. The Mab Mine, the A. Y. & Minnie and a few Carbonate Hill lessees are shipping a curtailed production to the Guggenheim plant, which is operating 9 furnaces at Pueblo. The remainder of the Leadville producing mines are in the same condition as last week, simply doing a little development work and keeping the pumps going.

MINING STOCKS.

Complete quotations will be found on pages 758, 759 and 730 of mining stocks listed and dealt in at:

Boston.	Philadelphia.	Paris.
Colo. Springs.	Salt Lake.	Rosslund.
Denver.	San Francisco.	Toronto.
Spokane.	London.	Valparaiso.
New York.	Mexico.	

New York. June 23.

The Exchange did a quiet business in mining shares this week. Anaconda Copper was bid down to \$49, but most of the trading was done around \$50.75. Amalgamated Copper was weaker, and sold down to \$91½ and at one time touched \$90 bid, while holders asked as high as \$94½. Tennessee Copper receded to \$19@19½ on Wednesday. Of the prospect Arizona Copper shares. Markeen was quoted on the curb at \$7¼@8½, and Wahahta at \$6@7¼. On June 20th United Verde Extension of Arizona was offered and some transactions were effected at \$5¼@5½, and on Wednesday sales were reported at \$6. We again advise our readers to make a careful investigation before investing in these shares. The preferred stock of the Morenci Copper Company, also of Arizona, has sold on the Industrial Exchange around \$1.50. The American Smelting and Refining securities have not been affected by the smelters' strike to any notable extent. The common shares lost about two points during the week, selling around \$37 on Wednesday; the preferred stock touched \$82 on Monday and Tuesday. Ontario, of Utah, gained \$1.50, selling at \$9.50 on Monday. The Comstocks were featureless, while the Colorado group is nervous about the ultimate outcome of the smelter's strike.

Miscellaneous dividends declared recently include Exploration Syndicate, \$2.50 quarterly, payable July 1st; General Chemical Company, \$2 on the preferred stock, July 1st; Federal Steel Company, 1½% quarterly on the preferred stock and 1¼% on common, both July 20th; Texas & Pacific Coal Company, 1½%, July 20th; Empire Steel and Iron Company, 6% per annum on the preferred stock from the net earnings, payable July 1st. Payment of the dividend on Federal Steel common has been temporarily enjoined.

Boston. June 22.

(From Our Special Correspondent.)

The market has been dull enough so far as copper stocks were concerned. All the interest this week was in the industrials, and copper had no show at all. The only stock in which there was much business was Parrot, about which a little contest has arisen. Apparently, everything is not smooth about the transfer to the Amalgamated, and two parties are bidding for the stock. It sold down to \$50, but recovered a little afterwards.

Calumet & Hecla stands around \$800, Boston & Montana, \$340; Tamarack, \$205. There were some sales of Amalgamated at \$92, and the talk is of lower prices.

Reports are current again of a sale of the Franklin property to the Quincy Company; but they are hardly credited. There is no special reason why anyone should want to buy the property, though the company may be quite willing to sell.

Most of the speculative stock did hardly business enough to make a quotation; and the same may be said of the smaller stocks. It looks as if the market had settled down for the summer. Of course new developments are talked about, but people are not ready to take them up just now. The Amalgamated affair has pretty well killed the copper stock market for the present.

Some New York and Boston papers brought out with a flourish a Salt Lake dispatch announcing the sale of the Daly-Hearst interests in the Anaconda Mining Company to our "Eastern syndicate." Some of them followed it with a column or so of comments. It was stale news, simply covering the sale of the Anaconda properties to the Amalgamated Copper Company, which was announced some weeks ago. They seem to have just found it out at Salt Lake; and the Eastern reception of the news shows that some editors do not read their own papers.

The Chippewa Copper Mining Company of Lake Superior has been organized under Maine laws with \$1,500,000 capital. The president is L. K. Washburn, of Boston; treasurer, F. A. Woodward, of Superior, Mich.

The East Mohawk is a new company which owns 1,280 acres adjoining the old Fulton in Keweenaw County, Michigan. It is to have 100,000 shares, \$25 par, and the stock will be brought out at \$10. Mr. John Stanton, of New York, and Cameron Currie, of Detroit, are interested.

Salt Lake City, June 17.

(From Our Special Correspondent.)

A nervous market, with sharp breaks and a few strong advances, followed the seeming improvement of the week ending June 10th. In this sultry vacation period outside interest cannot be aroused save by sensational ore uncoversings, and none are made known.

Ajax is about stationary. Bullion-Beck and Centennial-Eureka show no change. Eagle and Blue Bell softened badly, doing business under \$1.45. Four Aces fluctuates below 25c., with con-

siderable trading. Lower Mammoth droops. Mammoth sold around \$2. Sunbeam put on unlooked-for strength. Swansea is firm under \$4. South Swansea's advance was a forerunner of dividend No. 19, for \$7,500, payable June 21st, the third for current year. Tetro is higher. Geysers-Marion still softens. Little Pittsburg seemingly is a wee bit firmer. Mercur sold at \$7.50. Omaha is in an expectant mood of change of ownership. Sacramento is a little stronger. The Sunshine's anticipated advance is delayed.

Anchor is firm and quiet. Daly sold at \$1.05@1.38. Daly-West is jumping into favor with strong demand, selling up to \$11.10. Valeo holds above \$1. Horn Silver is in demand. Dexter drooped, selling under \$2, but recovered somewhat. After call features to-day are Daly-West and Grand Central, each being in lively demand; for the former \$11 is bid for all offerings and \$9 for the latter.

San Francisco. June 17

(From Our Special Correspondent.)

There has been no especial incident in the market this week. The quotations were somewhat lower early in the week, with subsequent recovery at the close; but the record was again made on small transactions, and public interest does not yet show itself to any extent.

The only encouraging incident is that the last assessment on Consolidated California & Virginia was pretty well paid up. The 25c. a share was paid on all but 3,200 shares of the total of 216,000, and only 600 shares were sold at the delinquent sale on Wednesday. Of the 3,200 shares unpaid, 1,700 were held in the East and 1,500 here.

Some quotations noted are: Consolidated California & Virginia, \$1.55; Ophir, \$1.05@1.08; Confidence, \$1; Caledonia, 74@77c.; Sierra Nevada, 68c.; Belcher, 48c.; Potosi, 37@38c.; Hale & Norcross, 34c.

A special meeting of the Mayflower Grand Mining Company is to be held June 22d to consider the present condition of the mine and what action had best be taken about it.

The project for furnishing power to the Comstock mines and mills from the Truckee River continues to be canvassed, and it is reported that matters will soon be ready for the organization of a company.

The mining company's statements, as filed in their offices, show cash on hand June 1st, with all expenses paid unless otherwise stated: Alpha Consolidated, \$1,564; Alta, \$48, with \$1,000 due the bank; Andes, \$4,117; Belcher, \$4,693; Best & Belcher, \$2,910; Bullion, \$4,121; Caledonia, \$4,174; Chollar, \$4,738; Consolidated California & Virginia, \$32,916, with balance of an assessment to be collected; Confidence, \$5,179, with May expenses unpaid; Consolidated New York, \$306; Crown Point, \$8,095; Challenge Consolidated, \$1,194; Consolidated Imperial, \$684; Exchequer, \$751; Gould & Curry, \$280, with \$2,000 due the bank and an assessment being collected; Hale & Norcross, \$7,608, with bills payable of \$1,755; Julia Consolidated, \$1,189; Justice, \$220, with bullion clean-up to be received; Mexican, an indebtedness of \$530, with an assessment being collected; Ophir, \$6,653.79 in cash; Overman, \$1,857.65; Segregated Belcher, \$1,990; Scorpion, \$24; Sierra Nevada, \$6,944; Silver Hill, \$67, with bills payable of \$100; Standard Consolidated, \$78,008, with May expenses unpaid; Syndicate, \$1,556; Union Consolidated, \$5,918; Utah Consolidated, \$2,260.

London. June 10.

(From Our Special Correspondent.)

The political events in South Africa are being made the most of by the bears. The failure of President Kruger and Sir Alfred Milner to arrive at a satisfactory basis of agreement for future internal reforms in the Transvaal is to be regretted, but it surely cannot be fraught with such dire consequences as the bear party affect to prophesy. South Africans have suffered considerably, and falls are shown all around.

The British Columbian market has seen the flotation of a new company this week called the Granite Gold Mines, Limited. This company has been formed to acquire the Granite and Royal Canadian group of mines, situated near Eagle and Sandy Creeks, in the Nelson Division of West Kootenay. It is promoted by a company called the Duncan Mines, Limited, of which Mr. Ernest R. Woakes is consulting engineer and Capt. T. J. Duncan manager. Very complete reports are given of the property by independent experts, such as John E. Hardman and Francis Bennetts. A good deal of development work has been done and extensive bodies of ore exposed. Some of the ore is free milling, but arrangements are being made for obtaining pyritic concentrates. The prospectus gives very full and clear information and the proposition seems a reasonable one. But the most remarkable thing about the prospectus is that it specifies the promoters' profits. The capital of the company is £120,000, of which £100,000—partly cash and partly shares—is the purchase price paid to the promoters, the Duncan Mines, Limited. Of this purchase price £55,000 is the profit to the promoters on the original cost and subsequent expenditure. In addition to this profit there are 10,000 shares to be paid in commissions for underwriting. This disclosure of promoters' profits

is a precedent which might well be followed in many other cases.

Two new copper mines have been introduced to the public this week. One is the Ray Copper Mines, Limited, which has been formed with a capital of £260,000 to acquire the Ray, Taylor and Innes groups of claims on Mineral Creek, near Riverside, Pinal County, Arizona. The properties have been acquired and the company has been formed under the direction of Messrs. Alexander Hill and H. P. Winslow. Mr. Hill will be remembered as having been manager of the Mountain Copper Mines, Shasta County, Cal. A good deal of development work, it is said, has been done by the former owners and large bodies of ore averaging 4 to 5% of copper exposed. The profits of working are based on a price of copper of £50 per ton, and not, as is usual nowadays, on £70. The properties have been independently examined by Mr. W. Y. Westervelt, of New York. I understand that the whole of the capital now offered for subscription has been underwritten.

The other new copper company is called the Buena Vista Copper Mines, Limited. This has been formed to acquire the Buena Vista and San Bruno claims, which are stated to be near the Boleo Mines, Lower California. The prospectus is meager, the directors unknown people, and no independent report on the properties is given. Mr. G. A. Burr, the government engineer, is quoted as saying that the surface indications are excellent, while the directors themselves figure on having 15% ore to deal with. The capital of the company is £50,000, of which £3,000 in cash and £32,000 in shares is purchase price, while £15,000 will be available for working capital, though the directors say they will be quite happy if they get £5,000 for this purpose. The whole thing is an unmeritorious proposition. "Close to the Boleo" is the motto.

Paris. June 17.

(From Our Special Correspondent.)

We are still in the midst of a political excitement which largely diverts attention from the stock market. This has also a depressing effect on values, since there is always uncertainty as to the result. Financial interests exercise a strong pressure in favor of quiet; but the multitude sometimes disregards the financiers.

In the metallurgical shares there have been some notable fluctuations. The Creusot strike has produced an impression not altogether favorable, and there are fears of further labor complications. The stockholders of the Acleries de France will hold a special meeting on June 20th to vote on the question of issuing 4% bonds to the amount of 4,000,000 fr., for the purpose of extending the operations of the company.

The zinc and lead shares hold their values well, especially the former. The demand for zinc continues very large and the prices of the metal afford a better profit than for a long time past.

The copper stocks are quiet and there has been some reaction in prices. There is no especial reason for this, particularly as one no longer regards the American consolidation of companies as of great importance. The Amalgamated Copper Company, now that one is able to take its exact measure, is a very small affair compared with the great combination of all the American producers which was promised us by certain vapors in Boston. It is a company of considerable proportions, but only one of the large concerns, and it is put on a much more expanded basis than the others—that is to say, it is a more risky and speculative holding. What we most admire here is the neat and quiet way in which our London friends unloaded their holdings of Anaconda stock on New York and Boston at higher prices than they had ever hoped to get.

The South African gold stocks are disturbed and uneasy in view of the troubles between England and the Transvaal. Some of our journalists are urging an appeal to arbitration, but it is evident that in view of the claim that the Transvaal is and always has been under the suzerainty of Great Britain, that country could not submit to any intervention or arbitration, which would be in effect to abandon its claim and acknowledge the Boer government as that of an equal and sovereign state.

Toronto, Ont. Azote.

(From Our Special Correspondent.)

The market during the week has been feverish and active. As predicted, the advance in Golden Star was followed by a slump, and the stock sold down from 74½ to 53c. It is now on the up turn and ruling around 60c., with the chances in favor of an advance to the old figures. Hammond Reef declined 10 points, but recovered 2 at the close to-day. Superior Gold and Copper sold up to 14c., and is likely to go higher. It is said some of the copper magnates of Boston are interesting themselves in this stock. The silver stocks are dull, owing to the strike in the silver mining districts of British Columbia. Alice A. has attracted some attention, and the stock has advanced. Business on the Toronto Mining Exchange is good, in spite of the tightness of the money market.

STOCK QUOTATIONS.

NEW YORK. Table with columns: NAME OF COMPANY, Location, Par Val., June 16, June 17, June 19, June 20, June 21, June 22, Sales. Lists various mining and industrial stocks.

BOSTON - MASS. Table with columns: NAME OF COMPANY, Par val., No. of shares, June 15, June 16, June 17, June 19, June 20, June 21, Sales. Lists various mining and industrial stocks.

COAL AND INDUSTRIAL STOCKS. Table with columns: Am. Sm. & Ref., Am. S & W Co., Central of N. J., Col. Fuel & L., Del. & Hud., Federal Steel, National Lead, National Salt, New Central C., Phila. & Read, Standard Oil, Tenn. C. I. & R. Lists various coal and industrial stocks.

PHILADELPHIA PA. Table with columns: NAME OF COMPANY, Location, Par Val., June 15, June 16, June 17, June 19, June 20, June 21, Sales. Lists various mining and industrial stocks.

VALPARAISO, CHILE. May 20. Table with columns: NAME OF COMPANY, Location, Capital paid, Sh. Val. paid up, Last Div'd. Amt. d. Date, Prices. Lists various mining and industrial stocks.

COLORADO SPRINGS COLO. Table with columns: NAME OF COMPANY, Par val., June 12, June 13, June 14, June 15, June 16, June 17, Sales. Lists various mining and industrial stocks.

SPOKANE, WASH. Week June 3. Table with columns: NAME OF COMPANY, Par val., Prices, Sales. Lists various mining and industrial stocks.

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

* Official quotations Spokane Stock Exchange. Total sales, 13,500 shares.

STOCK QUOTATIONS.

DENVER, COLO.

Table of stock quotations for Denver, Colorado, listing various mining and industrial companies with their share prices and sales figures.

Official Quotations Denver Stock Exchange. Sales: Mines, 110,000 shares; Prospects, including those mentioned, 64,000 shares; Miscellaneous, 45,000 shares; total, 123,000 shares.

SALT LAKE CITY, UTAH.

June 17

Table of stock quotations for Salt Lake City, Utah, listing various mining companies and their market prices.

*From Our Special Correspondent. †Utah companies. ‡Mines in Vanderbilt, Cal. §Mines in Tuscarora, Nev.

ROSSLAND, BRITISH COLUMBIA.

June 15.

Table of stock quotations for Rossland, British Columbia, listing various mining and industrial companies.

*From Our Special Correspondent

SAN FRANCISCO, CAL.

Table of stock quotations for San Francisco, California, listing various mining and industrial companies.

Official telegraphic quotations of San Francisco Stock Exchange

MEXICO.

June 15.

Table of stock quotations for Mexico, listing various mining companies and their market prices.

NOTE:—In most of the older 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. Many newer companies have a nominal par value, usually \$50 or \$100. Prices are in Mexican dollars.

PARIS.

June 8.

Table of stock quotations for Paris, listing various mining and industrial companies and their market prices.

TORONTO, CAN.

Table of stock quotations for Toronto, Canada, listing various mining and industrial companies.

Official quotations of the Standard and Toronto Mining and Industrial Exchanges. Total shares sold, 227,933.

STOCK QUOTATIONS.

Table with columns: NAME OF COMPANY, Country, Authorized capital, Par value, Last dividend, Quotations. Lists various mining companies like Alaska-Mexican, Cariboo, and others with their respective financial details.

Table with columns: NAME OF COMPANY, Location, Meeting, Date, Place of Meeting. Lists meetings for companies like Alexander, Best & Reicher, and others.

Table with columns: NAME OF COMPANY, Location, Div, Sale, Amt, Office. Lists assessments for companies like Midnight Bowers, Yankee Boy, and others.

Table with columns: NAME OF CO., Date, Amt., Paid 1899, Grand Total. Lists dividends for companies like Alamo, Alaska-Mexican, and others.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

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). Rows 1-127.

Table with columns: Name and Location of Company, Capital Stock, Shares (No., Par Val), Assessments (Total Levied, Date and Amount of Last). Rows 1-127.

G., Gold. S., Silver. L., Lead. C., Copper. B., Borax. * Non-assessable.

NOTE.—This table is corrected up to June 5. Correspondents are requested to forward changes or additions so as to reach us before the end of each month.

CHEMICALS, MINERALS, RARE ELEMENTS, ETC.—CURRENT PRICES.

Table with multiple columns listing various chemicals and minerals such as Abrasives, Acids, Alkalis, Ammonia, Alum, Aluminum, Ammonium, Antimony, Arsenic, Asphaltum, Barium, Barytes, Bauxite, Benzene, Bismuth, Bitumen, Borax, Bromine, Cadmium, Calcium, Carbide, Carbonate, Cement, Chlorine, Chrome Ore, Clay, Cobalt, Copper, Cream of Tartar, Cryolite, Explosives, Feldspar, Flint, Fluorspar, Fuller's Earth, Gypsum, Iron, Iodine, Kaolin, Lead, Lime, Magnesite, Magnesium, Manganese, Marble, Mercury, Mica, Mineral Wool, Monazite, Nickel, Nitrates, Oils, Oxides, Potassium, Potash, Pyrites, Quartz, Rosin, Salts, Silica, Sulphate, Sulphur, Tar, Tin, Uranium, Zinc, and Zirconium. Each entry includes a description, measurement unit, and price.

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. This table is revised up to June 16th. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable. See also Market Review of Chemicals and Minerals.

THE ENGINEERING AND MINING JOURNAL

GENERAL LIBRARY
UNIV. OF MICH.
JUN 26 1899

VOL. LXVII., No. 25.

NEW YORK, SATURDAY, JUNE 24, 1899.

PRICE, 15 CENTS.

THE HARRINGTON & KING PERFORATING CO.

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

Mining and Milling Machinery, Stone, Coal and Ore Screens,
Reduction and Concentrating Works, Stamp Battery Screens.

Standard Sizes Perforated Tin and Brass Always in Stock

Main Office and Works: 241-243 North Union Street, Chicago, Ill.

DON'T BE MISLED

more than once. If you have invested in an imitation Worthington Electric Mine Pump don't waste money and patience in doing so again. You thought to save money by purchasing a cheap machine. It broke down. Don't duplicate this experience. The Worthington Triplex Electric Mine Pump is the most modern machine of the kind on the market, and will meet the most difficult conditions of the service for which it is intended. Install one now that you have tried the imitation, and see why the difference in cost is justified.

HENRY R. WORTHINGTON, - - New York
WORTHINGTON PUMPING ENGINE CO., 153 Queen Victoria St., London, E. C., England.



WE CLAIM THE FOLLOWING MERITS FOR JENKINS BROS.' VALVES

1. Manufactured of the best Steam Metal.
2. No regrinding, therefore not constantly wearing out the Seat of the Valves
3. Contains JENKINS DISC, which is suitable for all Pressures of Steam, Oil and Acids.
4. The Easiest Repaired, and all parts Interchangeable.
5. Every Valve Tested before leaving the factory.
6. ALL GENUINE stamped with Trade Mark.

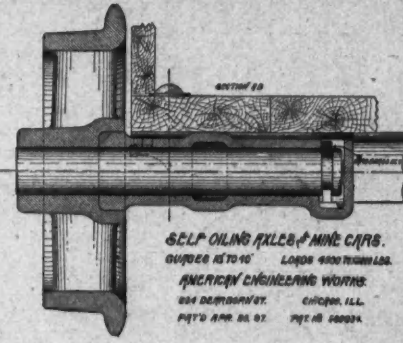
JENKINS BROTHERS, New York, Philadelphia, Chicago, Boston.

DOUBLE CRIMPED MINING SCREENS

SEE PAGE 25.
THE W. S. TYLER WIRE WORKS CO.,
Cleveland, O., U. S. A.

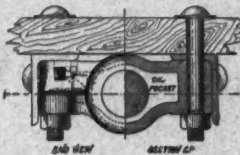
"PEGAMOID" GOLD PAINT.

Latest application of gold paint looks like leaf gold. Washable; untarnishable; water and oil proof; durable; easily applied. Bicycles, radiators, pipes, boats, metal work, machinery, etc. Makes tarnished objects better than new. A necessity in household, in machine shop and to engineer. Sample bottle and circular for 25c.



SELF OILING AXLES FOR MINE CARS.
SIZES 12 TO 16" LARGER SIZES AVAILABLE.
AMERICAN ENGINEERING WORKS
254 DEARBORN ST. CHICAGO, ILL.
PATD APR 26 01 REGD MAR 20 00

SAVES LABOR.
SAVES OIL.



Long Bearings.
No Loose Parts.
Built for Steel
or
Wooden Cars.

AIR COMPRESSORS

For Every Application of Compressed Air Power.

CLAYTON AIR COMPRESSOR WORKS,
20 Cortlandt Street, NEW YORK.
Complete Catalogue upon application.



BRISTOL'S RECORDING INSTRUMENTS

FOR PRESSURE, TEMPERATURE, AND ELECTRICITY
All ranges, low prices, and every instrument fully guaranteed.
Send for Circulars and Testimonials.
THE BRISTOL CO.,
WATERBURY, CONN.

LABORATORIES.

CHEMICAL ANALYSES AND ASSAYING
SEE PAGE 24.
SIMONDS & WAINWRIGHT.

CYANIDE.

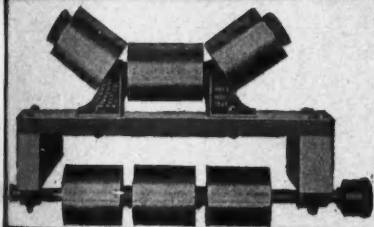
SEE PAGE 24.
THE ROESSLER & HASSLACHER CHEMICAL CO.

CONVEYING MACHINERY.

SEE PAGE 44.
THE AULTMAN COMPANY, Canton, O.

FLANGES...

CAST-STEEL WELDLESS FLANGES,
FORGED AND ROLLED FROM
SOLID STEEL INGOTS,
Suitable for High-Pressure Steam,
Water or Gas Lines.
For details as to prices, etc., address
LATROBE STEEL COMPANY,
1200 Girard Building, Philadelphia.



ROBINS BELT CONVEYORS

SEE PAGE 44.

"PNEUMATIC" CYANIDE PROCESS

Patented in United States, South African Republic, New Zealand, Victoria, New South Wales, South Australia.)
Compressed Air Solves the Problems of Oxygen, Agitation, Hot Solution, Slimes, and Perfect Extraction. Doubles Capacity.
Pamphlet, THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.



THE JACKSON POWER ROCK DRILL.

SEND FOR CIRCULAR.
New York, 43 John St. Denver, Col., 1756 Larimer St.

EDISON JR. INCANDESCENT LAMP

THOMAS A. EDISON, JR., 27 William Street, New York, U. S. A.



MAGNOLIA METAL.

Best Anti-Friction Metal for all Machinery Bearings. For Sale by all Dealers.
BEWARE OF IMITATIONS.
Genuine MAGNOLIA METAL is made up in bars of which this is a fac-simile.
The name and trade-mark appear on each box and bar, and the words "Manufactured in United States" and "Patented June 3, 1890," are stamped on the under side of each bar.
London Office, 24 Queen Victoria St., London, E. C.
Chicago Office: 266 & 267 West St., N. Y. Fisher Bldg., 231 Dearborn St.
MAGNOLIA METAL CO. Owners and Sole Manufacturers, Room 254 Board of Trade Building, Montreal.

ELMORE HAND ROCK DRILL.



Can strike with ease from 80 to 120 blows per minute. Weight of blow regulated by tension of spring. The only practical hand power drill ever invented. Simple, effective and durable.

SEND FOR CATALOGUE.
ELMORE HAND ROCK DRILL CO.,
25 Quincy St., - Chicago, U. S. A.

LIXIVIATION

In its modern development.
For Silver and Gold Ores and Tailings.
THE RUSSELL PROCESS CO., Park City, Utah.
Australian Office, No. 2 O'Connell St., Sydney, New South Wales
For Spanish publications address Agent for Mexico, R. B. Watson, Ramos, San Luis Potosi.

THE UNION BOILER TUBE CLEANER CO.,

257 PENN AVE., PITTSBURGH, PA.,
Has set the acknowledged standard for the World for removing, by POWER driven MECHANICAL devices, all conditions of scale from all makes of Water Tube Boilers—curved as well as straight tubes—also from pipes and tubes used in industrial enterprises. We have the only FLEXIBLE SHAFT OF REMARKABLE STRENGTH AND PHENOMENAL DURABILITY UNDER GREAT STRESS.

BRIQUETTING MACHINERY AND DRYERS.

B. C. WHITE'S PATENTS.

COAL.

The Henry S. Mould Company,



Ores, Concentrates,
Cement, Flue Dust.

CARNEGIE BUILDING, Pittsburg, Pa., U. S. A.

MINING MACHINERY. FRIED. KRUPP GRUSONWERK.

DIAMOND PROSPECTING DRILLS

QUARRYING AND MINING MACHINERY.
—SEE CARD OF—
SULLIVAN MACHINERY CO. Page 41

MINING MILLING, MARINE MACHINERY OF EVERY KIND. UNION IRON WORKS, S. F.

See Page 37.

A GOLD MINE, the ENGINEERING AND MINING JOURNAL. Send postal for a copy.

PROSPECTING DRILLS,
JOHN MUIRHEAD & SON,
See page 41. PITTSBON, PA.

THE VENTURI METER

ADJUSTS CONTRACTS TO A CORRECT BASIS!
One of our customers had a contract for water at 6 cents per thousand gallons, on an estimate that the maximum quantity used would not cost more than \$1,200 per year. The meter showed that the charge for the first quarter should be \$1,250; and the contract was adjusted.

BUILDERS IRON FOUNDRY,
PROVIDENCE, R. I.

THE BUFFALO OUTDOOR FORGE

For steel construction work, Miners, Bridge Builders, Railroaders, etc.

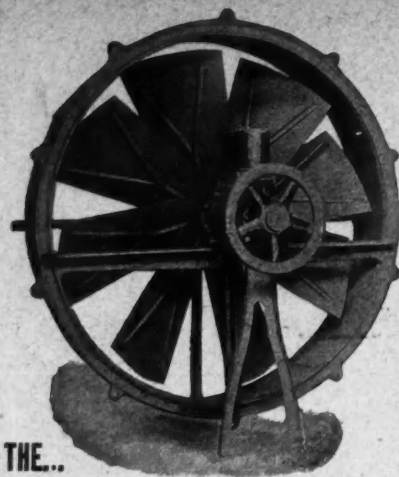
Write for photograph and description.



America's Best.

BUFFALO FORGES

The World's Standard.



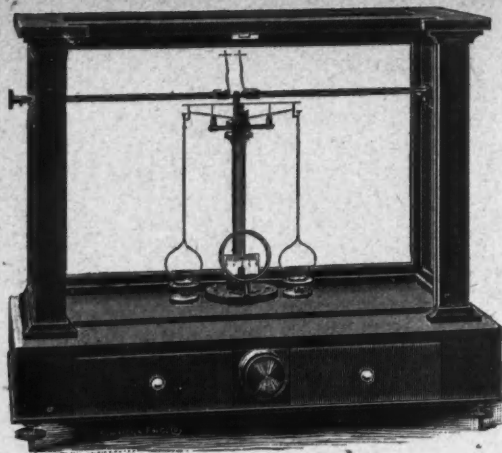
THE... Buffalo Disk Wheels

Electric, Steam and Pulley.

For effective Ventilation, Cooling and Drying. They remove foul odors, fumes, smoke, dust, steam, etc. A special catalogue illustrates and tells how.

BUFFALO FORGE COMPANY,
Buffalo, N. Y., U. S. A.

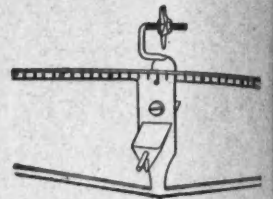
DEALERS IN ASSAYERS' AND CHEMISTS' SUPPLIES.



No. 1 SPECIAL BUTTON BALANCE.
WITH 5 INCH BEAM.

Sensibility 1-200 Milligramme. Made for particularly accurate and rapid work, and is guaranteed to be the most accurate balance made. The balance has a great range of adjustment for sensitiveness and speed, and if we know the requirements of the work to be done can adjust the balance so as to be most suitable for it. There are over 200 balances of this style in use in scientific, assay and chemical laboratories in the world. Send or Catalogue A to

All of our latest improvements are embodied in this balance and it is the result of our 18 years' experience building balances. Among the noteworthy features of this instrument is the improved adjusting device herewith shown.



The adjusting device will appeal to the assayer as the simplest and most convenient device for checking the beam, and consists of a star wheel on a threaded arbor, mounted on the outer edge, back of the beam. By turning the wheel backward or forward it is moved along the arbor and so adjusts the beam to equilibrium.

WM. AINSWORTH & SONS,
SUCCESSORS TO
WM. AINSWORTH, No. 2
DENVER, COLO., U. S. A.

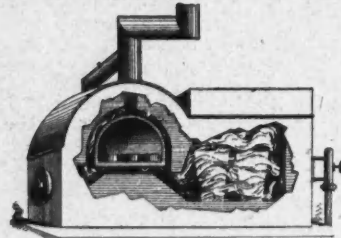
Engineers and Contractors. Machinery, Hardware and General Supplies.

THE LLOYD-TALMAGE COMPANY

SUCCESSORS TO
A. A. TALMAGE & CO. and GREATER N. Y. SUPPLY CO.
Address P. O. Box 91, - - New York City.

EXECUTIVE AND ENGINEERING DEPARTMENTS: 29 Broadway. Cable, "Lteo." W. U. Code.

SUPPLY DEPARTMENT: 33 Barclay St. 38 Park Place. Long Distance Telephones.



PATENTED.

This illustration shows L. & C. Furnace in operation. Melting and Cupelling at same time with one burner.

L. & C. Combination Melting and Muffle ASSAYERS' FURNACES

Are Economical, Convenient and Efficient.

Send for Descriptive Catalogue.

F. W. BRAUN & CO.,
Manufacturers and Dealers in Assayers' Supplies,
Los Angeles, Cal.

CRANE CO.

When you are in need of pipe or pipe fittings of any kind, correspond with us. We carry in stock at all times a full line of heavy hydraulic straight-way valves, suitable for a working pressure of 800 pounds. These valves are tested up to 2,000 pounds pressure per square inch, and are just the things for use in remote districts where accidents cause long delays and consequent heavy losses. We have branch stores at New York, Philadelphia, Kansas City, San Francisco, Los Angeles, Portland, Omaha and Sioux City. Write to our nearest house for anything you need.

Our pocket catalogue is full of information for mine and smelter superintendents, and is mailed on application.

CRANE CO.,
CHICAGO.

RICHARDS & CO., Limited, Importers, Manufacturers and Dealers in **ASSAYERS' and CHEMISTS' SUPPLIES**

We carry in stock—BECKER'S Fine Assay, Analytical, Pulp and Bullion Balances and Weights. MORGAN CRUCIBLE CO., Battersea, London, Clay Crucibles, Mufflers, Scorifiers, Furnaces, Etc. DR. HEINR. KOENIG & CO., Leipzig, Germany, Fine C. P. Chemicals. FLETCHER'S Laboratory Gas Furnaces. BAKER & ADAMSON'S Absolutely C. P. Acids and Chemicals.

Also a full line of Blow-Pipe Apparatus, Bohemian and German Glass Ware, Platinum, Porcelain, Filtering Paper, Etc. Estimates furnished promptly for Assay and Laboratory Outfit.

RICHARDS & CO., Limited,
30 East 18th Street, New York. 108 Lake Street, Chicago.

OUR method of Removing Oil from Feed Water returned to Boilers from Surface Condensers prevents burning of tubes and plates.

THE WEFUGO COMPANY,
No. 2, SMITH AND AUGUSTA STS., CINCINNATI, O.

Amalgamating Plates
Plain copper or silver plated.

MINING SUPPLIES
CRAMER & BURT,
11:4 Monadnock Block, CHICAGO.

ALBANY GREASE
LUBRICATES EVERYTHING.
ONLY MADE BY
ADAM COOK'S SONS
A sample can of grease and one ALBANY GREASE Cup free of charge or expense for testing.
313 WEST STREET, NEW YORK.
BRANCH: 55 SOUTH CANAL STREET, CHICAGO, ILL.

Out in the Country,

away from shop or town, or deep down in a mine, in remote districts where a blacksmith can't be had for the asking, is where the user of a VULCAN CHAIN PIPE WRENCH can feel securely happy in the thought that if the teeth get dull he can easily sharpen them with a file, since they are saw tempered, and that if the teeth in one side of the Vulcan double jaws should break he can promptly use the other side. No delay! No expense! Try it!

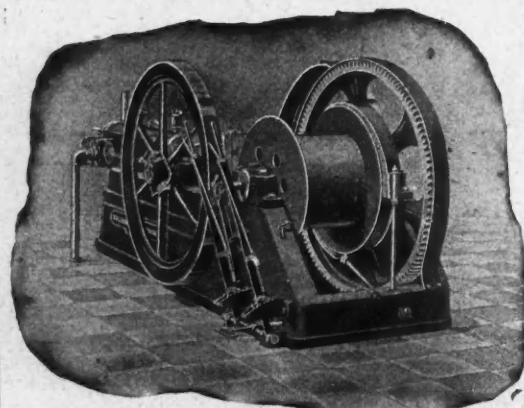
Ask for Cat. L.

J. H. WILLIAMS & CO.,
9-31 RICHARDS ST., BROOKLYN, NEW YORK.

FIRST QUALITY IN ALL LINES.

ILLINOIS ZINC COMPANY,
MANUFACTURERS OF
Spelter, Sheet Zinc,
Sulphuric Acid
and Acid Phosphate.
PERU, ILL.

W. FISHER, Agent, 366 Washington St., New York City.
Telephone, 802 Franklin.



Gasoline Geared Hoist.

STEAM { ENGINES, HOISTS, PUMPS, BOILERS. }
GASOLINE { ENGINES, HOISTS, AIR COMPRESSORS, PUMPING PLANTS. }



FAIRBANKS STANDARD SCALES.

MINING and DUMP CARS. PATENT PRESSED STEEL WHEELS
WINDMILLS, TANKS, PIPE, VALVES, Etc.

FAIRBANKS, MORSE & CO.,

Chicago, St. Paul, Minneapolis, St. Louis, Kansas City, Denver, Omaha, Indianapolis, Louisville, Cincinnati, Cleveland, San Francisco, Los Angeles, Portland, Ore.

DIRECTORY OF DEALERS IN ASSAYERS' AND CHEMISTS' SUPPLIES.

Trade Mark  **Jena Normal Glass,**  Trade Mark

The Best Laboratory Ware Made.

Everything necessary for the **ASSAYER AND CHEMIST** will be furnished of best quality at reasonable prices. Fine balances for all purposes.

EIMER & AMEND,
205-211 Third Ave., NEW YORK.

HENRY HEIL CHEMICAL CO.,
ST. LOUIS, MO.

Chemical Apparatus AND Chemicals.

Agents for the United States for the celebrated **Battersea Crucibles Muffles, Etc., Assayers' Supplies**

Oldest and Largest House in America.

CHRISTIAN BECKER,
Successor to Becker & Sons and to Becker Bros.,
MANUFACTURER OF

Balances and Weights of Precision

for Assayers, Chemists, Jewelers and all who require accuracy of weight. In use in all colleges and in the scientific departments of the U. S. Government.

Only Factory, NEW ROCHELLE, N. Y.
Office; No. 117 Chambers Street, New York City.
Illustrated Price List on Application.

Established during the first gold discoveries in California.

JOHN TAYLOR & CO.,
INCORPORATED 1895.

63 First St., San Francisco, Cal.

Importers, Manufacturers and Dealers in **ASSAYERS' MATERIALS, MINE and MILL SUPPLIES, Chemicals and Chemical Glassware, School and Philosophical Apparatus.**

Pacific Coast Agents for Morgan Crucible Co., Battersea, England; Denver Fire Clay Co., Baker & Adamson's Acids, and other leading manufacturers in Europe and America.

Heavy Chemicals, Borax, Bone Ash, Cyanide Potassium, Acids, etc., at manufacturers' prices.

Manganese, ground and sacked, from our own mine. Write for catalogue and prices.

SPECIAL ASSAY BALANCE.



Manufactured for us by Wm. Ainsworth & Sons. Beam 4 in. long, graduated into 100 parts, sensitive to 1-200 milligram, agate bearings and edges, reading glasses for needle and rider.

Further details upon application.

E. H. SARGENT & CO.,
106 and 108 Wabash Ave., Chicago, Ill.

ESTABLISHED IN 1840.

HENRY TROEMNER,
710 MARKET ST., PHILADELPHIA, PA.

MAKER OF

Assay & Analytical Instruments, Fine Weights, Etc.,

In use at U. S. Assay Office, New York. U. S. Mint at Philadelphia, New Orleans, and U. S. Treasury Departments, Washington, etc., etc.

Agents.

E. H. SARGENT & CO., 108 Wabash Ave., Chicago.
THE DENVER FIRE CLAY CO., Denver, Colo.

The Baker & Adamson Chemical Co.,
MANUFACTURERS OF

Strictly Chemically Pure Acids and Chemicals and Ashless Filter Papers.

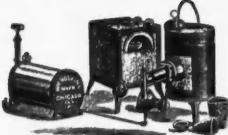
EASTON, - - - PENNA.

SMITH & THOMPSON
Manufacturers of Fine

ASSAY BALANCES.

Write for Catalogue.
2219 STOUT ST., DENVER, COLO.

Hoskins' Patent Hydro-Carbon BLOW-PIPE and ASSAY FURNACES.



No dust. No ashes. Cheap effective, economical, portable and automatic.

Send for Price List to
W. HOSKINS, 81 South Clark St., Room 51, CHICAGO, ILL.

PLATINUM.

HIGHEST AWARDS at the International Exhibitions of 1851, 1855, 1862, 1865, 1867, 1873, 1878, 1889, 1893, 1894, for products and manufactures of Platinum and the precious metals.

JOHNSON, MATTHEY & CO., Ltd.
HATTON GARDEN, LONDON. FOUNDED 1725.

Established 1850.

HERMAN KOHLBUSCH, Sr.
59 Nassau St., NEW YORK, N. Y.

MANUFACTURER OF

Fine Balances and Weights

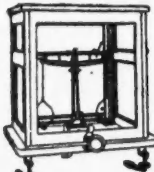
FOR EVERY PURPOSE WHERE ACCURACY IS REQUIRED.
Send for Illustrated Catalogue.

PROGRESS IN ELECTRO-CHEMISTRY IN 1897, by H. BORN. A very complete review of the year's developments. Purchase Volume VI. of THE MINERAL INDUSTRY. Price (postpaid), \$5 00. THE SCIENTIFIC PUBLISHING Co., 253 Broadway, New York.

THE FAIR DRUG & ASSAY SUPPLY CO.
(CASH CAPITAL, \$125,000).
BUTTE, MONTANA.

Assayers' and chemists' supplies.
Located in the largest mining camp in the world.

Queen No. 4 Assay Balance




Aluminum Beam Agate Knives and Plaques, Sensibility 1-50 mg. The Best Low Price Assay Balance on the Market. Send for Circular.

QUEEN & CO.,
OPTICAL AND SCIENTIFIC INSTRUMENT WORKS,
1010 CHESTNUT ST.,
N. Y. Office, 59 Fifth Ave. PHILADELPHIA.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champs St. DENVER, COLO.

Platinum Ware



For laboratory and general chemical purposes.


ALL **HAMMERED WORK.**

Crucibles, etc., repaired.
Scrap bought, reworked or exchanged.

J. C. ENTRIKEN,
MALVERN, PA.

BULLOCK & CRENSHAW
528 Arch Street, Philadelphia, Pa.

CHEMICALS AND CHEMICAL APPARATUS, COMPLETE LABORATORY SUPPLIES, ASSAY OUTFITS.



Sole Agents for Dreverhoff's Filter Papers.
Agents for J. Bishop & Co.'s Platinum. Agents for Marquart's & Schuehardt's Chemicals.

TROEMNER'S BALANCES.

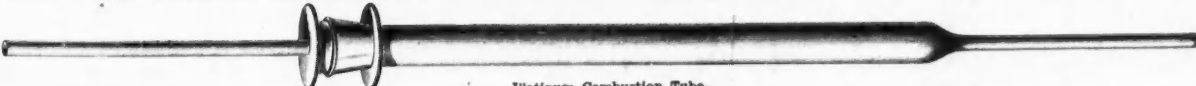
Illustrated Catalogues furnished on receipt of postage, 10 cents.



Manufacturers, importers and dealers in chemicals, apparatus and assayer's supplies, fire brick and tile.

SOLE AGENTS FOR THE "AINSWORTH BALANCES."
Write for catalogues.

MANUFACTURED BY **The Western Chemical Co. DENVER, COLO.**
FOR LABORATORY USE AND FINE CHEMICAL WORK ALSO COMMERCIAL ACIDS

BAKER & CO. Manufacturers of  **Platinum Combustion Tube.**

HAMMERED PLATINUM WARE, NEWARK, N. J.
NEW YORK OFFICE, 120 LIBERTY STREET

DIRECTORY OF ENGINEERS, METALLURGISTS, CHEMISTS, ASSAYERS, ETC.

UNITED STATES	
Page No.	
ARIZONA:	
Blandy, John F. 4	
Blauvelt, H. 4	
CALIFORNIA:	
Boss, M. P. 4	
Bradley, Fred. W. 4	
Brown, R. G. 4	
Browne, R. E. 4	
Janin, Louis, Sr. 5	
Jasper, O. W. 5	
Keyes, W. S. 5	
Lang, H. 5	
Parker, Richard A. 6	
Warteweller, A. 6	
COLORADO:	
Arthur, Jr., E. P. 4	
Brown, Horace F. 4	
Burlingame, E. E. 4	
Caldon, J. D. 4	
Ceilins, J. H. & Sons 4	
Cuno, C. F. 4	
Draper & McLeod. 5	
Farish, John B. 5	
Freeland, F. T. 5	
Goodell, Albert J. 5	
Jarvis & Blaney. 5	
Kirby, E. B. 5	
Lavagnino, G. 5	
Leech, Wm. C. 5	
Lloyd & Co., Geo. W. 5	
Luckraft & Countryman. 5	
Rickard, T. A. 5	
Rothwell, John E. 5	
Schwartz, Theo. E. 5	
Slevens, F. H. 5	
Throckmorton, H. W. 5	
Tyler, S. W. 5	
Weston, W. 5	
Wiley, W. H. 5	
DISTRICT OF COLUMBIA:	
Dewey, F. P. 4	
IDAHO:	
Huntley, D. B. 5	
Kelsey, Chas. R. 5	
ILLINOIS:	
Dickman & Mackenzie. 4	
Ellis, George H. 4	
Gibson & Weis. 5	
Hunt, R. W. & Co. 5	
Inne, Dr. F. W. 5	
Long, F. H. 5	
MacDonald, J. Q. 5	
McCoy, J. W. 5	
Mariner & Hoskins. 5	
Unzicker, H. 5	
Young, J. D. 6	
INDIANA:	
Karslake, Wm. J. 5	
MASSACHUSETTS:	
Fisk, W. W. 5	
Peters, E. D., Jr. 6	
Richardson, Chas. S. 6	
MISSOURI:	
Paxton, Geo. B. 6	
Winslow, Arthur. 6	
MONTANA:	
Molson, Charles A. 5	
Wishon, W. W. 6	
NEW YORK CITY:	
Case & Westervelt. 4	
Church, John A. 4	
Cohen, Hartwig A. 4	
Dusedau, W. 4	
Gibbs, F. N. 5	
Hunt, R. W. & Co. 5	
Lowell, S. J. 5	
Maynard, Geo. W. 5	
Nicholson, F. 5	
Olcott, Fearn & Peelle. 6	
Randolph, J. C. F. 6	
Raymond, Dr. R. W. 6	
Rothwell, R. P. 6	
Simonds & Wainwright. 6	
Sutton, W. E. 6	
Throckmorton, H. W. 6	
Van Slooten, Wm. 6	
NORTH CAROLINA:	
Boggs, W. R., Jr. 4	
Gilchrist, P. S. 5	
Pratt, J. H. 5	
OHIO:	
Crowell, Benedict. 4	
PENNSYLVANIA:	
Kennedy, Julian 5	
Lewis, F. H. 5	
RHODE ISLAND:	
Darling, L. B. 4	
SOUTH CAROLINA:	
Thies, Adolph. 6	
SOUTH DAKOTA:	
Lyon, M. H. 5	
TENNESSEE:	
Johnson, Guy R. 5	
UTAH:	
Bradley, Geo. O. 4	
Donohue, P. J. 4	
Keller, Herman A. 5	
Molson, Chas. A. 5	
Neill, James W. 5	
Robinson, G. H. 5	
Weir, T. 5	
WASHINGTON:	
Howe & Juessen. 5	
Linsley, N. E. 5	
Sonnemann, G. A. 5	
Sutton W. E. 5	
WYOMING:	
Knight, W. C. 5	
FOREIGN.	
CANADA:	
BRITISH COLUMBIA:	
Brewer, Wm. M. 4	
Ferrier, W. F. 4	
Fowler, S. S. 4	
Hastings, John B. 4	
Hastings, H. 4	
Jeffery, W. H. 4	
MacDonald, Bernard 4	
Thomson, A. R. 4	
NOVA SCOTIA:	
Mason, F. H. 5	
ONTARIO:	
Evans, J. W. 4	
MEXICO:	
Abadie, Emile R. 4	
Allan, J. F. 4	
Boggs, W. R., Jr. 4	
Boss, M. P. 4	
Braschi, V. M. 4	
Brodie, Walter M. 4	
Collins, J. H. & Son. 4	
Pritchett, C. W. Jr. 6	
Vogel, Herman. 6	
AUSTRALIA:	
Collins, J. H. & Sons 4	
Knox, Schlapp & Co. 5	
Nichols, R. 6	
BRAZIL:	
Richardson, Chas. S. 6	
EUROPE:	
ENGLAND:	
Allan, J. F. 4	
Clement, V. M. 4	
Collins, J. H. & Sons 4	
Hammond, J. Hays. 5	
Nicholson, Frank. 5	
FRANCE:	
De La Bouglise, Geo 4	
SOUTH AFRICA:	
Denny, G. A. 4	
Leggett, T. H. 5	
PERU:	
Schafer, F. J. 6	

A **BADIE, EMILE R.,**
Mining Engineer,
P. O. Address, Torres, Sonora, Mex.
Late General Manager,
The Grand Central Mining Co., Ltd.,
Minas Prietas, Sonora, Mex.
Cable Address, Erabad, Torres, Mex.
Codes, Bedford, McNeill, Lieber.

A **BBOTT BROS.,**
Civil and Mining Engineers,
Lake City, Colorado.
Deputy U. S. Mineral Surveyors.
Practicing in the San Juan Region of Colorado.

A **ARTHUR, EDWARD P., JR.,**
Mining Engineer,
Care Bimetallic Bank, Cripple Creek, Colo.

A **LLAN, JOHN F.,**
Mining Engineer and Cyanide Expert.
General Manager Mexican Gold & Silver Recovery
Company, Ltd.
Don Juan Manuel No. 24, Mexico City.
Reports on Mining Properties and Expert advice
on Cyanide Treatment of Ores and Tailings. Ex-
tensive knowledge of the country and its minerals.
London Office: Winchester House, Old Broad
Street, London, E. C., England. Cable address:
"Cyanogen," Mexico. Code used, Bedford McNeill.

B **LANDY, JOHN F.,**
Mining Engineer,
Ex-Territorial Geologist,
Prescott, Yavapai Co., Arizona.
Mines examined and reported on

B **LAUVELT, HARRINGTON,**
Mining Engineer and Metallurgist,
Prescott, Arizona.
Mines examined and reported upon.

B **OGGS WM. R. JR.,**
Mining Engineer and Metallurgist.
Saltepec, Estado de Mexico, Mexico.

B **OOKS, SEND FOR THEM TO**
The Scientific Publishing Company,
Publishers and Booksellers,
Main Office, 253 Broadway, Room 817, New York.
BRANCHES: Chicago, Ill.; Denver, Colo.; Salt Lake City,
Utah; San Francisco, Cal.
London, Eng., 30 Bucklersbury, Rooms 866 and 867.

B **OSS, M. P.,**
Milling Engineer,
309 California Street, Avenida Juarez,
San Francisco, Cal. No. 218 Mexico.
Improved continuous pan system.

B **OUGLISE, GEO. DE LA,**
Mining Engineer,
80 Rue Taitbout, Paris, France.

B **RADLEY, FRED. W.,**
Mining Engineer,
Crocker Building, San Francisco, Cal.
Manager, Bunker Hill & Sullivan Mining and Concen-
trating Co., Wardner and Kellogg, Idaho; Spanish Gold
Mining Co., Washington, Nevada Co., California.
Cable Address—"Basalt, San Francisco." Bedford, McNeill's
Code.

B **RADLEY, GEORGE O.,**
Mechanical and Metallurgical Engineer,
230 Atlas Building, Salt Lake City, Utah.

B **RASCHI, VICTOR M., E. M., C. E.,**
Engineer and Contractor,
Apartado 83", City of Mexico, Mexico.
Plans, Specifications and Estimates furnished
for Mining and the Reduction of Ores.
Advice on Mining Installations.

B **REWER, WILLIAM M., M. E.,**
Mining and Mechanical Engineer,
Member North of England Institute,
28 Broad St. (P. O. Box 130), Victoria, B. C.
Consulting Engineer British Pacific Gold Prop-
erty Company, Limited Liability.

B **RODIE, WALTER M.,**
Mining Engineer and Metallurgist,
P. O. Box 965, City of Mexico, Mexico.

B **BROWN, HORACE F., M. E.,**
699 Washington Boulevard, Chicago, Ill.
Mechanical roasting, cooling and conveying of
ores. Automatic milling plants adapted to stand-
ard process of extraction, etc.

B **BROWN, ROBERT GILMAN,**
Mining Engineer,
310 Fine St., San Francisco.
Manager Standard Cons. Mining Co., Bodie, Calif. Cable
address "Argoby, San Francisco." Bedford McNeill code.

B **BROWNE, ROSS E.,**
Mining Engineer,
Office: 43 Threadneedle Street, London, E. C.
Nevada Block, San Francisco, Cal.
Telegraphic Addresses: "CRYPTONYM, LONDON."
"REB, SAN FRANCISCO."

B **BURLINGAME, E. E.**
Assay Office and Chemical Laboratory,
1736 & 1738 Lawrence Street, Denver, Colo.

C **ALDON, J. D.,**
Consulting Mining Engineer,
Room No. 10, B. & M. Block, Cor. 17th & Stout Sts., Denver, Colo.
Cable address "Zulu." 35 years' practical experience.

C **HURCH, JOHN A.,**
Mining Engineer.
Specialist in Gold and Silver Mines.
11 William Street, New York. Cable: "SCOTTIST."

C **LEMENT, VICTOR M.,**
Mining Engineer and Metallurgist,
Care W. K. MILLAR,
24 Austin Friars, Throgmorton, London, E. C., Eng.

C **OHEN, HARTWIG A.,**
Mining Engineer,
No. 30 Broad Street, Room 324, New York.
New York Cable address, FARBRANG.
Bedford McNeill Code.

C **OLLINS, J. H., & SONS,**
Mining and Metallurgical Engineers.
Broad Street Avenue London, E. C., England.
A. L. COLLINS, P. O. S. Central City, Colo.
G. E. COLLINS, Nacoochee, White Co., Ga., U. S. A.
H. F. COLLINS, A. H. S. M. Teapa, Tabasco Mexico.

C **ROWELL, BENEDICT.**
Mining Engineer,
Atwater Building,
Cleveland, Ohio.

C **CUNO, CHAS. F.,**
Assayer and Chemist,
P. O. Box 784. 1732 Champa St., Denver, Colo.

D **ARLING, L. B.,**
Metallurgist, Chemist and Assayer.
Works parcels of ores of 100 lbs. to 10,000 lbs. for
testing mines. Gives best methods for working
ores of Gold and Silver.
Principal of New England Mining Bureau.
Providence, E. I.

D **ENNY, G. A.,**
Mining and Consulting Engineer.
P. O. Box 4181, Johannesburg.
Consulting Engineer to Messrs. G. L. Albu.

D **EWY, FREDERIC P.,**
Chemist and Metallurgist,
428 Ninth Street N. W., Washington, D. C.
Specialty: Examination, Demonstration and
Development of Patented Processes.

CONTINUED ON PAGE 5.

DIRECTORY OF ENGINEERS, METALLURGISTS, CHEMISTS, ASSAYERS, ETC.

DICKMAN & MACKENZIE,
Mining Engineers, Assayers and Chemists.
1224-1226 Rookery Bldg., Chicago.
Telephone, Harrison 198. Assays and Ore Analysis. Sampling ores at smelter, furnace or mine.

DONOHUE, P. J.,
Consulting and Examining Mining Engineer
Twenty-five years' experience in mining and reducing gold and silver ores.
711 & 712 McCormick Building, Salt Lake, Utah, and Purisima Mining Co., San Jose de Gracia, Sinaloa, Mex.

DRAPER & MCLEOD,
Assayers, Chemists, Mining Engineers,
1821 Arapahoe Street, Denver, Colo.

DUSEDALU, W.,
Mechanical Engineer,
36 Pilling St. Brooklyn, N. Y.
BUILDER OF WIRE ROPEWAYS.
All work guaranteed. Send for particulars.

ELLIS, GEORGE H.,
Assayer and Analytical Chemist,
103-105 Metropolitan Block 163 Randolph St., Chicago.
Assaying taught. Send for terms. Reports on mining properties.

EVANS, J. W.,
Mining Engineer and Assayer,
Sudbury, Ontario, Canada.

FARISH, JOHN B.,
Mining Engineer,
517-520 Cooper Building, Denver, Colo.
Cable Address, Farish, Denver.

FERRIER, W. F., B. A. Sc. F. G. S.
Mining Engineer and Geologist.
Late Petrographer to the Geological Survey of Canada. Rossland, B. C.
War Eagle Con. Mining & Development Co., Ltd.

FISK, WINTHROP W., B.S.,
Mining Engineer,
12 Pearl Street, Boston, Mass.
Examination, Development and Equipment of Mines.

FOWLER, SAMUEL S.,
Mining Engineer and Metallurgist,
Nelson, British Columbia.

FREELAND, FRANCIS T.,
Consulting, Mining and Mech'l Engr.,
Box 1016, Aspen, Colo.
Gen'l Mgr. Durant Mg. Co., Mineral Farm Cons. Mg. Co., Aspen Contract Mg. Co., etc., Aspen, Colo.

GIBBS, FRANK N.,
Mining Engineer.
Quartz and Placer Properties examined and reported on.
Specialty: Installation and Operation of the Hydraulic Gravel Elevator System
Present Address: Port Arthur, Ont., Canada.
Bedford McNeill's Code.

GIBSON & WEIS,
Assayers and Analytical Chemists,
81 Clark Street, Chicago, Ill.
Assays and analyses of all kinds. Mail orders promptly attended to. Mining properties examined and reported upon. Terms on application.

GILCHRIST, PETER S.,
Chemical Engineer,
Charlotte, N. C.
The manufacture of Sulphuric Acid a specialty.

GOODELL, ALBERT I.,
Assayer and Chemist,
1430 Stout St., Denver, Colo.

HAMMOND, JOHN HAYS,
Consulting Engineer,
Consolidated Gold Fields of South Africa, Ltd.,
British South Africa Company, Ltd.,
43-46 Threadneedle Street, London, E. C., England
Cable Address: "Oceanology,"
Bedford McNeill and Lieber's codes.

HASTINGS, JOHN B.,
Consulting Mining Engineer,
Rossland, B. C.
Gen'l Mgr. War Eagle Con. Mining & Develop't Co., Ltd.
Center Star Mining Co., Ltd.

HOPPING, ROY,
Mineralogist.
Minerals for Scientific and Educational Purposes; rare minerals.
5 and 7 Dey Street, New York, N. Y.

HOWE AND JUESSEN,
Mining and Civil Engineers,
510-511 Peyton Bldg., Spokane, Washington.
Examine and report on mines in British Columbia, Idaho, Washington, Oregon and Montana.
Special attention to placer propositions.

HUNT, ROBERT W., & CO.
Bureau Inspection, Tests and Consultation,
Chemical Analyses, Physical Tests,
Inspections and Reports.
1137 The Rookery, Chicago. 80 Broadway, New York.
Sacks Building, Pittsburgh, Pa.

HUNTLEY, D. B.,
Mining Engineer and Metallurgist,
De Lamar, Owyhee County, Idaho.

IHNE, DR. F. W.,
Consulting and Examining
Mining Engineer,
920 Madinah Building, Chicago, Ill.
Best References.

JANIN, LOUIS, SR.,
Mining Engineer,
Pacific-Union Club, San Francisco, Cal.

JASPER, O. W.,
Civil and Mining Engineer, Assayer and Surveyor.
State Licensed and U. S. Deputy Mineral Surveyor. Reports on mining and other investment properties. Mines, mill and construction work superintended.
Oroville, Cal.

JEFFERY, W. H.,
Mining and Consulting Engineer,
Rossland, B. C.
Mines Examined and Reported on. Careful attention given to the Superintendence of Development Work. Use A. B. C. Code.

KARSLAKE, WILLIAM J.,
Consulting Chemist and Expert Analyst,
Irvington (Indianapolis), Ind.
Commercial and Technical Analyses of all kinds. Mail orders promptly attended to. Check work a specialty.

KELLER, HERMAN A.
OSCAR SZONTAGH,
Metallurgy and Mining,
Dooly Block Salt Lake City Utah.
Cable address, "Keller," Salt Lake or San Francisco

KELSEY, CHAS. R.,
Consulting Mining Engineer.
Mines and mining properties examined. Coal Mines a specialty. Personally familiar with every coal district in America. Correspondence solicited.
Mountain Home, Idaho.
Cable Address "Kelsey Mountain Home."

KENNEDY, JULIAN,
Consulting and Contracting Engineer,
Vandergrift Building, Pittsburg, Pa.
Blast Furnaces, Bessemer and Open Hearth Steel Works, Steam and Hydraulic Machinery, Gas Producers, etc.

KEYES, W. S.,
Mining Engineer,
Pacific-Union Club, San Francisco, Cal.
Examines Mines, or Mill and Furnace Property.

KIRBY, EDMUND B.,
Mining Engineer and Metallurgist,
101 Boston Building, Denver, Colo.
Specialty: The expert examination of mining investments and metallurgical enterprises.

KNIGHT, WILBUR C.,
Mining Engineer and Geologist.
619 Seventh Street, Laramie, Wyo.
Will make examinations and report.

KNOX, SCHLAPP & CO.,
Mining Engineers and Metallurgists.
Broken Hill Chambers.
31 Queen Street, Melbourne, Australia.

LANG, HERBERT,
Mining and Smelting Engineer,
The Albany, Oakland, Cal.

LAVAGNINO, G.,
Mining Engineer,
Cripple Creek, Colorado.

LEGGETT, THOS. HAIGHT,
Consulting Mining Engineer,
P. O. Box 485, Johannesburg, South Africa.
Cable address: "Tomleg."

LEWIS, FREDERICK H.,
Civil Engineer.
406 Locust St., Philadelphia, Pa.
Designs and estimates for plant for Portland Cement. Examinations and reports on raw materials.

LINSLEY, N. E.,
Consulting, Mining and Milling Engineer
Will examine and report on mines.
Rooms 1 and 2 Jameson Block. SPOKANE, WASH.

GEO. W. LLOYD, E. L. HAFF.
LLOYD, GEO. W., & CO.,
Mining Engineers.
U. S. Deputy Mineral Surveyors.
Colorado Springs, Colo. Cripple Creek, Colo.

LOYD, MARY HAMPTON,
Mining Stenographer,
709 Equitable Building, Denver, Colo.
Work for Mining Experts a specialty.
Highest references.

LONG, FREDERIC H.,
Consulting Metallurgical and Contracting Engineer,
84 Adams Street, Chicago.

LOWELL, S. J., & PUSHIE, J. A.,
Mineral Experts and Consulting Engrs.,
137 Broadway, New York.
Examinations and Reports on Mining Properties.

LUCKRAFT & COUNTRYMAN,
Mining Engineers,
U. S. Deputy Mineral Surveyors
J. S. LUCKRAFT, T. R. COUNTRYMAN, E. M.,
12 Hagerman Building, Ivanhoe Building,
Colorado Springs, Colo. Cripple Creek, Colo.

LYON, MOSES H.,
Mining Engineer,
Union Assay Office, Deadwood, S. Dak. Joplin, Mo.
MCNEILL'S CODE USED.

CONTINUED ON PAGE 61

DIRECTORY OF ENGINEERS, METALLURGISTS, CHEMISTS, ASSAYERS, ETC. (Continued from page 5.)

MACDONALD, BERNARD,
Mining Engineer.
120 St. James St., Montreal, Que.
Bedford McNeill's and Moreing & Nell's Codes used.

MACDONALD, JOHN Q.,
Mining and Metallurgical Engineer.
Manager, National Gold Extraction Company,
of Cripple Creek, Goldfield and Florence, Colorado.
Address FLORENCE, COLORADO.

MARINER & HOSKINS,
Assayers, Chemists, Mining
Engineers.
81 S. Clark Street, Chicago.
Assays and analyses of ores; weighing and sampling car load
lots in Chicago and vicinity.

MASON, F. H., F. C. S.,
Mining and Metallurgical Engineer,
Assayer, Etc.
Queen Building, Halifax, Nova Scotia.

MAYNARD, GEORGE W.,
Consulting, Mining,
and Metallurgical Engineer,
Rooms 49 & 50 No. 20 Nassau Street, New York.

MOLSON, CHARLES A.,
Mining Engineer.
Salt Lake, Utah.
Consulting Engineer: The Exploration Co., Ltd.,
Tomboy Gold Mines Co., Helena-Frisco M. Co. Ltd.
Cable Address: Molson, Salt Lake.

NAEF, PAUL, Ph. D.,
Chemical Engineer.
Woody Crest Ave., near 165th St., New York.
P. O. Box 1054. Eighteen years' experience.

NEILL, JAMES W.,
Metallurgist and Mining Engineer,
Gen'l Sup't United States Mining Co.
Manager Taylor & Brunton O. S. Co. Salt Lake City

NICHOLSON, FRANK,
Consulting Mining Engineer and
Metallurgist,
New York: 253 Broadway, care ENGINEERING AND
MINING JOURNAL.
London: Care Merton, Chaplin & Co., Bankers.
Cable address: "Nickhop."
Codes used: Bedford McNeill, Moreing & Neal
At present in Joplin, Mo.

NICHOLS, RALPH.
KALGOOLIE, WEST AUSTRALIA.
General Manager Great Boulder Perseverance
Gold Mining Co., Ltd.; Boulder South Gold Min-
ing Co.; Boulder Bonanza Gold Mining Co.
Cable Address, "Stohcin."

OLCOFF, FEARN & PEELE,
Mining Engineers and Metallurgists,
18 Broadway, New York.
Cable Address, "Kramolena."

OGDEN ASSAY CO.,
Chemists and Assayers,
1429 16th St., Denver, Colo.
Samples by mail receive prompt attention.

PARKER, RICHARD A.,
Consulting Mining Engineer,
Crocker Building, San Francisco, Cal.
Cable Address: "Richpark."

PAXTON, GEO. B.,
Consulting Mining Engineer,
Joplin, Mo., U. S. A.
Cable Address: "PAXTON, JOPLIN."
Codes: A. B. C. and McNeill's.

PPETERS, EDWARD D., JR.,
Mining Engineer and Metallurgist,
Address letters and telegrams: Corner Percival and Fox
Sts., Dorchester, Mass.
Cable Address, "Peters," Boston.

PPRATT, J. H., Ph. D.,
Mineralogist and Consulting Mining
Engineer.
Mineralogist for State of North Carolina.
Chapel Hill, N. C.

PPRITCHETT, C. W.,
Consulting Mining Engineer and
Metallurgist,
Apartado Postal 858, City of Mexico, Mex.
Reference: W. Guggenheim, with Guggenheim
Smelting Co., New York.

RRANDOLPH, JOHN C. F.,
Mining Engineer and Metallurgist,
Mills Building, 15 Broad and 35 Wall St., New York.
Cable Address: "Rhosog," New York.

RRAYMOND, ROSSITER W.,
Mining Engineer and Metallurgist
13 Burling Slip, New York. (P. O. Box 223)

RRICHARDSON, CHARLES S.
Mem. Inst. M. M.
General Manager Minas & Goyaz, Ltd., Sabara,
Brazil.
American Address, 40 Water St., Boston, Mass.
Care Richardson, Hill & Co., Bankers.

RRICKARD, T. A. & A. C. BEATTY,
Mining Engineers,
608 & 609 McPhee Building, Denver, Colo.
Cable Address, "Bendigo," Denver.

RROBINSON, G. H.,
Mining Engineer,
Salt Lake City, Utah.

RROTHWELL, JOHN E.,
Mining Engineer,
206 Boston Building, Denver, Colo.
Specialty: Roasting and Chlorination of Gold Ores

RROTHWELL, RICHARD P.,
Mining and Civil Engineer,
Editor, Engineering and Mining Journal,
253 Broadway New York.

SSCHAFFER, F. J.,
Mining and Milling Engineer,
Chimbote, Peru.
Reports on Gold, Copper and Coal Mines in Peru.

SSCHWARZ, THEODORE E.,
Mining Engineer,
Office: Room 4, Bank Block, Denver, Colo.
Management, Examinations and Development
of Mines.

SSCIENTIFIC AND TECHNICAL SUB
JECTS.
Those desiring to investigate them can learn
which are the best books and sources of informa-
tion on the same by writing to
THE SCIENTIFIC PUBLISHING CO., Publishers and
Booksellers, 238 Broadway, New York; 206 Boston
Building, Denver, Colo.; 157 Monadnock Bldg.,
Chicago, Ill.; Salt Lake City, Utah, 316 Atlas
Bldg.; 207 Montgomery St., San Francisco,
Cal.; 20 Bucklersbury, London.

SSIMONDS & WAINWRIGHT,
Chemical and Mining Engineers and
Analysts.
Laboratories, 159 Front St. (cor. Maiden Lane), New York.

SSONNEMANN, GEORGE A.,
Mining Engineer,
430-432 The Bookery Spokane, Wash.
Examines and reports. Directs mining opera-
tion in British Columbia and Northwestern U. S. A.

SSUTTON, WILLIAM E.,
Consulting Mining Engineer,
11 Broadway, New York. Everett, Washington.
Examination of Mines.

TTHIES, ADOLPH,
Mining Engineer,
Halle Gold Mine, S. O.
Specialty: Chlorination of Gold Ores.

TTHOMSON, A. R.,
Mining Engineer,
Dawson, British Northwest Territory.
Will give particular attention to the examination
of Placer Mines on the Yukon River, and
especially in the Klondike Region.

TTHROCKMORTON, HOWARD W.,
Mining Engineer.
44 Broadway, New York. Cury, Colo.

TTYLER, S. W.,
Mining Engineer,
6 Windsor Hotel Block, Denver, Colo.
Cable Address, Retyl, Denver.

UUNZICKER, HERMANN,
Mechanical and Mining Engineer,
1745 Arlington Place, Chicago, Ill.

VVAN SLOOTEN, WILLIAM,
Mining Engineer and Metallurgist,
35 Wall Street, New York.

VVOGEL HERMANOS,
Graduated Consulting Mining and
Mechanical Engineers, Metallurgists.
Centro Mercantil, Office 22, First Floor.
Mexico, D. F. Apartado 331.
Examinations and Reports on mining
properties, on water power, on all kinds of
technical and electrical installations.
TREATMENT OF ORES.
MINES BOUGHT AND SOLD.

WWARTENWEILER, A.,
Mining Engineer and Metallurgist,
Mills Building, San Francisco, Cal.
Cable Address: "Warten."

WWARWICK, A. W.,
Mining Engineer and Metallurgist,
Prescott, Ariz.
Specialty: Mining property in the Southwest.

WWEIR, THOMAS,
Consulting and Mining Engineer,
Dooley Building, Salt Lake City.

WWESTERVELT, WM. YOUNG, E.M.,
(Successor to Case & Westervelt)
Mining Engineer,
(See ad. page 24.) 100 William St., New York

WWESTON, W.,
Mining Engineer,
Cripple Creek, Colo.
Metallurgical Course, Royal School of Mines, '76
Member American Institute of Mining Engineers.
Member Institute Mg. and Metallurgy, London.

WWINSLOW, ARTHUR,
Mining Engineer and Geologist.
General Manager and Consulting Engineer,
United States and British Columbia Mining Co.
Liberty Bell Gold Mining Co.
Joplin Zinc Mining Co.
Office: 306 to 308 Lyceum Building, Kansas City, Mo.

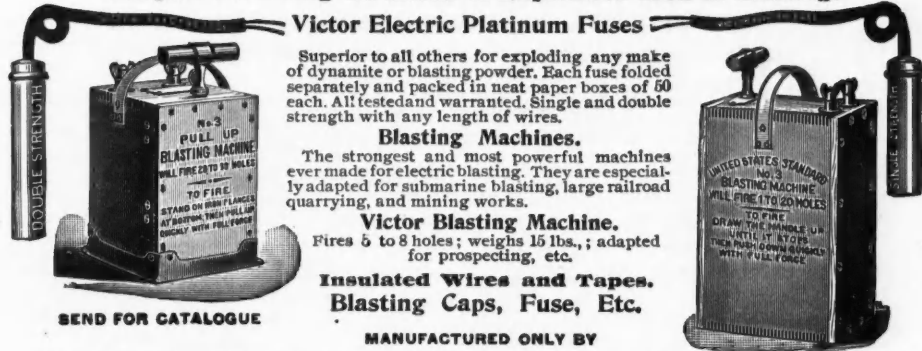
WWISHON, WALTER W.,
Mining Engineer,
Butte, Montana.
Cable address, Wishon, Butte, Moreing and
Neal Code. Mining properties examined through-
out the Northwest and British Columbia.

WWILEY, W. H.,
Mining Engineer,
Idaho Springs, Colo.

YYOUNG, J. DUNRAVEN,
Analytical Chemist, Assayer and Mining Engineer,
1760 Monadnock Building, Chicago.
Analyses and Assays of Ores, Alloys, Paints, Coal and Coke.
Cements, Asphalts, Waters and all metallurgical products.
Instruction for Students.

Electric Blasting Apparatus.

Adapted for Firing all Kinds of Explosives used in Blasting.



Victor Electric Platinum Fuses

Superior to all others for exploding any make of dynamite or blasting powder. Each fuse folded separately and packed in neat paper boxes of 50 each. All tested and warranted. Single and double strength with any length of wires.

Blasting Machines.

The strongest and most powerful machines ever made for electric blasting. They are especially adapted for submarine blasting, large railroad quarrying, and mining works.

Victor Blasting Machine.

Fires 5 to 8 holes; weighs 15 lbs.; adapted for prospecting, etc.

Insulated Wires and Tapes.
Blasting Caps, Fuse, Etc.

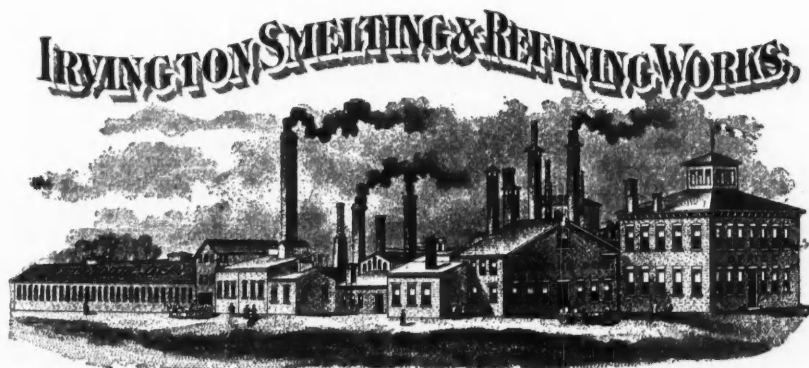
SEND FOR CATALOGUE

MANUFACTURED ONLY BY

JAMES MACBETH & CO., 128 Maiden Lane, New York, U.S.A.

GLORIEUX & WOOLSEY,

IRVINGTON, N. J.



BULLION, GOLD, SILVER, COPPER and LEAD ORES.

AURIFEROUS and ARGENTIFEROUS MATTE.

ELECTROLYTIC COPPER WORKS.

Smelting and Refining of any Material containing Gold, Silver or Platinum.

THE MINERAL INDUSTRY.

SEE PAGE 9.

THE AMERICAN MANUFACTURING COMPANY

65 Wall Street, NEW YORK.

ROPE

SPECIALTIES :

“PLUMBAGO HEART” HOISTING ROPE!
“AMERICAN” TRANSMISSION ROPE!
NO EXTRA CHARGE.

Send to us for a “A LITTLE BLUE BOOK ON ROPE TRANSMISSION!”

GEORGE SCHLEY, Consulting, Civil and Mining Engineer.

Topographical Maps and all classes of Surveying, Estimates, Pavements of all kinds Irrigation, Water-Works, Sewerage, Harbor, River and Water Front Improvements, Construction of Docks, Piers and Bulkheads, Dredging, Hydraulic Blasting, Etc.

Will Report on Mining and Ore Milling Property. Have Gold and Copper Properties for Sale.

SPANISH, FRENCH AND GERMAN SPOKEN.

Office Hours, 9 A. M. to 5 P. M.

27 THAMES STREET, NEW YORK, N. Y.

Aetna Dynamite

Lion Brand
Electrical Fuzes
and other
Blasting Supplies

The Aetna Powder Co.
188 Madison St. Chicago

“REX” DYNAMITE.

Guaranteed Full Strength.
THE SAFEST AND BEST

MINING and
BLASTING.. **POWDER.**

KING'S Smokeless, Semi-Smokeless and
Duckshot Sporting Powder.
Caps, Fuse, Batteries.

THE KING POWDER CO., Cincinnati, O.
80 Chambers St., New York. 33 Ninth St., Pittsburgh.
T. F. DILLON & Co., Denver, Colo.

The Standard for 20 Years

100
Eagle
Blasting Caps,
Treble Force.
Extra Strong.
Number and Quality Guaranteed
KEEP DRY.

Infallible. Strongest.

Eagle Blasting Caps.
TRADE MARK REGISTERED.

J. H. LAU & CO., Manufacturers
67 CHAMBERS ST., NEW YORK.

FINANCIAL.—BANKERS, BROKERS, ETC.

NEW YORK

Produce Exchange Bank

Capital. \$1,000,000 | Surplus... \$250,000

TRANSACTS A GENERAL BANKING BUSINESS.

Issues Certificates of Deposit bearing Interest.

Solicits Mercantile and Personal Accounts.

BUYS AND SELLS STERLING EXCHANGE.

Draws upon and makes Cable Transfers through
THE LONDON CITY AND MIDLAND BANK,
LIMITED, LONDON.

Circular Letters of Credit issued for Travelers' use Foreign Countries; also, Commercial Credits.

MINES

and Mineral Property Examined.
RICHARD H. TERHUNE, E. M.
Gen'l Sup't Hanauer Smelting Works.
Reference and Address: McCornick &
Co., Bankers, Salt Lake City, Utah.**GOLD,**Silver, Copper, Lead Properties, developed, partly developed and promising prospects in the United States and Mexico, for sale. Also two fine gold placer properties. Only properties of merit handled.
L. W. TULLEYS, Council Bluffs, Ia.**THOMPSON INVESTMENT COMPANY,**
OF BUTTE, MONTANA.

MINES and INVESTMENTS.

New York Office, 1214-15 Commercial Cable Building,
20 Broad Street.

Special attention given to copper properties.

The Exploration Co. of Washington,
SPOKANE, WASHINGTON.
MINES and MINING SECURITIES
REPUBLIC, BRITISH COLUMBIA,
BUFFALO HUMP.Reliable information, relative to Mines and
Stocks, furnished upon application.**R. N. BISHOP & CO.,**Loomis, Okanogan County, Wash.
Gold and Copper Properties in Okanogan
County.

A virgin field for investment.

Reliable information furnished and correspond-
ence solicited.**THE HEWETT-SISLEY CO.,**
MINING BROKERS,

Butte, Montana.

We handle mines and stocks strictly on com-
missions. Whether a buyer or seller, let us hear
from you.

Mines

or prospects operated on contract to purchase,
or under lease on fixed royalty or percentage.
MONEY loaned mines, MINING companies organized,
their property experted, financed and managed, MINES,
prospects, mineral lands, mining securities, contracts,
bonds, stocks, leases and options bought and sold or
negotiated. EXAMINE mines, prospects and mineral
lands as to their value, method of working and condition
of their titles. Assay and chemical work done.
EDW. N. BREITUNG Marquette, Mich.
Cable address Edbee, Codes, Lieber's Bedford.
McNiel's, A B C Universal Commercial, U. S. A.**Immense Business.—Immense Profits.**
WHY?

We have been particularly successful in advising the purchase of stocks that have advanced tremendously, thus making large profits for our clients

For instance we recommended "Lone Pine." Ninety days later it sold at an advance of 32 cents per share. We recently mailed our special letter urging the purchase of "Blacktail." It has trebled in value. This is not a matter of luck, we are making special efforts to get our clients into some quick money makers, and our success in advising stocks that have advanced so materially is due to the fact that we selected stocks selling below the intrinsic value of the property.

We are recommending two stocks that are so located and developed that they justify a much higher figure than they at present command. We look for 100 per cent. advance in ninety days.

Write or wire immediately for particulars to the

British Canadian Investment
and Mining Syndicate,

SPOKANE, WASH.,

We operate the largest brokerage system in the Northwest.

S. L. Boccs,213 Dooley Block, Salt Lake City, Utah.
Mines, Dividend-Paying and Investment Stocks.**\$36,674,650**

Paid by Utah active mining stock. Stocks pay from 15 per cent. to 40 per cent. annually. Weekly Market Letter and quotations upon application.

JAMES A. POLLOCK,
SALT LAKE CITY, UTAH.

References: McCornick & Co., Bankers, Salt Lake City; Laidlaw & Co., Bankers, New York City; Martin's Bank, Limited, London, England.

DEVELOPED.

Copper, Gold, Silver and Lead mines for sale; also a fine list of undeveloped mining properties for sale on lease and bond for one year. We always have a high grade list of good dividend mining shares for sale, also prospective dividend shares. We deal in none but first-class mining shares. Address.

W. H. NICHOLS, Mining Broker,
P. O. Box 455. BUTTE, MONTANA.
(Business established in Butte in 1887.)**HANDY & HARMAN**

Dealers in Bullion, Specie and Bonds,

No. 32 Nassau Street, New York.
Sovereigns, Francs and Marks, Doubloons, Mexican Dollars, Fine Silver Bars, Fine Gold Bars.
Special attention given to investments and to consignments of Silver and Gold Bullion of all grades.

REFERENCE: American Exchange National Bank, New York City.

REPUBLIC STOCKS.

We handle only good properties. Unexcelled facilities for either buying or selling. Lowest quotations furnished by wire. Write for map of Republic and Camp McKinney.

H. P. PALMER & CO.,

Mining Brokers, SPOKANE, WASH.

Reference—OLD NATIONAL BANK.

THE MEYER-CLARKE-ROWE MINES COMPANY,

KANSAS CITY, MO.

Agents for Investors in Mines.

Mines and Titles reported upon.
Agents in all important Mining Districts in British Columbia, the United States and Mexico.

W. B. CLARKE, President.

A. R. MEYER, Vice-President.

J. H. MURRAY.

B. D. ROWE, Secretary and Treasurer.

H. W. HARDINGE.

Correspondence Invited.

Cable Address, "MINERAL."

HAVE YOU REASON

to be suspicious of boiler compounds in general? An absolute guarantee goes with every barrel of PITTSBURG BOILER SCALE RESOLVENT. No need of using water Purifiers.

No. 5.

PITTSBURG BOILER SCALE RESOLVENT CO., Pittsburg, Pa.



A Mighty Mining and Metallurgical Monument



NOW IN PRESS, READY EARLY IN JULY.

.....

OUTLINE OF TABLE OF CONTENTS, VOLUME VII.

The Mineral Industry...

Its Statistics, Technology and Trade

in the United States and other Countries to the End of 1898

EDITED BY

Richard P. Rothwell,

Editor of the Engineering and Mining Journal.

Volume VII., Copiously Illustrated, including numerous Diagrams and Working Drawings.

Royal Octavo Cloth,
With Nearly One Thousand Pages.
Price, \$5.00 Postpaid,

Positively indispensable to all interested in Mining and Metallurgical matters.

This noteworthy volume includes the usual Statistics of Mining Stock Prices in 1898 in all the important markets, Dividends Paid and Assessments Levied by Mining Companies, together with a Complete and Faithful Summary of the Mineral Statistics of the Entire World.

Among the many valuable technical treatises incorporated in the forthcoming volume are the following, with the number of pages assigned to each particular article; a page of the Mineral Industry is equivalent to about two of a treatise of ordinary size:

- RECOVERY OF AMMONIUM SULPHATE FROM GAS LIQUOR, by H. A. Frasch. (20 pp.)
- ASPHALTUM REFINING, by H. A. Frasch. (12 pp.)
- THE HYDRAULIC CEMENT INDUSTRY IN THE UNITED STATES, by F. H. Lewis. (6 pp.)
- THE PRINCIPLES OF FIRE BRICK MANUFACTURE, by Charles Ferry. (6 pp.)
- THE MANUFACTURE AND USE OF PAVING BRICK IN THE MIDDLE WEST, by H. Foster Bain. (13 pp.)
- KAOLIN, ITS OCCURRENCE, TECHNOLOGY AND TRADE, by T. C. Hopkins. (13 pp.)
- COAL MINING METHODS AND THEIR ECONOMIC BEARING, by W. S. Gresley. (19 pp.)
- THE OCCURRENCE AND UTILIZATION OF PEAT, by Ernst A. Sjöstedt. (8 pp.)
- THE ELECTROLYSIS AND REFINING OF COPPER, by Edward Keller. (32 pp.)
- FELDSPAR, ITS OCCURRENCE, MINING AND USES, by T. C. Hopkins. (7 pp.)
- THE IDENTIFICATION OF GEMS, by Leopold Claremont. (9 pp.)
- PROGRESS IN THE METALLURGY OF GOLD AND SILVER, by W. R. Ingalls. (26 pp.)
- THE HYDRO-METALLURGY OF SILVER, by Ottokar Hofmann. (27 pp.)
- THE TECHNOLOGY OF GYPSUM, by G. P. Grimsley. (6 pp.)
- PROGRESS IN THE METALLURGY OF STEEL, by H. M. Howe. (20 pp.)
- THE MANUFACTURE OF NICKEL STEEL, by Titus Ulke. (4 pp.)
- PRESENT PRACTICE IN SILVER-LEAD SMELTING AT DENVER AND PUEBLO, by L. S. Austin. (7 pp.)
- RECENT IMPROVEMENTS IN LEAD SMELTING, by H. O. Hofman. (21 pp.)
- THE BEDFORD OOLITIC LIMESTONE, by C. E. Siebenthal. (4 pp.)
- LIME AND LIME BURNING, by H. A. Frasch. (14 pp.)
- THE MANUFACTURE OF ACID PHOSPHATE OF LIME, by Peter S. Gilchrist. (10 pp.)
- PRESENT PRACTICE IN THE METALLURGY OF QUICKSILVER IN CALIFORNIA, by R. B. Symington. (7 pp.)
- OCCURRENCE AND RECOVERY OF SODIUM CARBONATE IN THE GREAT BASIN, by S. A. Knapp. (9 pp.)
- THE MANUFACTURE OF CHAMBER SULPHURIC ACID, by F. J. Falding. (54 pp.)
- DEVELOPMENTS IN THE METALLURGY OF ZINC AND CADMIUM, by W. R. Ingalls. (16 pp.)
- PROGRESS IN ORE DRESSING IN 1898, by Robert H. Richards. (14 pp.)
- THE PROGRESS OF METALLOGRAPHY IN 1898, by Albert Sauveur. (11 pp.)

Besides the above important papers, the volume treats of nearly all the metals and minerals of commercial importance, giving in each case the statistics of production in the United States and foreign countries, the statistics of exports and imports, the range of prices and a general review of the industrial conditions during 1898; also a record of the progress in the metallurgy and chemical technology of each metal and mineral. The list comprises:

Aluminum and Alum (including Bauxite, Cryolite, Corundum and Emery), Antimony, Arsenic, Asbestos, Asphaltum, Barytes, Bismuth, Borax, Bromine, Calcium Carbide, Carborundum, Cement, Chromium and Chrome Ore, Clay and Clay Products, Coal and Coke, Copper, Copperas, Feldspar, Fluorspar, Fullers Earth, Garnet, Gems and Precious Stones, Gold and Silver, Graphite, Gypsum, Iron and Steel, Lead, Limestone, Magnesium and Magnesite, Manganese, Mica, Molybdenum, Monazite, Nickel and Cobalt, Nitrate of Soda, Ocher and Oxide of Iron Pigments, Petroleum, Phosphate Rock and Phosphorus, Platinum and Iridium, Potassium, Potash and the chief Potash Salts, Quicksilver, the Rare Elements (including Glucinum, Lithium, Uranium, Vanadium, etc.), Salt, Silica (including Diatomaceous Earth, Tripoli, Pumice Stone, Grindstones and Whetstones, and Flint and Quartz), Slate, Soda, natural and artificial, and the most important soda salts, Sulphur and Pyrites, Talc and Soapstone, Tin, Tungsten, Zinc and Cadmium.

Send your order in advance so that the book can be shipped to your address promptly on day of publication.



The Scientific Publishing Company,

253 BROADWAY, NEW YORK.

Deer Trail No. 2.**A Regular Dividend Payer.**

This mine is under excellent management, is a steady producer and has been paying monthly dividends of $\frac{1}{4}$ c. a share for past ten months. The working force was this month increased from 8 to 30 men and with the increased output larger dividends will soon be paid.

The stock has never been boomed and is selling too low. I can fill a few orders at 25 cents per share and at this price it pays 12 per cent. interest. Will sell for 50 cents inside of 90 days and is the best buy I can offer you.

I handle all the Standard Republic, Buffalo Hump, Rossland, Slocum, Boundary and Camp McKinney stocks and will be pleased to quote by mail or wire on application.

Free map of Republic camp mailed on request.

Codes: { Clough's,
Bedford McNeill's,
Lieber's.

N. B. BUCKLER

MINING BROKER,

425-426 Peyton Building,

SPOKANE, WASH.

Reference:
Old National Bank, Spokane.

The Republic Gold Mines

Because of their great richness and rapid development have attracted world-wide attention. Within another year there will undoubtedly be 10, possibly 20, additional dividend payers.

Many investors have made thousands of dollars from small sums invested in mining stocks of this section.

Fifteen years' residence has given us great advantages for knowing the mineral resources of Washington, Idaho, and British Columbia, of which Spokane is the mining center.

Quotations of stocks furnished on application. Correspondence solicited.

C. F. Clough & Co., MINING BROKERS,

5-6 Jamieson Block,

Spokane, Wash.

M. R. GALUSHA & SON,

SPOKANE, WASH.

MINING and**STOCK BROKERS.**

Good Investment in Following Stocks:

Republic,	Buffalo Hump,	Rossland and Slocan,
WASHINGTON.	IDAHO.	BRITISH COLUMBIA.

Correspondence Solicited.

REFERENCES—ANY SPOKANE BANK.

HERRIN & REINER,**Mining Brokers.**

We Handle all the Standard Stocks of the Great Northwest.

Republic,	Boundary Creek,	Cour d'Alene,
Rossland,	Camp McKinney and all the Kootenays,	
BRITISH COLUMBIA.		

Do you want prospects or partially developed properties or mines? We have old and experienced men in all the camps. Special stock quotations furnished by wire. References furnished.

Offices, 9-10 Ziegler Block,

SPOKANE, WASH.

De Lashmutt & Rutter,

P. O. Box, 1024.

INCORPORATED,

CODES: { CLOUGH'S
LIEBER'S

SPOKANE, WASH.

Republic Camp Stocks

A SPECIALTY.

The Greatest Mining Camp on this Continent.

Write for maps, quotations or other information.

REPUBLIC
... POCKET MAPS

WITH INVESTMENT POINTERS

Mailed on Application *Free.***CHAS. LIFTCHILD & Co.,**

ESTABLISHED 1889.

P. O. Box, 1740.

SPOKANE.

REFERENCE, OLD NATIONAL BANK.

Agents Wanted.

Reference Required.

S. NORMAN & CO.,

Mining and Stock Brokers,

Established 1896.

Slocan, Boundary, Rossland, Republic.**Coeur d'Alene and Buffalo Hump****Stocks.**

Special information, maps and weekly market letter free on application.

Hotel Spokane Building,

SPOKANE, WASH.

Cable Address, "Norman."

MINING INVESTMENTS.**FREE MILLING PROPERTY.**

Four claims—Vein 5 to 8 feet. Tunnel proposition. 5,000 tons of ore on dump. Average \$12.00. Good water power. Easy payments.

FREE MILLING PROPERTY.

Three claims—Vein 20 to 40 feet. Tunnel and shaft. Over 20,000 tons of ore in sight. Average \$6.25. Good water power. Easy payments.

COPPER PROPERTY.

Eight claims—Vein 4 to 14 feet. Tunnel and shaft. Picked ore car-load went 21 per cent. Copper, \$4.00 Gold. 2 ft. of vein will average 15 per cent. Copper, remainder 8 per cent. This property can be secured by small cash payment and balance on long time, provided it is actively developed. First come first served.

C. D. RAND,

MINING BROKER,

28 Jamieson Block, Spokane, Wash.

BEST OF REFERENCES.

Are You Looking for Gold Mines?

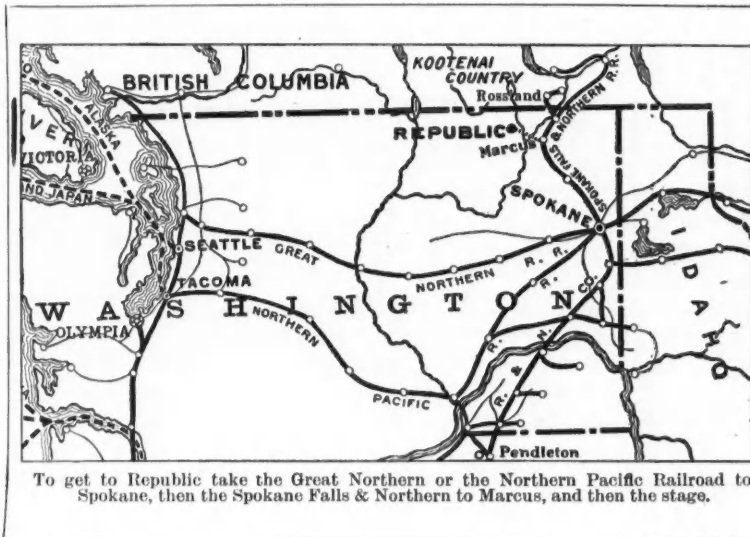
Then try Republic, Wash.

This Camp, situated 135 miles North West of Spokane, Wash., and 40 miles from Marcus, on the Spokane Falls and Northern Railroad, is less than 2 years old, but huge ledges of cheaply mined gold quartz already uncovered promise a wonderful output.

The Republic Mine.

The greatest find of 1898. Paid from the start. \$120,000 in dividends in the past 4 months.

Large bodies of low grade ore running over \$20 per ton. Streaks of rich ore yielding over \$400 per ton.



To get to Republic take the Great Northern or the Northern Pacific Railroad to Spokane, then the Spokane Falls & Northern to Marcus, and then the stage.

The Republic Mine.

The \$40 ore gives 85 per cent. extraction.

Plenty of water and timber.

Cheap mining and milling. Profits sure.

Better than the Transvaal mines, which yield but \$7 per ton.

The Republic claim was located in 1896, but no development work was done till the spring of 1897. Its great success has stimulated prospecting. Miles of promising quartz ledges are known to exist. The quartz is generally soft and easily crushed, and the gold is not alloyed with base metals. The camp is reached by stage line from Marcus.

Among the other prominent mines might be mentioned:

The Lone Pine, Jim Blaine, Rebate, Number Six, Iron Mask, Pearl and Surprise.

With the coming of the railroad, in a year, the cost of machinery and supplies will be reduced, and the value of all property will jump.

This camp will stand the closest investigation. If you are interested, write to any bank or responsible broker at Spokane, Wash., and ask about the Republic District.

REPRESENTATIVE MINING BROKERS OF CANADA.

WILLIAM C. FOX.

J. HUGO ROSS.

FOX & ROSS,

(Members Toronto Mining and Industrial Exchange, and Mining Section Board of Trade.)

Mining and Investment Brokers,
 19 & 21 Adelaide Street East, Toronto, Ont.

E. STRACHAN COX,

Member Toronto Mining and Industrial Exchange.

Mining shares and mining claims. Correspondence invited.

No. 7 and 9 TORONTO ST., TORONTO.

Code—Moring, Neal's and Clough.

MAGEE & COMPANY,

MINING BROKERS,

Members Standard Mining Exchange,

10 King Street East, Toronto, Can.

Standard mining stocks on commission.

MINING STOCKS.

I DEAL IN

British Columbia, Ontario and REPUBLIC Mining Issues
All orders for standard stocks executed promptly on the **Standard Mining Exchange Board**. I have direct and exclusive representation at **Republic (Wash)** and am in an excellent position to supply investors with reliable and definite information.

E. GARTLY PARKER, Mining Broker,

12 Adelaide Street East, Toronto.

CURRIE & KITELEY, Brokers,

52 YONGE STREET, TORONTO, ONT.

Canadian Gold and Copper Mining Shares & Properties. Members of the Toronto Mining & Industrial Exchange (Mining Section of the Board of Trade). Orders executed promptly. Correspondence solicited. Reference, Bank of Montreal and Bradstreets. Moring & Neal's Code.

BUY A FARM FOR

SILVER

and sell the products for

GOLD.

You can do it in

MEXICO

Raising Coffee, Oranges, Bananas and Cattle.

**THE MEXICAN CENTRAL
STANDARD GAUGE RAILWAY**

reaches all the important points in the Republic. Excursion tickets, limited nine months from date of sale, may be purchased at any railroad ticket office.

Address the undersigned for descriptive matter including "Notes on Mexico," mailed free.

W. C. CARSON, Eastern Agent

No. 1 BROADWAY, NEW YORK.

NITRO-EXPLOSIVES.

By P. G. SANFORD.

A Practical Treatise on the Properties, Manufacture and Analyses of Fulminates, Smokeless Powders, Celluloid and other Nitrated Substances.

12mo, Cloth, Illustrated. Price, \$3.00.

Scientific Publishing Company

253 BROADWAY, NEW YORK.

It Pays

An investment of a few cents a day and a little of your spare time devoted to study at home will secure a scientific education that will qualify you for a responsible and high salaried position. Our system of instruction is the result of seven years of experience in teaching by correspondence, and presents the means by which a thorough technical education can be obtained at home at a cost so low that the outlay will not be noticed.

Complete Courses by Mail in

Engineering.

Mining, including Prospecting and Surveying, Geology, Mineralogy, Coal Mining, Metal Mining.

Metallurgy in all its departments (in preparation).

Electrical, including Electric Station, Electric Railways, Electric Lighting, Telegraphy, Telephony, and Electro Plating.

Mechanical, including Mechanical Drawing and Machine Design.

Civil, including Hydraulic, Municipal, Railroad and Bridge Engineering, Surveying and Mapping.

Steam, including Stationary, Marine and Locomotive.

Sanitary, including Plumbing, Heating, Drainage, Ventilation and Gasfitting.

Architecture, Structural Iron Work, Architectural Designing, and courses for Sheet Metal Workers and Pattern Makers

Newspaper Work, including Reporting, Correspondence, Editorial Work, Management and Advertising.

Business and English Branches, including Composition, Stenography, Bookkeeping, etc.

THE BEST, MOST THOROUGH and PRACTICAL COURSES of any CORRESPONDENCE SCHOOL in the WORLD.
SEVEN YEARS OF EXPERIENCE IN CORRESPONDENCE INSTRUCTION.

Best text books and unsurpassed drawing plates free to students. Write for free illustrated circular N, sample pages of text books, drawing plate, and booklet of letters from students all over the world.

THE UNITED CORRESPONDENCE SCHOOLS,

 With which are incorporated the Correspondence School of Technology and the Institute for Home Study of Engineering of Cleveland, O.
 154, 156, 158 FIFTH AVENUE, NEW YORK, U. S. A.

MINING



New mines are being discovered every day along the line of the ...

CANADIAN PACIFIC RAILWAY.

The North Shores of Lakes Huron and Superior, with their Copper and Nickel.

The Rainy Lake with its Gold.

The Kootenay with its Gold, Silver, Copper, Lead and Quicksilver, and Coal Fields unlimited.

Cariboo with its immense Placer Mines.

The Atlin and Yukon Gold Fields.

For Descriptive Pamphlets, Rates, Tickets and Time Tables, also the Lowest Rates, write to any Agent of the Canadian Pacific Railway, ... or to...

NEW YORK
PHILADELPHIA
BALTIMORE
WASHINGTON
BOSTON
BUFFALO
DETROIT
CHICAGO
MINNEAPOLIS
PITTSBURG
SAN FRANCISCO
TORONTO
MONTREAL
WINNIPEG
VANCOUVER

353 Broadway
Corner Third and Chestnut Streets
129 East Baltimore Street
1229 Pennsylvania Avenue
197 Washington Street
233 Main Street
11 Fort Street, W.
228 South Clark Street
General Passenger Agent "Soo Line"
Room 409, Smith Bldg.
Chronicle Building
1 King Street, East
General Passenger Agent
Traffic Manager
Dist. Passenger Agent

E. V. SKINNER
H. McMURTRIE
C. G. OSBURN
W. W. MERKLE
H. J. COLVIN
A. J. SHULMAN
A. E. EDMONDS
J. F. LEE
W. R. CALLAWAY
F. W. SALISBURY
M. M. STERN
C. E. McPHERSON
C. E. E. USSHER
ROBT. KERR
E. J. COYLE

BOILER PLANTS ARE BEING TAXED MORE AND MORE.



Therefore the demand for an article to accomplish something TANGIBLE by way of eliminating the EVILS resulting from the use of impure boiler feed water is becoming greater and greater

We may not know what methods will be used after twenty-five years more of scientific progress, but at the present time WE OFFER to the user of steam our WELL-KNOWN ANTIDOTES. They are conveniently prepared in dry powder. They are the results of CAREFUL and thoroughly scientific LABORATORY RESEARCH.

These remedies are individual, each being prepared after a correct analysis of the feed water has been made. Two quarts of feed water sent us, express prepaid, will be analyzed correctly and a report of the same sent you free of charge.

No. 1

THE J. H. PARSONS CHEMICAL CO., 1511-1513 MASONIC TEMPLE, CHICAGO, ILL.

EDUCATIONAL INSTITUTIONS

MCGILL UNIVERSITY, MONTREAL.

Courses in Mining Engineering and Metallurgy; Civil, Mechanical and Electrical Engineering; Chemistry; Architecture. Also full courses in Arts, Law, Medicine and Veterinary Science. For further information and for the University Calendar, address W. VAUGHAN, Registrar.

MISSOURI SCHOOL OF MINES AND METALLURGY. (A Department of the State University.)

Offers courses in Mining, Metallurgy, Chemistry, Civil Engineering, General Science. Tuition Free. Fine Equipment. Unexcelled Metallurgical and Ore-Dressing plant. GEO. E. LADD, Director, Rolla, Mo.

CHICAGO SCHOOL OF ASSAYING.

Courses in Assaying and Ore Testing. Courses in Chemistry and Chemical Analysis. Courses for Miners and Prospectors. Instruction individual. Enter any time. Open evenings. J. DUNNEVEN YOUNG, Director, 1760 Monadnock Building.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Boston, Mass.

The regular courses in Mining Engineering and Metallurgy include a thorough training in Mathematics, Chemistry and Physics, as well as Surveying, Mineralogy, Lithology, Geology, Mining Engineering, Metallurgy, Steam Engineering, Hydraulics, and Electric Testing with Laboratory Practice in Ore Dressing, Milling and Smelting, and with Summer Schools of Metallurgy and Mining. For catalogues address DR. HARRY W. TYLER, Secretary.

MICHIGAN COLLEGE OF MINES.

A state Institution devoted exclusively to giving instruction in subjects relating to Mining and Mining Engineering. Located in the Lake Superior copper mining district. Has special advantages for practical work. Laboratories; shops, mill, etc., well equipped with modern appliances. Particular attention given to men who wish to study special subjects. College year forty-five weeks, which with the elective system, enables good students to graduate in three years. Catalogues giving full information about the Institution and the occupation of the graduates sent free on application to Mrs. F. H. SCOTT, Secretary, Houghton, Mich.

STUDENTS—Instruction in Assaying, Mineralogy and Chemical Analysis.

SEE PAGE 24. SIMONDS & WAINWRIGHT.

HARVARD UNIVERSITY. Lawrence Scientific School

OFFERS COURSES IN ENGINEERING, CHEMISTRY, MINING, GEOLOGY, ARCHITECTURE, BIOLOGY, ETC., ETC., ETC. For Descriptive Pamphlet apply to M. CHAMBERLAIN, Secretary, N. S. SHALER, Dean. Cambridge, Mass.

The Mineral Industry, Vol. VI.

"We fully appreciate the value of THE MINERAL INDUSTRY, and always look forward to the appearance of the new volume." LONDON AND BRITISH COLUMBIA GOLDFIELDS, LTD.



THE HARRINGTON & KING PERFORATING CO. CHICAGO.
METALS PERFORATED AS REQUIRED.
FOR MINING SCREENS OF ALL KINDS.
STANDARD SIZES PERFORATED TIN AND BRASS ALWAYS IN STOCK.

PERFORATED METALS
ALL KINDS FOR EVERY PURPOSE.

Cotton Seed Oil Mills, Phosphate Mills, Centrifugal Machine and Filter Press Plates a Specialty.
CHAS. MUNDT & SONS, Mfrs., 88 and 90 Walker Street, New York.

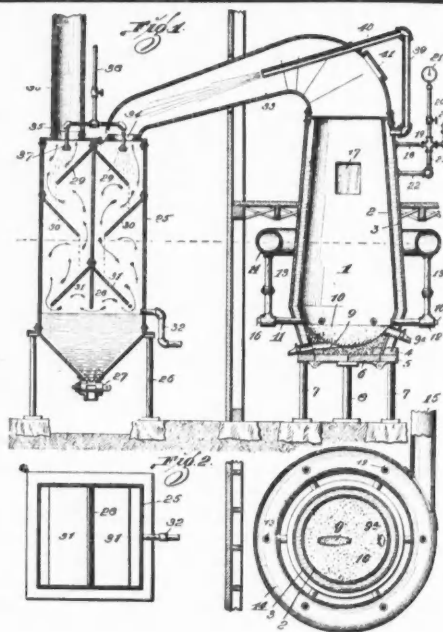
THE AUSTRALIAN MINING STANDARD

ESTABLISHED IN 1888.
THE MINING AUTHORITY OF THE SOUTHERN HEMISPHERE.
The Only Mining Paper in the Australasian Colonies. Advertising Rates and Sample Copies Mailed on Application. Subscription—30s. per Annum in Advance. Correspondence Solicited.
Offices—231-233 Lit. Flinder St., MELB., VIC.; and EQUITABLE BGS., George St., SYDNEY, N. S. W.
No. 3. F. CRITCHLEY PARKER, Sole Proprietor

This is our UNION COMBINATION SMELTER, full water jacketed with metallic fume and dust condensers for matte and pyritic smelting. Built in five sizes with capacity from 10 to 100 tons per 24 hours, according to condition of the ore. Send for our catalogue, giving full particulars and specifications.

The construction of this smelter is such that during the process of smelting the sulphur in the ore is utilized for fuel. A further object is to combine with the smelter a metallic fume and dust condenser for collecting, by the action of condensation and precipitation, the solid and volatile values which leave the body of smelted ore during the operation.

We will not sell our smelters unless we are satisfied that intending purchasers have ore adapted to our treatment. We guarantee absolute satisfaction. Correspondence solicited.



Union Smelter Manufacturing Co.,

415 Locust Street, ST. LOUIS, MO.

BUYERS' CLASSIFIED DIRECTORY.—Continued on Page 17.

A.
Accountants.
 Audit Co., The, New York.
Adjustable Stocks and Dies.
 Armstrong Mfg. Co., Bridgeport, Conn.
Air Compressors.
 Allis, The E. P. Co., Milwaukee, Wis.
 American Diamond Rock Drill Co., N. Y.
 Burleigh Rock Drill Co., Fitchburg, Mass.
 Bullock, The M. C. Mfg. Co., Chicago.
 Clayton Air Compressor Works, N. Y.
 Colorado Iron Works Co., Denver.
 Davis, The F. M., Iron Works, Denver.
 Denver Engineering Works.
 Fairbanks, Morse & Co., Chicago, Ill.
 Fraser & Chalmers, Chicago, Ill.
 Gates Iron Works, Chicago, Ill.
 Ingersoll-Sergeant Drill Co., N. Y.
 Mine & Smelter Supply Co., The, Denver.
 Norwalk Iron Works Co., South Norwalk.
 Hand Drill Co., The, New York, N. Y.
 Sullivan Mach. Co., Chicago, Ill.
 Weber Gas & Gasoline Engine Co., Kansas City.
Amalgamators.
 Urlic Mining Machinery Co., Kansas City, Mo.
Amalgam Plates.
 Crammer & Burt, Chicago, Ill.
 Denver Engineering Works, Denver, Colo.
 Mine & Smelter Supply Co., The, Denver.
Anti-Friction Metals.
 Besly, C. H., & Co., Chicago, Ill.
 Chester Steel Casting Co., Philadelphia.
 Magnolia Metal Co., New York.
 Phosphor Bronze Sm. Co., Philadelphia.
Armor.
 Bethlehem Iron Co., So. Bethlehem, Pa.
Arsenic.
 Fuerst Bros. & Co., New York.
Assayers.
 Ogden Assay Co., Denver, Colo.
 St. Louis Sampling & Testing Wks., St. Louis, Mo.
 Reckhart, D. W., El Paso, Tex.
Assayers' and Chemists' Supplies.
 Ainsworth, W., Denver, Colo.
 Atteaux & Co., Boston, Mass.
 Baker & Co., New York, N. Y.
 Baker & Adamson Chem. Co., Easton, Pa.
 Becker, Christian, New York.
 Braun & Co., F. W., Los Angeles, Cal.
 Bullock & Crenshaw, Philadelphia, Pa.
 Denver Fire Clay Co., Denver, Colo.
 Entriken, J. C., Malvern, Pa.
 Elmer & Amend, New York.
 Fair Drug & Assay Supply Co., Butte.
 Fuerst Bros. & Co., New York, N. Y.
 Hell, Henry, Chemical Co., St. Louis, Mo.
 Kohlbusch, H., New York.
 Pennsylvania Salt Mfg. Co., Philadelphia.
 Richards & Co., Ltd., New York and Chicago.
 Roessler & Haaslach Chem. Co., N. Y.
 Schoellkopf, Hartford & Maclagan, Ltd., New York.
 Sargent, E. H., & Co., Chicago, Ill.
 Smith & Thompson, Denver, Colo.
 Solvay, The, Process Co., Syracuse, N. Y.
 Taylor, John, & Co., San Francisco, Cal.
 Troemner, Henry, Philadelphia, Pa.
 Western, The, Chemical Co., Denver.
 White Co., The, Chicago, Ill.
B.
Babbitt Metal.
 Besly, C. H., & Co., Chicago, Ill.
 Magnolia Metal Co., New York.
Bankers and Brokers.
 Bishop & Co., E. N., Wash.
 Boggs, S. L., Salt Lake City, Utah.
 Breitung, E. N., Marquette, Mich.
 British Canadian Investment and Mining Syndicate, Spokane, Wash.
 Buckler, N. B., Spokane, Wash.
 Clough & Co., C. F., Spokane, Wash.
 Colley & Co., Boston, Mass.
 Cox, E. Strachan, Toronto, Ont.
 Currie & Kitley, Toronto, Ont.
 De Lashmutz & Rutter, Spokane, Wash.
 Fox & Ross, Toronto, Ontario.
 Galusha & Sons, M. R., Spokane, Wash.
 Graham, Garrett & Co., Spokane, Wash.
 Handy & Harman, New York, N. Y.
 Hedburg, E., Joplin, Mo.
 Herrin & Reiner, Spokane, Wash.
 Litchfield & Co., Chas., Spokane, Wash.
 Magee & Co., Toronto, Ont.
 Meyer, Clarke Rowe, Bines Co., Kansas City, Mo.
 Norman & Co., S., Spokane, Wash.
 Nichols & Bro., W. H., Butte, Mont.
 Palmer & Co., H. P., Spokane, Wash.
 Parker, E. G., Toronto, Ont.
 Produce Exchange Bank, New York.
 Pollock, J. A., Salt Lake City.
 Rand, C. D., Spokane, Wash.
 Republic Gold Mining & Milling Co., Spokane, Wash.
 Tulleys, L. W., Council Bluffs, Ia.
Bearing Metal.
 Besly, C. H., & Co., Chicago, Ill.
 Chester Steel Castings Co., Philadelphia.
 Link-Belt Machinery Co., Chicago, Ill.
 Magnolia Metal Co., New York.
Belting.
 Aultman Co., The, Canton, Ohio.
 Hendrie & Bolthoff Mfg. Co., Denver.
 Jeffrey, The, Mfg. Co., Columbus, Ohio.
 Link-Belt Machinery Co., Chicago, Ill.
 Robins Conv. Belt Co., New York.
Belt Lacing.
 Bristol, The, Co., Waterbury, Conn.
Blasting Caps.
 Aetna Powder Co., Chicago, Ill.
 King Powder Co., Cincinnati, Ohio.
 Macbeth & Co., Jas., New York.

Blasting Batteries, Caps and Fuse.
 Aetna Powder Co., Chicago, Ill.
 King Powder Co., Cincinnati, Ohio.
 Lau, J. H., & Co., New York, N. Y.
 Macbeth, J., & Co., New York, N. Y.
Blowers.
 Buffalo Forge Co., Buffalo, N. Y.
Boilers.
 Allis, The E. P. Co., Milwaukee, Wis.
 Aultman Co., The, Canton, Ohio.
 Billin, C. E., & Co., Chicago, Ill.
 Bacon, E. C., New York.
 Colorado, The, Iron Works Co., Denver.
 Davis, F. M., Iron Works Co., Denver.
 Denver, The, Eng. Works Co., Denver.
 Fairbanks, Morse & Co., Chicago, Ill.
 Fraser & Chalmers, Chicago, Ill.
 Hamilton Mfg. Co., Wm., Peterborough, Ont.
 Pollock, W. B., & Co., Youngstown, O.
 Risdon Iron Works, San Francisco, Cal.
 Stillwell-Bierce & Smith-Valle Co., The, Dayton, O.
Boiler Cleaners.
 Union Boiler Tube Cleaner Co., Pittsburg, Pa.
Boiler Compounds.
 Dearborn Drug Co., Chicago, Ill.
 Metropolitan Steam Boiler Compound Mfg. Co., Brooklyn, N. Y.
 Parsons, J. H., Co., Chicago, Ill.
 Pittsburg Boiler Scale Resolvent Co., Pittsburg, Pa.
Boiler Fronts.
 Denver Engineering Works, Denver, Colo.
Boils (Eyes).
 Williams, J. H., & Co., Brooklyn, N. Y.
Brass Goods.
 Besly, Chas. H., & Co., Chicago, Ill.
 Eddy Valve Co., Waterford, N. Y.
 Detroit Lubricator Co., Detroit, Mich.
 Ludlow-Saylor Wire Co., St. Louis.
Brattice Cloth.
 Besly, C. H., & Co., Chicago, Ill.
Brick Machinery
 Freese, E. M., & Co., Gallon, O.
 Harrington & King Perf. Co., Chicago.
Bridges.
 Berlin Iron Bridge Co., East Berlin, Conn.
 Gillette-Herzog Mfg. Co., Minneapolis.
 Shiffler Bridge Co., Pittsburg, Pa.
Briquetting Machines.
 Chisholm, Boyd & White Co., Chicago.
 Mould Co., Henry S., Pittsburg, Pa.
Buckets.
 Amer. Engineering Works, Chicago, Ill.
 Link-Belt Machinery Co., Chicago, Ill.
 Brown Hoist, and Conv. Mach. Co., Cleveland, O.
 Jeffrey, The, Mfg. Co., Columbus, Ohio.
 New Jersey Foundry & Mach. Co., New York.
 Weber Gas & Gasoline Engine Co., Kansas City, Mo.
C.
Carbons.
 Levy, H., New York.
 Lexow, Th., New York.
 Motley & Co., San Francisco, Cal.
 Yawger, I. C., New York.
Cars (Dump and Mine).
 Allis, The, E. P. Co., Milwaukee, Wis.
 American Engineering Works, Chicago.
 Colorado, The, Iron Works Co., Denver.
 Davis, F. M., Iron Works Co., Denver.
 Denver, The, Eng. Works Co., Denver.
 Fairbanks, Morse & Co., Chicago, Ill.
 Fraser & Chalmers, Chicago, Ill.
 Gillette-Herzog Mfg. Co., Minneapolis.
 Goodwin Car Co., New York.
 Hendrie & Bolthoff Mfg. Co., Denver.
 Koppel, Arthur, New York.
 Krupp, Fried., Magdeburg-Buckau, Germany.
 Mine and Smelter Supply Co., Denver.
 New Jersey Foundry & Mach. Co., New York.
 The Lloyd Talmage Co., New York.
 Truax Mfg. Co., Denver, Colo.
 Urlic Mining Mach. Co., Kansas City, Mo.
Castings.
 Bethlehem Iron Co., So. Bethlehem, Pa.
 Chester Steel Castings Co., Philadelphia.
 Graham Steel Works, Brooklyn, N. Y.
 New Jersey Foundry & Mach. Co., New York.
 Taylor Iron & Steel Co., High Bridge.
 Western Forge & Rolling Mills, St. Louis, Mo.
 Wood, R. D., & Co., Philadelphia, Pa.
 Bucyrus Co., So. Milwaukee, Wis.
Chemical Engineers.
 Dearborn Drug Co., Chicago, Ill.
Chemicals.
 Atteaux & Co., Boston, Mass.
 Baker & Adamson Chemical Co., Easton, Pa.
 Braun & Co., F. W., Los Angeles, Cal.
 Bullock & Crenshaw, Philadelphia, Pa.
 Elmer & Amend, New York.
 Fair Drug & Assay Supply Co., Butte.
 Fuerst Bros. & Co., New York.
 Hell, Henry, Chemical Co., St. Louis, Mo.
 Illinois Zinc Co., Peru, Ill.
 Pennsylvania Salt Mfg. Co., Phila., Pa.
 Richards & Co., Ltd., New York and Chicago.
 Roessler & Haaslach Chem. Co., N. Y.
 Sargent, E. H., & Co., Chicago, Ill.
 Schoellkopf, Hartford & Maclagan, Ltd., New York.
 Solvay, The Process Co., Syracuse, N. Y.
 Western Chemical Co., Denver.
Chemists.
 McKenna, Chas. F., New York.
 Ogden Assay Co., Denver, Col.
Coal.
 Berwind-White Coal Mfg. Co., New York.
 Castner, Curran & Bullett, Phila., Pa.

Consolidation Coal Co., Baltimore, Md.
 Davis Coal & Coke Co., New York.
 Flemington Coal & Coke Co., New York.
 Stickney, Conyngham & Co., New York.
 Ward & Olyphant, New York, N. Y.
Coal Cutters.
 Ingersoll-Sergeant Drill Co., New York.
 Jeffrey, The, Mfg. Co., Columbus, Ohio.
 Link-Belt Machinery Co., Chicago, Ill.
 Sullivan Machinery Co., Chicago, Ill.
Coal Handling Machinery.
 Aultman Co., The, Canton, Ohio.
 Robins Conv. Belt Co., New York.
Coal Washing Machinery.
 Jeffrey, The, Mfg. Co., Columbus, Ohio.
 Link-Belt Machinery Co., Chicago, Ill.
 St. Louis Sampling & Testing Wks., St. Louis, Mo.
Cocks.
 Besly, C. H., & Co., Chicago, Ill.
Compressed Air Shop Tools.
 Clayton Air Compressor Works, N. Y.
Concentrators.
 Abbe Mfg. Co., Max F., New York.
Contractors for Cleaning Boilers.
 Union Boiler Tube Cleaner Co., Pittsburg, Pa.
Contractors, Prospecting
 Muirhead & Son, John, Pittston, Pa.
Conveying Belts.
 Aultman Co., The, Canton, Ohio.
 Davis, F. M., Iron Wks. Co., Denver.
 Lidgerwood Mfg. Co., New York, N. Y.
 Link-Belt Machinery Co., Chicago, Ill.
 Robins Conveying Belt Co., New York.
Conveying Machinery.
 Aultman Co., The, Canton, Ohio.
 Bacon, E. C., New York.
 Brown Hoist, and Conv. Mach. Co., California Wire Works, San Francisco.
 Colorado, The, Iron Works Co., Denver.
 Cooper, Hewitt & Co., New York, N. Y.
 Davis, F. M., Iron Works Co., Denver.
 Denver Engineering Works Co., Denver.
 Exeter Mach. Works, Pittston, Pa.
 Fraser & Chalmers, Chicago, Ill.
 Jeffrey, The, Mfg. Co., Columbus, Ohio.
 Lidgerwood Mfg. Co., New York, N. Y.
 Link-Belt Machinery Co., Chicago, Ill.
 Nelsonville F. & M'ch. Co., Nelsonville, O.
 New Jersey Foundry & Mach. Co., New York.
 Robins Conveying Belt Co., New York.
 Ropeway Syndicate, London, Eng.
 Trenton Iron Co., Trenton, N. J.
 Urlic Mining Mach. Co., Kansas City, Mo.
 Vulcan Iron Works, San Francisco, Cal.
Copper Dealers and Producers.
 American Metal Co., The, New York.
 Arizona Copper Co., Clifton, Ariz.
 Atlantic Mining Co., Atlantic Mine P. O., Mich.
 Balbach Smelting and Refining Co., Newark, N. J.
 Baltimore Copper Works, Baltimore Md.
 Bath, Henry, & Son, London, Eng.
 Bond, V., & Co., New York.
 Bridgeport Copper Co., Bridgeport, Conn.
 Canadian Copper Co., The, Cleveland, O.
 Colonial Copper Co., New York.
 Copper Queen Con. Mfg. Co. of Arizona, New York, N. Y.
 Detroit Copper Mfg. Co., of Arizona, Morenci, Ariz.
 Elliott's Metal Co., Burry Port, S. W.
 Jlorieux & Woolsey, Irvington, N. J.
 James & Shakespeare, London, Eng.
 Lambert's Wharfage Co., Swansea, Eng.
 Lewisohn Bros., New York, N. Y.
 Mariken Copper Co., New York.
 Mountain, The, Copper Co., New York.
 Nichols Chemical Co., New York.
 Orford Copper Co., The, New York.
 Pass, C., & Son, Bristol, Eng.
 Pennsylvania Salt Mfg. Co., Philadelphia.
 Phelps, Dodge & Co., New York, N. Y.
 Vivian, Younger & Bond, London, E. C.
Crucibles, Graphite, etc.
 Denver, The, Fire Clay Co., Denver.
 Dixon, Joseph, Crucible Co., Jersey City.
 Richards & Co., Ltd., New York and Chicago.
Crushers.—See Pulverizers.
Cyanide.
 Braun & Co., F. W., Los Angeles, Cal.
 Fuerst Bros. & Co., New York, N. Y.
 Roessler & Haaslach Chemical Co., Schoellkopf, Hartford & Maclagan, Ltd., New York.
D.
Diamonds.
 Levy, H., New York.
 Lexow, Th., New York.
 Muirhead & Son, John, Pittston, Pa.
 Yawger, I. C., New York.
Diamond Drills.
 American Diamond Rock Drill Co., Buffalo, The, M. C., Mfg. Co., Chicago.
 Muirhead & Son, John, Pittston, Pa.
 Sullivan Machinery Co., Chicago, Ill.
Diamond Drill Carbons.
 Levy, H., New York.
 Lexow, Th., New York.
 Muirhead & Son, John, Pittston, Pa.
 Yawger, I. C., New York.
Drawing Materials.
 Altender, Theo., & Son, Philadelphia.
 Berger, C. L. & Sons, Boston, Mass.
 Besly, C. H., & Co., Chicago, Ill.
 Dietzen, Eugene Co., Chicago, Ill.
 Gurley, W. & L. E., Troy, N. Y.
 Keuffel & Esser Co., New York.
 Letz, The A., Co., San Francisco, Cal.
 Queen & Co., Philadelphia.
 Wittstock, P. & R., Berlin, Germany.

Dredging Machinery.
 Bucyrus, The, Co., So. Milwaukee, Wis.
 Jeffrey Mfg. Co., Columbus, O.
 Marion Steam Shovel Co., Marion, O.
 Montgomery, J. H., Mach. Co., Denver.
 Risdon Iron Works, San Francisco, Cal.
 Urlic Mining Machinery Co., Kansas City.
Drills (Rock).
 American Diamond Rock Drill Co., N. Y.
 Allis, The E. P. Co., Milwaukee, Wis.
 Bullock, The, M. C., Mfg. Co., Chicago.
 Burleigh Rock Drill Co., Fitchburg, Mass.
 Denver Engineering Works, Denver.
 Elmore Hand Rock Drill Co., Chicago, Ill.
 Fraser & Chalmers, Chicago, Ill.
 Ingersoll-Sergeant Rock Drill Co., N. Y.
 Jackson Drill & Mfg. Co., Denver.
 Keystone Driller Co., Beaver Falls, Pa.
 Muirhead & Son, John, Pittston, Pa.
 Rand Drill Co., New York, N. Y.
 Sullivan Machinery Co., Chicago, Ill.
Dryers.
 Abbe Mfg. Co., Max F., New York.
 Buffalo Forge Co., Buffalo, N. Y.
 Colorado Iron Wks. Co., Denver.
 Cummer, F. D., & Son Co., Cleveland.
 Davis, F. M., Iron Wks. Co., Denver.
 Denver, The, Eng. Works Co., Denver.
 Ruggles, Coles Eng. Co., New York.
Dump Cars.
 Allis & Co., E. P., Milwaukee, Wis.
 Colorado, The, Iron Wks. Co., Denver.
 Davis, F. M., Iron Works Co., Denver.
 Denver, The, Eng. Works Co., Denver.
 Fairbanks, Morse & Co., Chicago, Ill.
 Fraser & Chalmers, Chicago, Ill.
 Gillette-Herzog Mfg. Co., Minneapolis.
 Goodwin Car Co., New York.
 Hendrie & Bolthoff Mfg. Co., Denver.
 Koppel, A., New York.
 Krupp, Fried. E., Magdeburg-Buckau.
 Mine & Smelters Supply Co., Denver, Colo.
Dynamite.
 Aetna Powder Co., Chicago, Ill.
 King Powder Co., Cincinnati, O.
E.
Educational Institutions.
 Chicago School of Assaying, Chicago, Ill.
 Harvard University, Cambridge, Mass.
 McGill University, Montreal, Can.
 Massachusetts Institute of Technology, Boston, Mass.
 Michigan School of Mines, Houghton.
 Missouri School of Mines.
 Simonds & Wainwright, New York.
Electrical Batteries.
 Macbeth, James & Co., New York, N. Y.
 McIntyre, Elmer E., Pittsburg, Pa.
 Weston Elect. Inst. Co., Newark, N. J.
Electrical Machinery Supplies.
 Besly, C. H., Co., Chicago, Ill.
 Chicago Edison Co., Chicago, Ill.
 General Electric Co., Schenectady, N. Y.
 Jeffrey, The, Mfg. Co., Columbus, O.
 Link-Belt Machinery Co., Chicago, Ill.
 McIntyre, Elmer, Pittsburg, Pa.
 Okonite, The, Co., New York, N. Y.
 Westinghouse Electric & Mfg. Co., Pittsburg, Pa.
 Weston Electrical Instrument Co., Newark, N. J.
Electric Blasting Fuse.
 Macbeth & Co., Jas., New York.
Electric Safety Lamp.
 McIntyre, Elmer, Pittsburg, Pa.
Elevator Conveyors.
 Aultman Co., The, Canton, Ohio.
 Bacon, E. C., New York.
 Brown Hoisting and Conveying Machine Co., Cleveland, O.
 California Wire Works, San Francisco.
 Colorado, The, Iron Works Co., Denver.
 Cooper, Hewitt & Co., New York, N. Y.
 Davis, F. M., Iron Works Co., Denver.
 Denver, The, Eng. Works Co., Denver.
 Exeter Mach. Works, Pittston, Pa.
 Fraser & Chalmers, Chicago, Ill.
 Frenier & Le Blanc, Rutland, Vt.
 Jeffrey, The, Mfg. Co., Columbus, O.
 Lidgerwood Mfg. Co., New York.
 Link-Belt Machinery Co., Chicago, Ill.
 Montgomery, J. H., Mach. Co., Denver.
 Nelsonville Foundry & Machinery Co., New Jersey Foundry & Mach. Co., New York.
 Robins Conv. Belt Co., New York.
 Ropeway Syndicate, London, Eng.
 Vulcan Iron Works, San Francisco, Cal.
Emery and Buhr Mills.
 Sturtevant Mill Co., Boston, Mass.
Emery Wheels.
 Besly, C. H., Co., Chicago, Ill.
Engineers and Chemists.
 See Page 4, 5 and 6.
Engineers' Instruments.
 Altender, Theo., & Sons, Philadelphia.
 Berger, C. L., & Sons, Boston, Mass.
 Brandis, F. E., Sons & Co., Brooklyn.
 Bullock & Crenshaw, Philadelphia, Pa.
 Dietzen, Eugene Co., Chicago, Ill.
 Gurley, W. & L. E., Troy, N. Y.
 Keuffel & Esser Co., New York.
 Kohlbusch, H., New York.
 Letz, The A., Co., San Francisco, Cal.
 Queen & Co., Philadelphia.
 Wittstock, P. & R., Berlin, Germany.
Engines.
 Allis, E. P., Co., Milwaukee, Wis.
 Aultman Co., The, Canton, Ohio.
 Bacon, E. C., New York.
 Buffalo Forge Co., Buffalo, N. Y.
 Bullock, The M. C., Mfg. Co., Chicago.
 Colorado, The, Iron Works Co., Denver.
 Davis, F. M., Iron Works Co., Denver.
 Denver Eng. Wks. Co., Denver.
 Fraser & Chalmers, Chicago, Ill.
 Jeffrey Mfg. Co., Columbus, O.
 Lidgerwood Mfg. Co., New York.
 Risdon Iron Works, San Francisco, Cal.
 Stillwell-Bierce & Smith-Valle Co., The Dayton, O.



BOOKS THAT WILL HELP YOU.



Timely Books on Gold and Placer Mining.

- Stamp Milling of Gold Ores.** By T. A. Rickard. An actual record of milling practice, including valuable details regarding devices employed to overcome the difficulties in the handling of refractory ores. A thoroughly up-to-date treatise in every respect. Cloth, profusely illustrated with half-tone pictures and folding plates. \$2.50
- The Miners' Pocketbook.** By C. G. W. Lock. A reference book for Miners, Geologists, Assayers, Metallurgists, etc. Flexible leather. 5.00
- Practical Gold Mining.** By C. G. W. Lock. A comprehensive treatise on the Origin and Occurrence of Gold-Bearing Gravels, Rocks and Ores and the Methods by which Gold is Extracted. 800 pages, 8 plates, 300 engravings. Cloth. 15.00
- The Prospectors' Hand-book.** By J. W. Anderson. A Guide for the Prospector and Seeker of Metal-Bearing and other valuable Minerals. Cloth, illustrated. 1.50
- A Practical Treatise on Hydraulic Mining in California.** By A. J. Bowie. Cloth, illustrated with tables and plates. 5.00
- Getting Gold.** By J. C. F. Johnson. 1.50
- Wilson's Guide to the Yukon Gold Fields.** Illustrated.75
- The Gold Fields of the Klondyke and the Wonders of Alaska.** By Ernest Ingersoll and Henry W. Elliott. Tells all about the mines—how they were discovered—how they are worked—what fields are yet unexplored—the vast extent and possibilities of the gold region—how to get there—what is required to go—the climate of the region, also the other vast riches of Alaska, splendidly illustrated with a magnificent colored map. Cloth. 1.50
- The Hydraulic Gold Miners' Manual.** By T. S. G. Kirkpatrick. A very complete little book. Cloth, illustrated. 1.00

Practical Books on Assaying

- ASSAYING.** By C. H. Aaron. (Part One.) Consisting of gold and silver ores, with special chapters on The Solubility of Metals—Tests for Ores—To Find the Value of a Specimen—Cupellation—Examples of Dressing—Mixing and Charging—Assay of Ore Containing Coarse Metal—A Simple Assay Balance, etc. 12mo, cloth, illustrated. Price. \$1.00
- ASSAYING.** By C. H. Aaron. (Parts Two and Three.) Including Gold and Silver Bullion—Lead—Copper—Tin—Mercury—Zinc—Nickel—Cobalt—Chromium—Bismuth—Arsenic—Antimony—Sulphur and Salt. 12mo, cloth, illustrated. Price. \$1.75
- NOTES ON ASSAYING.** By Ricketts and Miller. Prepared with special reference to the wants of the student and practical assayer. Containing also Instructions for Laboratory Tests by Cyanide, Chlorination, Russell Process, etc.—Assayer's Outfit—Rapid Volumetric Methods for the Analysis of Ores, etc. 8vo, cloth. Price. \$3.00
- MANUAL OF ASSAYING OF GOLD, SILVER, COPPER AND LEAD.** By W. L. Brown. An exceedingly practical work of untold value, especially for the amateur assayer. Written in terse modern English and thoroughly revised to date. 12mo, cloth, with colored plates. Price. \$2.50
- TEXT BOOK ON ASSAYING.** By C. and J. J. Beringer. Containing information that an assayer will find requisite in the examination of minerals. This work is essentially of a practical character and embraces important chapters in the methods of assaying by the dry and wet gravimetric methods, re-agents, volumetric assays and the general metallurgy of silver, gold, platinum, mercury and other metals. Royal 8vo, cloth, illustrated. \$3.25

Practical Books for Progressive People.

Tersely Told by Writers of Pre-
eminent Reputation, and in
Convenient Shape for
Pocket Use.

PRICE 50 CENTS EACH

- THE STORY OF THE STARS.** By G. F. CHAMBERS. With 24 Illustrations.
- THE STORY OF PRIMITIVE MAN.** By EDWARD CLODD. With 88 Illustrations.
- THE STORY OF THE PLANTS.** By GRANT ALLEN. With 49 Illustrations.
- THE STORY OF THE EARTH IN PAST AGES.** By Prof. H. G. SEELEY. With 40 Illustrations.
- THE STORY OF THE SOLAR SYSTEM.** By G. F. CHAMBERS. With 28 Illustrations.
- THE STORY OF A PIECE OF COAL.** By E. A. MARTIN. With 38 Illustrations.
- THE STORY OF ELECTRICITY.** By J. MUNRO. With 100 Illustrations.
- THE STORY OF EXTINCT CIVILIZATIONS OF THE EAST.** By R. E. ANDERSON. With Maps.
- THE STORY OF THE CHEMICAL ELEMENTS.** By M. M. PATTISON MUIR.
- THE STORY OF FOREST AND STREAM.** By JAMES RODWAY.
- THE STORY OF THE WEATHER.** By G. F. CHAMBERS. With 40 Illustrations.
- THE STORY OF ANIMAL LIFE.** By B. LINDSAY. With 40 Illustrations.
- THE STORY OF THE EARTH'S ATMOSPHERE.** By DOUGLAS ARCHIBALD. With Illustrations.
- THE STORY OF THE EARTH'S SURFACE.** By Professor H. G. SEELEY. With Illustrations.

The Manual of American Water-Works.

By M. N. BAKER.

Containing the History and Descriptions of
the Source and Mode of Supply, Etc.,
of the Water-Works of the United
States and Canada.

8vo, Cloth, \$3.00.

A TEXT-BOOK OF MINERALOGY.

BY EDWARD S. DANA.

With an extended treatise on Crystallography and Physical Mineralogy, and being designed chiefly to meet the wants of class or private instruction, this object has at once determined the choice of topics discussed, the order and fulness of treatment, and the method of presentation, including special divisions on Physical and Chemical Mineralogy. New edition thoroughly revised to date, royal 8vo, cloth, with one thousand figures, a colored plate, and six hundred pages.

PRICE, \$4.00.

Useful Books on Electricity

- Electric Railways and Tramways.** By PHILLIP DAWSON. A practical handbook, containing complete financial and engineering data as to design, construction, equipment and working. 530 illustrations; 183 tables. Half morocco, \$12.50
- Electric Smelting and Refining.** By BOCHERT and McMILLAN. A practical work, treating of all those metals in the extraction and working of which the electric current has found any application. 188 illustrations; 3 folding plates. 8vo, cloth. \$6.50
- Power Distribution for Electric Railroads.** By Dr. LOUIS BELL. Sets forth the general principles of the distribution of electrical energy to moving motors. 139 illustrations. 8vo, cloth. \$2.50
- Art of Electro-Metallurgy.** By GORE. Including all known processes of Electro-Deposition. 56 illustrations. 12mo, cloth. \$2.00
- Art of Electrolytic Separation of Metals, Etc.** By GORE. Theoretical and practical. 10 illustrations. 8vo, cloth. \$3.50
- Electro-Chemistry** By GORE. 16mo, cloth. \$0.80
- Theory and Practice of Electro-Deposition.** By GORE. Including every known mode of depositing Metals, Preparing Metals for Immersion, Taking Moulds and rendering them Conducting. 16mo, cloth. \$0.80
- The Practical Management of Dynamos and Motors.** By F. B. CROCKER and S. S. WHEELER. With a special chapter by H. A. Foster. Illustrated. 12mo, cloth. \$1.00
- Electrical Power Transmission.** By Dr. LOUIS BELL. 8vo, cloth. \$2.50
- The Electrical Transmission of Energy.** By A. V. ABBOTT. A Manual for the Design of Electrical Circuits. Illustrations and 9 folding plates. 8vo, cloth. \$4.50
- A B C of Electricity.** By MEADOWCROFT. 12mo, cloth. \$0.50
- How to Make and Use a Dynamo.** By BOTTONE. \$0.90
- How to Manage a Dynamo.** By BOTTONE. \$0.60

PRACTICAL BOOKS ON Hydrodynamics and Drainage

- A Practical Treatise on Hydraulic and Water Supply Engineering.** By J. H. FANNING. Relating to the Practical Construction of Water-Works in North America. Copiously illustrated, 8vo, cloth, 13th edition, revised and enlarged, with new tables and illustrations. \$5.00
- The Separate System of Sewerage: Its Theory and Construction.** By C. STALEY and G. S. PIERSON. 8vo, cloth, with maps, plates and illustrations. 3.00
- The Design and Construction of Masonry Dams.** By E. WEGMAN, JR. Giving the Method employed in the Profile of the Quaker Bridge Dam, including full information concerning all the highest masonry dams of the world. 8vo, cloth, illustrated. 5.00
- A Treatise on Masonry Construction.** By I. O. BAKER. Containing Materials and Method of Testing, Strength, Composition and Foundations, the Bearing Power of Soils, etc. 8vo, cloth, illustrations and maps. 5.00
- Water Supply Considered Mainly from a Chemical and Sanitary Standpoint.** By W. R. NICHOLS. 8vo, cloth, illustrated. 2.50
- The Manual of American Water-Works.** By M. N. BAKER. Containing the History and Descriptions of the Source and Mode of Supply, etc., of the Water-Works of the United States and Canada. 8vo, cloth. 3.00
- Practical Hydraulics.** By P. M. RANDALL. A manual of great utility and service. 18mo, cloth. 2.00
- Tidal Rivers: Their Hydraulics, Improvement and Navigation.** By W. H. WHEELER. An excellent book, very complete in detail. 8vo, cloth, illustrated, including maps. 5.00

THE SCIENTIFIC PUBLISHING COMPANY,
253 BROADWAY, NEW YORK.

BUYERS' CLASSIFIED DIRECTORY.—Continued on Page 18.

Union Iron Works, San Francisco, Cal.
 Weber Gas and Gasoline Engine Co.,
 Kansas City, Mo.
 Webster, Camp & Lane Machine Co., Ak-
 ron, O.
 White Iron Works Co., Kansas City, Mo.
Excavators—See Steam Shovels.
 Bucyrus The, Co., So. Milwaukee, Wis.
 Jeffrey Mfg. Co., Columbus, O.
 Marion, The, Steam Shovel Co., Marion,
 O.
 Risdon Iron Works, San Francisco.
 Weber Dredge Co., Kansas City, Mo.
Explosives.
 Aetna Powder Co., Chicago, Ill.
 King Powder Co., Cincinnati, O.
 Lau, J. H., & Co., New York, N. Y.
 Macbeth, J., & Co., New York, N. Y.
F.
Fans, Ventilating.
 Buffalo Forge Co., Buffalo, N. Y.
Feed Water Purifiers.
 The Wefugo Co., Cincinnati, O.
Filter Press.
 Perrin & Co., Wm., Chicago, Ill.
 Stillwell-Bierce & Smith-Valle Co., Day-
 ton, O.
Fire Brick and Clay.
 Denver, The, Fire Clay Co., Denver.
Fire Sand.
 Peck Fire Sand Co., Jas. D., New York.
Fittings (Cast Iron).
 Abendroth & Root Mfg. Co., New York.
Flexible Shafts.
 Union Boiler Tube Cleaner Co., Pittsburg,
 Pa.
Flue Cleaners.
 Union Boiler Tube Cleaner Co., Pittsburg,
 Pa.
Fluorspar.
 Fuerst Bros. & Co., New York, N. Y.
Forges.
 Buffalo Forge Co., Buffalo, N. Y.
Forgings.
 Bethlehem Iron Co., Bethlehem, Pa.
 New Jersey Foundry & Mach. Co., New
 York.
 Williams, J. H., & Co., Brooklyn, N. Y.
Fuel Economizers.
 Detroit Lubricator Co., Detroit, Mich.
Furnaces.
 Allis, The E. P. Co., Milwaukee, Wis.
 Billin, C. E., & Co., Chicago, Ill.
 Braun & Co., F. W., Los Angeles, Cal.
 Colorado Iron Works Co., Denver.
 Davis, F. M., Iron Works Co., Denver.
 Denver, The, Fire Clay Co., Denver.
 Garretson, O. S., Buffalo.
 Hoskins, W., Chicago, Ill.
 Krupp, F., Magdeburg-Buckau.
 Nichols Chemical Co., New York.
 Pollock, W. B. Co., Youngstown, O.
 Richards & Co., Ltd., New York and Chicago
 Sargent, E. H., & Co., Chicago, Ill.
 Union Smelter Mfg. Co., St. Louis, Mo.
 White Co., The, Chicago, Ill.
G.
Gas Engines.
 Allis, E. P. Co., Milwaukee.
 Weber Gas and Gasoline Engine Co.,
 Kansas City, Mo.
Gauges, Recording, etc.
 Besly & Co., Chicago.
 Bristol, The, Co., Waterbury, Conn.
Gearing.
 Besley & Co., C. H., Chicago, Ill.
 Chester Steel Casting Co., Chicago, Ill.
 Cresson Co., Philadelphia, Pa.
 Davis, F. M., Iron Works Co., Denver.
 Denver, The, Eng. Works Co., Denver.
 Fraser & Chalmers, Chicago, Ill.
 Link-Belt Machinery Co., Chicago, Ill.
Grease, Graphite, Etc.
 Besly, C. H., & Co., Chicago, Ill.
 Cook's, Adam, Sons Co., New York.
 Dixon, J., Crucible Co., Jersey City, N. J.
 The Lloyd Talmage Co., New York.
Grease Cups.
 Aultman Co., The, Canton, Ohio.
 Besly, C. H., & Co., Chicago, Ill.
 Cook's, Adam, Sons Co., New York.
 Detroit Lubricator Co., Detroit, Mich.
Grinding Mill Machinery.
 Sturtevant Mill Co., Boston, Mass.
 Abbe, Max F., Mfg. Co., New York.
H.
Holisting Machinery.
 Aultman Co., The, Canton, Ohio.
 Bacon, E. C., New York, N. Y.
 Bullock, The M. Y., Mfg. Co., Chicago.
 Colorado, The, Iron Works Co., Denver.
 Davis, F. M., Iron Works Co., Denver.
 Denver Engineering Works Co., Denver.
 Exeter Mach. Works, Pittston, Pa.
 General Electric Co., Schenectady, N. Y.
 Hamilton Mfg. Co., Wm., Peterborough,
 Ont.
 Hendrie & Bolthoff Mfg. Co., Denver.
 Jeffrey Mfg. Co., Columbus, Ohio.
 Mine & Smelter Supply Co., Denver, Colo.
 Nelsonville Foundry & Mach. Co., Nelson-
 ville, O.
 New Jersey Foundry & Mach. Co., New
 York.
 Robins Conv. Belt Co., New York.
 Union Iron Works, San Francisco, Cal.
 Weber Gas & Gasoline Engine Co., Kan-
 sas City, Mo.
 Westinghouse Electric & Manufacturing
 Co., Pittsburg, Pa.
I.
Impulse Cleaners.
 Union Boiler Tube Cleaner Co., Pittsburg,
 Pa.
Injectors.
 Jenkins Bros., New York, N. Y.

Insulated Wires and Cables.
 Okonite, The, Co., New York, N. Y.
 Roebling's, John A., Sons Co., New York.

Insurance Companies.
 Hartford Steam Boiler Inspection and In-
 surance Co., Hartford, Conn.
 Mutual Life Insurance Co., New York.

L.
Lamps.
 Wells Light Mfg. Co., New York.
Incandescent Lamps.
 Edison, Jr., Thos. A., New York.

Lathe Dogs.
 Williams, J. H., & Co., Brooklyn, N. Y.

**Lead Linings for Chlorination
 Tubs.**
 Raymond Lead Co., Chicago, Ill.

Link Belting.
 Aultman Co., The, Canton, Ohio.
 Link-Belt Machinery Co., Chicago, Ill.
 Jeffrey Mfg. Co., Columbus, Ohio.

Locomotives.
 Baldwin Locomotive Works, Philadelphia.
 Koppel, A., New York.
 Porter, H. K., & Co., Pittsburg, Pa.

Locomotive Cranes.
Lubricators.
 Bucyrus Co., So. Milwaukee, Wis.
 Detroit Lubricator Co., Detroit, Mich.

Lubricants.
 Besley, C. H., & Co., Chicago, Ill.
 Cook's, Adam, Sons Co., New York.
 Dixon, J., Crucible Co., Jersey City, N. J.

M.
Machinery, General.
 Abbe Mfg. Co., Max F., New York.
 Abendroth & Root Mfg. Co., New York.
 Allis, The, E. P. Co., Milwaukee, Wis.
 American Diamond Rock Drill Co., N. Y.
 Bacon, E. C., New York.
 Besly, C. H., & Co., Chicago, Ill.
 Blake, Theo. A., New Haven, Conn.
 Bradley Pulverizer Co., Boston, Mass.
 Bucyrus Co., So. Milwaukee, Wis.
 Bullock, The, M. C., Mfg. Co., Chicago.
 Buffalo Forge Co., Buffalo, N. Y.
 Colorado, The, Iron Works Co., Denver.
 Cresson Co., Philadelphia, Pa.
 Davis, F. M., Iron Works Co., Denver.
 Davis, Johnson, Co., Chicago, Ill.
 Denver, The, Eng. Works Co., Denver.
 Elmore Hand Rock Drill Co., Chicago, Ill.
 Englebach Mach. Mfg. Co., Denver.
 Exeter Mach. Works, Pittston, Pa.
 Fraser & Chalmers, Chicago, Ill.
 Fritch Foundry & Mach. Co., Arthur,
 St. Louis, Mo.
 Garretson, O. S., Buffalo, N. Y.
 Gates Iron Works, Chicago, Ill.
 Gillette-Herzog Mfg. Co., Minneapolis.
 Goodwin Car Co., New York.
 Hall Steam Pump Co., Pittsburg, Pa.
 Hammond Mfg. Co., Portland, Ore.
 Hamilton Mfg. Co., Wm., Peterborough,
 Ont.
 Hendrie & Bolthoff Mfg. Co., Denver.
 Ingersoll-Sergeant Drill Co., New York.
 Jackson Drill & Mfg. Co., Denver.
 Jeffrey, The, Mfg. Co., Columbus, O.
 Kent Mill Co., New York.
 Keystone Driller Co., Beaver Falls, Pa.
 Koppel, A., New York.
 Krom, S. R., Jersey City, N. J.
 Krupp, Fried., Magdeburg-Buckau, Ger-
 many.
 Lidgerwood Mfg. Co., New York, N. Y.
 Link-Belt Machinery Co., Chicago, Ill.
 Mecklenburg Iron Works, Charlotte, N. C.
 McCully, R., Philadelphia, Pa.
 Merrill Pneumatic Pump Co., New York.
 Mine & Smelter Supply Co., Denver, Colo.
 Montgomery, J. H., Mach. Co., Denver.
 Muirhead & Son, John, Pittston, Pa.
 Nelsonville, The, Foundry & Machine Co.,
 Nelsonville, O.
 New Jersey Foundry & Mach. Co., New
 York.
 Nichols Chemical Co., New York.
 Norwalk Iron Works, So. Norwalk, Conn.
 Pollock, W. B., Co., Youngstown, O.
 Prescott Steam Pump Co., F. M., Mil-
 waukee, Wis.
 Rand Drill Co., New York, N. Y.
 Risdon Iron Works, San Francisco, Cal.
 Robins Conv. Belt Co., New York.
 Snow Steam Pump Works, Buffalo, N. Y.
 Steadman's Foundry and Machine Wks.,
 Aurora, Ind.
 Sullivan Machinery Co., Chicago, Ill.
 Sturtevant Mill Co., Boston, Mass.
 The Lloyd Talmage Co., New York.
 Truax Mfg. Co., Denver, Colo.
 Union Iron Works, San Francisco, Cal.
 Urle Mining Machinery Co., Kansas City.
 Vulcan Iron Works, San Francisco, Cal.
 Weber Gas & Gasoline Engine Co., Kan-
 sas City.
 Webster, Camp & Lane Machine Co., Ak-
 ron, O.
 Westinghouse Electric & Mfg. Co., Pitts-
 burg, Pa.
 West Pulverizing Mach. Co., New York.

Magnolia Metal.
 Magnolia Metal Co., New York.

Manganese Steel.
 Taylor Iron & Steel Co., High Bridge,
 N. J.

Metal Dealers.
 American, The, Metal Co., New York.
 Bath, Henry, & Son, London, Eng.
 Besly, C. H., & Co., Chicago, Ill.
 Bond, Vivian & Co., New York.
 Bridgeport Copper Co., Bridgeport, Conn.

Entriken, J. C., Malvern, Pa.
 Eureka, The, Co., San Francisco, Cal.
 Goldsmith Bros., Chicago, Ill.
 Illinois Zinc Co., Peru, Ill.
 James & Shakespear, London, Eng.
 Johnson, Matthey & Co., London, Eng.
 Lambert's Wharfage Co., Swansea, Eng.
 Lewisohn Bros., New York, N. Y.
 Markeen Copper Co., New York.
 Mathiessen & Hegeler Zinc Co., La Salle,
 Ill.
 Mathison & Co., New York, N. Y.
 Montana Ore Purchasing Co., Butte.
 Nichols Chemical Co., New York.
 Orford, The, Copper Co., New York, N. Y.
 Pass, C., & Son, Bristol, Eng.
 Phelps, Dodge & Co., New York, N. Y.
 Picher Lead Co., Chicago, Ill.
 Raymond Lead Co., Chicago, Ill.
 Spanish-American Iron Co., New York.
 Stein & Boericke Ltd., Philadelphia, Pa.
 Stern, Julius & Co., Nuremberg, Germany.
 Vivian, Younger & Bond, London.

**Metallurgical Works and Ore
 Purchasers.**
 Balbach Smelting & Refining Co., New-
 ark, N. J.
 Baltimore, The, Copper Works, Baltimore.
 Bridgeport Copper Co., Bridgeport, Conn.
 fanning Co., Argentine, Kan.
 Gold and Silver Extraction Co., Denver.
 Goldsmith Bros., Chicago, Ill.
 Irvington Smelting & Refining Works,
 Irvington, N. J.
 Ledoux & Co., New York.
 Mathiessen & Hegeler Zinc Co., La Salle,
 Ill.
 Montana Ore Purchasing Co., Butte.
 Nichols Chemical Co., New York.
 Orford, The, Copper Co., New York.
 Pennsylvania Salt Mfg. Co., Phila., Pa.
 Ricketts & Banks, New York, N. Y.
 Russell Process Co., Park City, Utah.

Meters.
 Builders Iron Foundry, Providence, R. I.

Mine Fans.
 Buffalo Forge Co., Buffalo, N. Y.

Mill Stones.
 Sturtevant Mill Co., Boston, Mass.

Mill (Tube).
 Abbe Mfg. Co., Max F., New York.

Mine Cars.
 Colorado, The, Iron Works Co., Denver.
 Denver, The, Eng. Works Co., Denver.
 Davis, The, F. M., Iron Wks. Co., Denver.
 Gillette-Herzog Mfg. Co., Minneapolis.
 Hendrie & Bolthoff Mfg. Co., Denver.
 Koppel, A., New York.
 Jeffrey Mfg. Co., Columbus, Ohio.
 Nelsonville, The, Foundry & Machine
 Co., Nelsonville, O.
 Truax Mfg. Co., Denver, Colo.

Mine Transit (Pocket).
 Ainsworth, Wm., Denver, Colo.

Mineral Paint.
 American Pegamoid Co., New York.

Miners' Candle Sticks.
 Ludlow-Saylor Wire Co., St. Louis.

Mining and Land Companies.
 Arizona Copper Co., Clifton, Ariz.
 Atlantic Mining Co., Atlantic Mine P. O.,
 Mich.
 Bunker Hill & Sullivan Mfg. Co., Kellogg,
 Idaho.
 Copper Queen Con. Mining Co., New York.
 Detroit Copper Mining Co., Morenci, Ariz.
 Eureka, The, Co., San Francisco, Cal.
 Markeen Copper Co., New York.
 Morgan-Watson Mining & Construction
 Co., Cleveland, Ohio.
 Mountain Copper Co., New York.
 Republic Gold Mining Co., Spokane,
 Wash.

**Mining and Construction Com-
 panies.**
 Morgan-Watson Mining & Construction
 Co., Cleveland, Ohio.

Mining Supply.
 Cramer & Burt, Chicago, Ill.

Muck Bars.
 Bethlehem Iron Co., So. Bethlehem, Pa.

N.
Nickel.
 Canadian, The, Copper Co., Cleveland, O.
 Orford, The, Copper Co., New York.

O.
Oils.
 Ironsides Co., The, Columbus, Ohio.

Oil Engines.
 Aultman Co., The, Canton, Ohio.
 Priestman & Co., Inc., Philadelphia, Pa.

Oilers.
 Besley, C. H., & Co., Chicago, Ill.
 Detroit Lubricator Co., Detroit, Mich.

Olive Oil.
 Cook's Adam, Sons Co., New York.

Ore Cars.
 American Engineering Works, Chicago.
 Goodwin Car Co., New York.
 Truax Mfg. Co., Denver, Colo.

Ore Testing Works.
 Goldsmith Bros., Chicago, Ill.
 Hunt, F. F., New York, N. Y.
 Ledoux & Co., New York, N. Y.
 Montana Ore Purchasing Co., Butte.
 Penna. Smelting & Ref. Co., Philadelphia.

Pitkin, Lucius, New York.
 Ricketts & Banks, New York, N. Y.
 Robertson, W. F., New York, N. Y.
 Simonds & Wainwright, New York, N. Y.
 St. Louis Sampling & Testing Wks., St.
 Louis, Mo.
 White, Edw. F., Bayonne, N. J.

P.
Packing and Pipe Coverings.
 Brandt, Randolph, New York, N. Y.
 Goodsell Packing Co., Chicago, Ill.
 Jenkins Bros., New York, N. Y.
 The Lloyd Talmage Co., New York.
 Wyckoff, A., & Son, Elmira, N. Y.

Paints.
 New Jersey Zinc Co., New York.
 The Lloyd Talmage Co. (Fire Preventive),
 New York.

Perforated Metals.
 Althaus, The, Robert, Perforated Metal
 Co., Chicago, Ill.
 Davis, F. M., Iron Wks. Co., Denver.
 Fraser & Chalmers, Chicago, Ill.
 Harrington & King Perf. Co., Chicago.
 Ludlow-Saylor Wire Co., St. Louis.
 Mundt & Sons, Chas., New York.

Peroxide of Sodium.
 Roessler & Hasslacher Chem. Co., N. Y.

Phosphor-Bronze.
 Phosphor-Bronze Smelting Co., Phila, Pa.

Pile Drivers.
 Bucyrus The, Co., So. Milwaukee, Wis.
 Ingersoll-Sergeant Drill Co., New York.
 Weber Gas & Gasoline Engine Co., Kan-
 sas City.

Pipes.
 Abendroth & Root Mfg. Co., New York.
 Billin, C. E., & Co., Chicago, Ill.
 Crane Co., The, Chicago, Ill.
 Pollock, W. B. Co., Youngstown, O.
 Weber Gas & Gasoline Engine Co., Kan-
 sas City, Mo.
 Wood, R. D. & Co., Philadelphia, Pa.
 Wyckoff, R. D. & Co., Philadelphia, Pa.

Pipe Cleaners.
 Union Boiler Tube Cleaner Co., Pittsburg,
 Pa.

Pipe Cutters.
 Armstrong Mfg. Co., Bridgeport, Conn.
 Williams, J. H., & Co., Brooklyn, N. Y.

**Pipe Threading & Cutting of
 Machines.**
 Armstrong Mfg. Co., Bridgeport, Conn.

Pipe Wrenches.
 Armstrong Mfg. Co., Bridgeport, Conn.
 Williams & Co., J. H., Brooklyn, N. Y.

Pipe Vises.
 Armstrong Mfg. Co., Bridgeport, Conn.

Plates.
 Bethlehem Iron Co., So. Bethlehem, Pa.
Placer Mining Machinery.
 (See Dredging Machinery.)

Platinum.
 Baker & Co., Newark, N. J.
 Entriken, J. C., Malvern, Pa.
 Johnson, Matthey & Co., London, Eng.
 Richards & Co., Ltd., New York and Chi-
 cago.

Powder.
 Aetna Powder Co., Chicago, Ill.
 King Powder Co., Cincinnati, O.

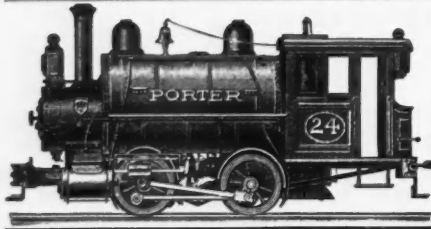
Publications.
 American, The, Fertilizer, Philadelphia.
 British, The, Columbia Mining Record,
 Victoria, B. C.
 Denver Republican, Denver, Colo.
 El Minero Mexicano, City of Mexico, Mex.
 Indian Engineering, Calcutta, India.
 Iron and Coal Trades Review, London.
 Mining, The, Journal, London, Eng.
 Mining, The, Investor, Colorado Springs.
 Ontonagon, The, Miner, Ontonagon, Mich.
 Scientific, The, Publishing Co., N. Y.
 South, The, African Mining Journal,
 Zeitschrift fur Praktische Geologie, Ber-
 lin, Germany.

Pulverizers.
 Allis Co., E. P., The, Milwaukee, Wis.
 Aultman Co., The, Canton, Ohio.
 Colorado Iron Works Co., Denver, Colo.
 Cresson Co., Philadelphia, Pa.
 Davis, F. M., Iron Works Co., Denver.
 Denver Eng. Works Co., The, Denver.
 Fraser & Chalmers, Chicago, Ill.
 Gates Iron Works Co., Chicago, Ill.
 Hamilton Mfg. Co., Wm., Peterborough,
 Ont.
 Hendrie & Bolthoff Mfg. Co., Denver.
 Jeffrey Mfg. Co., Columbus, Ohio.
 Krom, S. R., Jersey City, N. J.
 Krupp, Fried., Magdeburg-Buckau, Ger-
 many.
 Mecklenburg Iron Works, Charlotte, N. C.
 Montgomery, J. H., Mch. Co., Denver.
 New Jersey Foundry & Mach. Co., New
 York.

**Stedman's Foundry and Machinery
 Works, Aurora, Ind.**
 Sturtevant Mill Co., Boston, Mass.
 The Lloyd Talmage Co., New York.

Punches.
 Buffalo Forge Co., Buffalo, N. Y.

Pumps.
 Billin, C. E., & Co., Chicago, Ill.
 Cameron, A. S., Steam Pump Wks., N. Y.
 Clayton Air Compressor Works, N. Y.
 Davis, Johnson Co., Chicago, Ill.
 Denver, The, Eng. Works Co., Denver.
 Fraser & Chalmers, Chicago, Ill.
 Frenier & Le Blanc, Rutland, Vt.
 Hall Steam Pump Co., Pittsburg, Pa.
 Jeanesville Iron Works Co., Jeanesville,
 Pa.
 Merrill Pneumatic Pump Co., New York.
 Prescott Steam Pump Co., F. M., Mil-
 waukee, Wis.



H. K. PORTER CO.,
WOOD ST., CORNER OF 6TH,
PITTSBURGH, PA.

On bona fide application of any Railroad Contractor or Contractor's Foreman, or of any intending purchaser, we will mail free our Eighth Edition Pamphlet, "LIGHT LOCOMOTIVES," 216 pages, describing steam, electric and compressed air locomotives, with tables and information valuable to all interested in railroad construction and operation. To persons not requiring locomotives a copy will be sent on receipt of 50 cents.

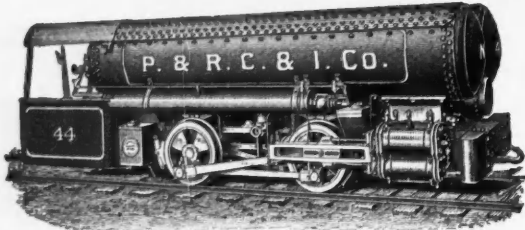
LOCOMOTIVES, wide and narrow gauge, always on hand.

ESTABLISHED
1831.

BALDWIN LOCOMOTIVE WORKS.

ANNUAL
CAPACITY,
1,000.

SINGLE EXPANSION AND COMPOUND LOCOMOTIVES.



Broad and Narrow Gauge Locomotives,
Mine and Furnace Locomotives,
Compressed Air Locomotives,
Steam Cars and Tramway Locomotives,
Plantation Locomotives,
Oil-Burning Locomotives.

Adapted to every variety of service, and built accurately to gauges and templates after standard designs or to railroad companies' drawings. Like parts of different engines of same class perfectly interchangeable.

ELECTRIC LOCOMOTIVES AND ELECTRIC CAR TRUCKS WITH APPROVED MOTORS.

BURNHAM, WILLIAMS & CO., Philadelphia, Pa., U. S. A.
LONDON OFFICE, DASHWOOD HOUSE, NEW BROAD ST

Goodwin Patent Steel
Gravity Dumping Car.

Cars Built

Ton Capacity, 60,000 lbs., 80,000 lbs.,
100,000 lbs.
Cubic Capacity, 30 cu. yds., 68 cu. yds.,
83 cu. yds.
Built with Open Grate or Covered Top.

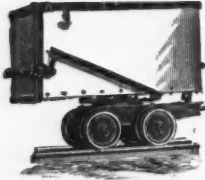
CARS LEASED ONLY.

THESE cars will discharge coal, coke, ore, gravel, large rock, broken stone, pig iron, castings, machinery, steel billets, tin plate bars loose grain, and many other similar materials by the gravity of the load alone, without careening of car body.

GOODWIN CAR CO., 96 Fifth Ave., New York.
115 Dearborn St., Chicago.

Address all correspondence to 96 FIFTH AVE., NEW YORK.

THE TRUAX PATENT AUTOMATIC ORE CAR
'98 IMPROVED.



MANUFACTURED BY
THE TRUAX MFG. CO.,
1717 Wazee St., Denver.

MANUFACTURED BY
THE TRUAX MFG. CO.,
114 First St., San Francisco, Cal.

We would be pleased to quote you on our cars or on any special make of cars. We are prepared to build all styles of cars, and will quote you F. O. B. Denver, Colo., or F. O. B. San Francisco, Cal.

SEND FOR CATALOGUE.

Engine and Pump Packings.

Rubber-Back Flax; "Dollar" Packing; Goodsell's "Sleeve" Packing; "98" Stitched Pump Packing; Special Hydraulic Packings, Etc.

Best goods ever made for reliable service. Most economical. Highest possible qualities.

GOODSELL PACKING COMPANY,
33 South Canal Street, Chicago, Ill.

BUYERS' CLASSIFIED DIRECTORY.—Continued from Page 17.

Snow Steam Pump Works, Buffalo, N. Y.
Stilwell-Bierce & Smith-Vaile Co., The, Dayton, O.
Weber Gas & Gasoline Engine Co., Kansas City.

Wood, R. D., & Co., Phila., Pa.
Worthington, H. R., New York.
Pumps (Hand).
Abendroth & Root Mfg. Co., New York.
Fuerst Bros. & Co., New York.

Quarrying Machines.
Bullock, M. C., Mfg. Co., Chicago, Ill.
Davis, F. M., Iron Works Co., Denver.
Ingersoll-Sergeant Drill Co., New York.
Rand Drill Co., New York.
Sullivan Machinery Co., Chicago, Ill.
Quicksilver.
Braun & Co., F. W., Los Angeles, Cal.
Eureka, The, Co., San Francisco, Cal.

Railroads.
Atch., Top, & Santa Fe R. R.
Canadian Pacific R. R.
C. C., C. & St. L.
Chicago, Milwaukee & St. Paul R. R. Co.
Colorado Midland R. R.
Denver & Rio Grande R. R.
Denver, Leadville & Gunnison Ry.
Florence & Cripple Creek R. R., Denver.
Great Northern R. R.
Illinois Central R. R.
Midland R. R. of Kentucky.
Midland, The, Terminal Railway.
Rio Grande Southern R. R.
U. P., D. & G. R. R.
Union Pacific R. R.

Railroad Supplies and Equipments.
Baldwin Locomotive Works, Philadelphia.
Bethlehem Iron Co., The, So. Bethlehem.
Goodwin Car Co., New York.
Koppel, A., New York.
Magnolia Metal Co., New York.
Marion Steam Shovel Co., Marion, O.
Porter, H. K., & Co., Pittsburg, Pa.
Robinson & Orr, Pittsburg, Pa.
The Lloyd Talmage Co., New York.
Torbert & Peckham, Chicago, Ill.

Real Estate.
McCConnell Real Estate Co., A. B., Joplin, Mo.
Regulators, Dampers, Heat, Etc.
Eddy Valve Co., Waterford, N. Y.
Jenkins Bros., New York, N. Y.

Rope.
American Mfg. Co., New York.
Rope Preservative.
Ironsides Co., The, Columbus, Ohio.
Roofing.
Berlin Iron Bridge Co., East Berlin, Conn.
Pheips, Dodge & Co., New York.

Scales and Balances.
Alsworth, W., Denver, Colo.
Becker, C., New York.
Braun & Co., F. W., Los Angeles, Cal.
Hill, Henry, Chem. Co., St. Louis, Mo.
Kohlbusch, H., New York.

Queen & Co., Philadelphia, Pa.
Richards & Co., Ltd., New York and Chicago.
Smith & Thompson, Denver, Colo.
Troemner, H., Philadelphia, Pa.

Screens.
Aitchison, The, Robert, Perforated Metal Co., Chicago, Ill.
Aultman Co., The, Canton, Ohio.
Colorado, The, Iron Works Co., Denver.
Davis, F. M., Iron Works Co., Denver.
Denver, The, Eng. Works Co., Denver.
Fraser & Chalmers, Chicago, Ill.
Gates Iron Works Co., Chicago, Ill.
Harrington & King Perf. Co., Chicago.
Jeffrey Mfg. Co., Columbus, Ohio.
Link-Belt Machinery Co., Chicago, Ill.
Ludlow-Saylor, The, Wire Co., St. Louis.
Mundt & Son, Chas., New York.
Tyler, W. S., Wire Work Co., Cleveland.
Urie Mining Machinery Co., Kansas City.

Second-Hand Machinery.
Chicago Edison Co., Chicago, Ill.
Robinson & Orr, Pittsburg, Pa.
Torbert & Peckham, Chicago, Ill.

Separators.—See Pulverizers.
Shears.
Buffalo Forge Co., Buffalo, N. Y.

Shafts, Flexible.
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

Sheet Iron.
Abendroth & Root Mfg. Co., New York.
Shields.
Ironsides Co., The, Columbus, Ohio.

Shoes and Dies.
Chester Steel Casting Co., Philadelphia.
Chrome Steel Works, Brooklyn, N. Y.
Colorado, The, Iron Works Co., Denver.
Crescent Steel Co., Pittsburg, Pa.
Davis, F. M., Iron Works Co., Denver.
Denver, The, Iron Works Co., Denver.
Fraser & Chalmers, Chicago, Ill.
Gates Iron Works, Chicago, Ill.
Koppel, A., New York.
Taylor Iron & Steel Co., N. J.
Western Forge & Rolling Mills, St. Louis.

Shovels (Steam).
Bucyrus Steam Shovel Co., So. Milwaukee, Wis.
Marion, The, Steam Shovel Co., Marion, Ohio.
Risdon Iron Works, San Francisco, Cal.
Weber Dredge Co., Kansas City, Mo.

Smelters.
Union Smelter Mfg. Co., St. Louis, Mo.
Smelting & Refining Works.
Baibach Sreittin & Refining Co., Newark, N. J.

Baltimore Copper Works, Baltimore, Md.
Bridgeport Copper Co., Bridgeport, Conn.
Goldsmith Bros., Chicago, Ill.
Irvington Smelting & Refining Co., Irvington, N. J.
Johnson, Matthey & Co., London, Eng.
Mathison & Co., New York, N. Y.
Nichols Chemical Co., New York.

Oxford, The, Copper Co., New York.
Pennsylvania Salt Mfg. Co., Phila., Pa.
Penn Smelting & Refining Works, Phila.
St. Louis Sampling & Testing Wks., St. Louis, Mo.

White, Eow F., Bayonne, N. J.
Steam Pipe Casings.
Wyckoff, A., & Son, Elmira, N. Y.
Steam Riding Gallery.
Armitage, Hershell Co., North Tonawanda, N. Y.

Steel (Drill).
Bethlehem Iron Co., So. Bethlehem, Pa.
Braeburn Steel Co., Braeburn, Pa.
Chester Steel Castings Co., Phila., Pa.
Crescent Steel Co., Pittsburg, Pa.
Hobson, Seamon & Co., New York.
Jessop, W., & Son, New York, N. Y.
Pollock, W. B., & Co., Youngstown, O.
Robinson & Orr, Pittsburg, Pa.
Taylor Iron & Steel Co., High Bridge, N. J.

Steel Flanges, Weldless.
Latrobe Steel Co., Philadelphia, Pa.
Strainers.
Abendroth & Root Mfg. Co., New York.

Sulphur Apparatus.
White, Edw. F., Bayonne, N. J.

Tanks.
Aultman Co., The, Canton, Ohio.
Colorado Iron Works, Denver.
Davis, F. M., Iron Works Co., Denver.
Denver Eng. Works Co., Denver.
Gates Iron Works, Chicago, Ill.
Mine and Smelter Supply Co., Denver.

Tailing and Slime Pump.
Frenier & Le Blanc, Rutland, Vt.
Telegraph Wires and Cables.
Okonite, The, Co., New York.

Tools.
Besly, C. H., & Co., Chicago, Ill.
Prait & Whitney Co., Hartford, Conn.

Tube Cleaners.
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

Tube Mills.
Abbe, Max F. Mfg. Co., New York.
Tubes.
Besly, C. H., & Co., Chicago, Ill.
Pollock, W. B., Co., Youngstown, O.
Williams Bros., Ithaca, N. Y.

Turbine Water Wheels.
Lefell, J., & Co., Springfield, O.
Stilwell-Bierce & Smith-Vaile Co., The, Dayton, O.

Valves.
Abendroth & Root Mfg. Co., New York.
Crane Co., The, Chicago, Ill.
Eddy Valve Co., Waterford, N. Y.
Jenkins Bros., New York, N. Y.
Wood, R. D., & Co., Philadelphia, Pa.

Ventilators.
Buffalo Forge Co., Buffalo, N. Y.
Bullock, The, M. G., Mfg. Co., Chicago.
Fraser & Chalmers, Chicago, Ill.

Voltmeters.
Abendroth & Root Mfg. Co., New York.
Weston Elec. Instrument Co., Newark.

Water Chemists.
Dearborn Drug Co., Chicago, Ill.
Parsons, J. H., Co., Chicago, Ill.

Water Filters.
The Wefugo Co., Cincinnati, O.
Water Softening Plants.
The Wefugo Co., Cincinnati, O.

Water Wheels.
Lefell, J., & Co., Springfield, Ohio.
Stilwell-Bierce & Smith-Vaile Co., The, Dayton, Ohio.

Weldless Steel Flanges.
Latrobe Steel Co., Philadelphia, Pa.
Well Drilling Machinery.
Keystone Driller Co., Beaver Falls, Pa.
Muirhead & Son, John, Pittston, Pa.
Sullivan Machinery Co., Chicago, Ill.
Williams Bros., Ithaca, N. Y.

Wharfage.
Lambert's Wharfage Co., Swansea, Eng.

Wheels, Car.
Bullock Mfg. Co., Chicago.
Chester Steel Castings Co., Philadelphia.
Davis, F. M., Iron Works, Denver.
Fraser & Chalmers, Chicago.
Gates Iron Works, Chicago.
Taylor Iron & Steel Co., High Bridge, N. J.

Wire Cloth.
Aitchison, R., Perforated Metal Co., Chicago, Ill.
Fraser & Chalmers, Chicago.
Harrington & King Perforating Co., Chicago, Ill.

Wire Works Co., Cleveland.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Tyler, W. S., Wire Works Co., Cleveland.

Wire Rope and Wire.
Besly, C. H., & Co., Chicago, Ill.
Broderick & Bascom Rope Co., St. Louis, Mo.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.

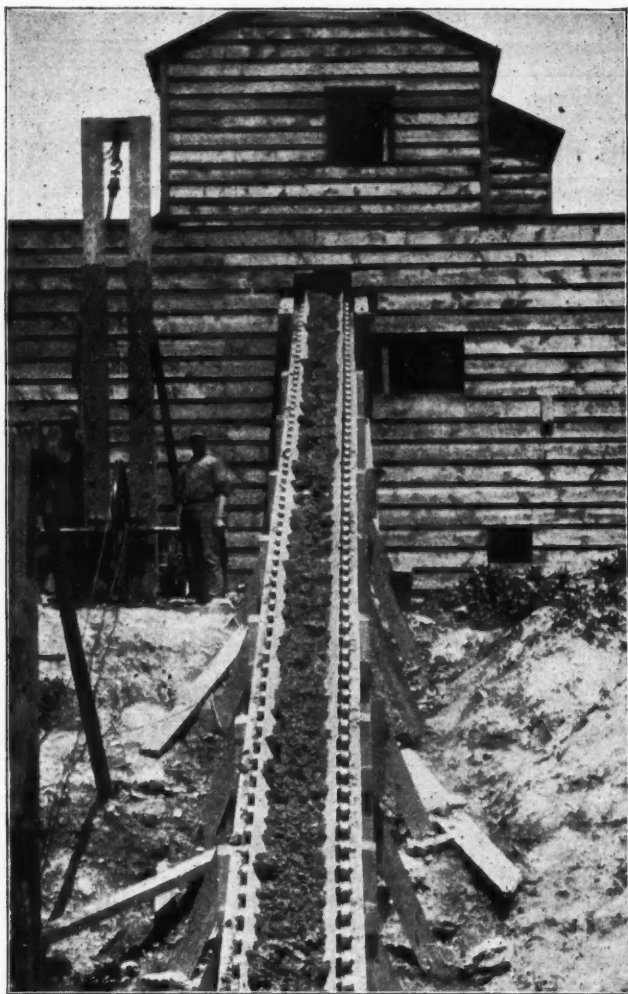
Wire Rope Tramways.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.
California Wire Works, San Francisco.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Roebling's, J. A., Son's Co., New York.
Trenton, The, Iron Co., Trenton, N. J.

Wire Rope Tramways.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.
California Wire Works, San Francisco.
Colorado, The, Iron Works Co., Denver.
Davis, F. M., Iron Works, Denver.
Dusedan, W., Brooklyn, N. Y.
Roebling's, J. A., Son's Co., New York.
Ropeway Syndicate, London, Eng.
Vulcan Iron Works, San Francisco, Cal.

Wrecking Cars.
Bucyrus Co., So. Milwaukee, Wis.

Wrenches.
Williams, J. H., & Co., Brooklyn, N. Y.
Wood Water Pipes.
Wyckoff, A., & Son, Elmira, N. Y.

Zinc Ores.
Ihseng, A. O., Joplin, Mo.
Illinois Zinc Co., Peru, Ill.



ENDLESS TROUGH CONVEYOR, carrying clay for 130,000 brick per day.

LINK-BELT

Elevators and Conveyors.

ELECTRIC COAL MINING, HOISTING and HAULAGE MACHINERY

Complete Tipple House Equipment.
Coal Washing Machinery.

Tilting Ore Cars, Car Hauls, Link-Belting,
Sprocket Wheels, Rope Sheaves, Shafting,
Pulleys, Gearings, Friction Clutches, Etc.

*Illustrated and described in Catalogue
mailed upon application.*

MACHINERY Designed and Erected to
meet all requirements...

The Link-Belt Machinery Co.,

ENGINEERS, FOUNDERS, MACHINISTS,

Denver, 1328 17th St.

CHICAGO, U. S. A.

AMERICAN SANITARY PLUMBING.

For Plumbers, Steam Fitters, Architects, Builders, Apprentices, and Household.

BY J. J. LAWLER.

Containing practical information of all the principles involved in the Mechanics and Science of Plumbing, Plumbing as an Art. Water Supply for domestic use. Sewerage and Drainage. Sewer Gas—what it is. Wells and Cisterns. Pumps of every description. Principles of the Suction Pump. The Lift and Force Pump. The Air Chamber and its use. Hydraulics of Plumbing. The Hydraulic Ram and its wonderful principles. The Direct Water Supply System. The Tank Supply System. Hot Water Circulating System. Most Practical, most Sanitary, and most Approved Water Closets up to date. How to draw Hot Water at the different fixtures throughout the house at the instant of opening the faucets. The Kitchen Range Boiler—how to properly connect it to the water back. Lawler's New Principle of Setting Range Boilers.

12mo, Cloth. Illustrated. Price, \$2.00.

THE SCIENTIFIC PUBLISHING CO., 253 Broadway, New York.

THE AMERICAN FERTILIZER.

An illustrated magazine, devoted to fertilizer manufacturing, phosphate mining, packing house fertilizer products, cotton seed meal production, fish scrap industry, and all matters dealing directly with modern fertilizing science and practice.

THE AMERICAN FERTILIZER

is the official press representative of all the Associations in its fields; it is the only journal specially devoted to these industries. Subscription, United States and Canada, \$2.00 per year; Foreign, \$2.50.

THE AMERICAN FERTILIZER,

PHILADELPHIA, PA.

P. O. Box 1556.

THE JEFFREY COAL MINING MACHINERY



ELECTRIC CHAIN COAL CUTTER.

DYNAMOS AND MOTORS.

All Machinery Fully Guaranteed.

THE JEFFREY MFG. CO. Columbus, Ohio,
U. S. A.

Electric Chain Machines.
Air Chain Machines.
Electric Long Wall Machines.
Electric Shearing Machines.
Electric and Air Power Drills.

ALSO MANUFACTURE
ELEVATING and
CONVEYING MACHINERY,
Coal Washing Machinery,
Screening Machinery,
Etc., Etc., Etc.

...SEND FOR 1899 CATALOGUE...



COMPRESSED AIR COAL CUTTER.

DIRECTORY OF ENGINEERING, MINING AND SURVEYING INSTRUMENT MAKERS.

1ST Class Mining and Surveying Instruments
Up-to-date Construction, Moderate Prices.
SEND FOR LIST!
P. & R. WITTSTOCK, BERLIN, S. 59, Germany

THE A. LIETZ COMPANY,
423 Sacramento St., SAN FRANCISCO, CAL.,
Sole Manufacturers of the
New Cyclotomic Transits.
Send for descriptive circular.

Established 1872.
F. E. BRANDIS, SONS & CO.
ENGINEERING INSTRUMENTS
FOR ALL PURPOSES.
812-814 GATES AVENUE, BROOKLYN, N. Y.
Catalogues mailed on application.

C. L. BERGER & SONS
SUCCESSORS TO
BUFF & BERGER
9 Province Court, Boston, Mass.
Largest Assortment of Accurate and
most improved mining transits
at reasonable prices.
Send for large Illustrated Catalogue.

EUGENE DIETZGEN CO.,
183 Monroe St., Chicago 149 Fifth Ave., New York.
Manufacturer and Importer of
**ENGINEERING and
DRAWING INSTRUMENTS**
OF EVERY DESCRIPTION.
WE CARRY THE LARGEST STOCK IN THE WEST.
162-page Catalogue free.
SECOND-HAND INSTRUMENTS



**CLEANED
WITHOUT
ALTERING
ADJUSTMENT**

**THE LEVER
RULING PEN**

SEND FOR DESCRIPTIVE CIRCULAR.
THEO. ALTENEDER & SONS, PHILADELPHIA.

QUEEN
Transits and Levels.
HIGH GRADE INSTRUMENTS
with the latest improvements.
**Engineers' and Draftsmen's
Supplies.**

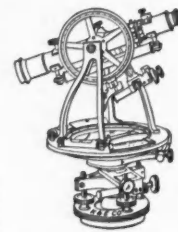
160-page Engineering Catalogue on application.
240-page Mathematical Catalogue on application.
QUEEN & CO.,
Optical and Scientific Instrument Works
59 Fifth Ave., New York.
1010 Chestnut St., Philadelphia.

INDUSTRIAL DRAWING.

By **MAHAN and THOMPSON.**

Comprising the Description and Uses
of Drawing Instruments, the Construc-
tion of Plane Figures, the Projections
and Sections of Geometrical Solids,
Architectural Elements, Mechanism,
and Topographical Drawing. Price \$3.50

SCIENTIFIC PUBLISHING CO., Publishers,
253 Broadway, New York.



Latest and Most Improved
**TRANSITS, ALL
LEVELS, AND
FIELD
INSTRUMENTS**

FOR...

ENGINEERS AND SURVEYORS.

Most Complete Line of

Drawing Materials in America.

Our goods are the standard of quality.
They all bear our trade mark and are war-
ranted by us. Our lavishly illustrated
catalogue minutely and correctly describes
our goods. It contains much valuable
information, and is sent gratis on appli-
cation.

KEUFFEL & ESSER CO.,

127 FULTON ST., NEW YORK.

BRANCHES { 111 Madison St., Chicago.
709 Locust St., St. Louis.

Established 1845.

W. & L. E. GURLEY, Troy, N. Y.

Largest Manufacturers of

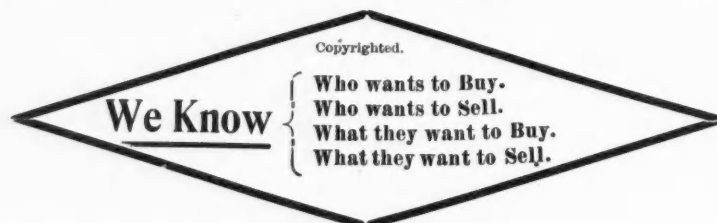
Civil Engineers' & Surveyors' Instruments.

Send for Illustrated Circular Price List showing
latest improvements.

IMPORTANT NOTICE

To **MINING COMPANIES, MINE OPERATORS** and **OWNERS**

Especially to: **Engineers, Builders, Erectors, Railroads, Quarries, etc.,** and **Purchasing Agents** who desire to **Buy or Sell** any and all kinds of **Plant, of every description, Mining and General Machinery and General Supplies, etc.,** New and Second-Hand. We wish to say that this office is **Headquarters.**



This is **Our Business**—Buying and Selling for You.
Send us full description and specifications of what you want to buy or sell. List
same with us. We can save and make you money.
Correspondence and investigation of our methods solicited.

WRITE US.

TORBERT & PEGKHAM.

Successors to **ALFRED C. TORBERT & COMPANY,**

GENERAL PURCHASING, MANUFACTURERS' AND SELLING AGENTS,

1603 Monadnock Block, Chicago, Ill.

Bankers: American National Bank of Chicago.

We act as direct **Purchasing Manufacturers and Selling Agents** for **Mining and Milling Com-
panies and parties** desiring to buy or sell all kinds of both **New and Second-Hand Plant, Mining and
General Machinery, Supplies, etc.** **WE CAN SAVE YOU TIME AND MONEY.**

THE MINERAL INDUSTRY.

SEE PAGE 9.

**ONLY DIRECT ROUTE
TO
REPUBLIC, WASH.**



Experts declare the Kootenai Coun-
try to be the greatest mining region
on earth. The Rossland and Slocan
mines are already world-famous.
"Republic Camp," the new wonder,
is exciting tremendous interest.

THE GREAT NORTHERN RAILWAY

is the only direct route to the Kootenai Country and "Republic Camp." Fast modern vestibuled trains, with palace, sleeping and dining cars run **DAILY** from St. Paul and Minneapolis, to all Western points. Full information, time tables, rates, etc., on application.

F. B. CLARKE,
General Traffic Manager.

F. I. WHITNEY,
General Passenger Agent.
ST. PAUL, MINN.

ALPHABETICAL INDEX TO ADVERTISERS. (-) Indicates every other week or monthly advertisements.

Abadie, E. R. 4
Abbe Mfg. Co., Max F. 37
Abbott Bros. 4
Arendroth & Root Mfg. Co. 35
Aetna Powder Co. 7
Ainsworth, Wm. 2
Atchison, R., Perf. Metal Co. 29
Allan, J. F. 4
Allis, Edward P., Co. 40
Altender, Theo., & Sons. 20
American Diamond Rock Drill Co. 41
American Engineering Works. 1
American Fertilizer. 19
American Mfg. Co. 7
American Metal Co. 24
American Pegamold Co. 1
Arizona Copper Co. 33
Armitage-Herschell Co. 1
Armstrong Mfg. Co. 4
Arthur, Jr., E. P. 23
Assessments. 27
Atch., Top. & Santa Fe R. R. 23
Atlantic Mining Co. 33
Ateaux & Co., F. E. 46
Audit Co., The. 44
Aultmann Co., The. 1
Austen Chemical Research Co. 43
Australian Mining Standard. 14

Darling, L. B. 4
Davis Coal & Coke Co. 33
Davis, F. M., Iron Works Co. 39
Davis, Johnson & Co. 30
Dearborn Drug & Chemical Co. 29
De Lashmuth & Rutter. 10
Denny, G. A. 4
Denver & Rio Grande R. R. 30
Denver Engineering Works Co. 37
Denver Fire Clay Co. 37
Denver Leadville & Gunnison Ry. 46
Denver Republican. 43
Detroit Copper Mining Co. 33
Detroit Lubricator Co. 32
Dewey, Frederick P. 4
Dickman & Mackenzie. 5
Dietzen, Eugene & Co. 20
Dividends. 23
Dixon, Jos. Crucible Co. 31
Donohue, P. J. 5
Donaldson & Co., A. M. 46
Draper & McLeod. 5
Dusedau, W. 5

Karlake, W. J. 5
Keller, H. A., & Co. 5
Kelsey, Chas. R. 5
Kennedy, J. 5
Kent Mill Co. 41
Keuffel & Esser Co. 20
Keyes, W. S. 4
Keystone Driller Co. 41
Kang Powder Co. 7
Kirby, Edmund B. 5
Knight, Wilbur C. 5
Knox, Schlapp & Co. 5
Kohlbusch, H. 3
Koppel, A. 26
Krom, S. R. 43
Krupp, F. Grusonwerk. 40

Pratt & Whitney Co. 27
Prescott Steam Pump Co., Fred. M. 30
Priestman & Co. 35
Pritchett, C. W., Jr. 6
Produce Exchange Bank. 8
Queen & Co. 3, 20
Rand, C. D. 10
Rand Drill Co. 43
Randolph, John C. F. 6
Raymond Lead Co. 40
Raymond, Rositer W. 6
Reckhart, D. W. 23
Republic Gold Mining & Milling Co. 11
Richards & Co., Ltd. 2
Richardson, C. S. 6
Rickard, T. A. 6
Ricketts & Banks. 24
Rio Grande Southern R. R. 31
Rio Grande Western Ry. 43
Risdon Iron Works. 28
Robertson & Ziegler. 24
Robins Conveying Belt Co. 1, 44
Robinson, G. H. 6
Robinson & Orr. 23
Roebbling's J. A., Sons Co. 1, 24
Roessler & Hasslacher Chem. Co. 1, 24
Ropeway Syndicate. 45
Rothwell, John E. 6
Rothwell, Richard P. 6
Ruggles Coles Engineering Co. 2
Russell Process Co. 1
St. Louis & San Franc. R. R. Co. 34
Sargeant, E. H., & Co. 3
Schafer, F. J. 6
Schley, George. 7
Schoellkopf, Hartford & MacLagan, Ltd. 42
Schwarz, Theodore E. 6
Sellers Bridge Co. 2
Simonds & Wainwright. 1, 6, 14, 24
Situations Wanted. 22
Smith & Thompson. 3
Snow Steam Pump Co. 31
Solway Process Co. 31
Sonnermann, Geo. A. 6
South African Mining Journal. 46
Spanish-American Iron Co. R. E. 46
Spokane Falls & Northern R. R. 36
Stedman's Foundry & Mach. Wks. 25
Stein & Boerke, Ltd. 46
Stern, Julius & Co. 46
Stetson, Thos. Drew. 23
Stickney, Conyngham & Co. 43
Stillwell-Bierce & Smith-Valle Co. 30, 32, 46
St. Louis Sampling & Testing Works. 24
Sturtevant Mill Co. 45
Sullivan Machinery Co. 1, 41
Sutton, Wm. E. 6

Talmage & Co., A. A. (See The Lloyd Talmage Co.) 2
Taylor Iron & Steel Co. 27
Taylor, John & Co. 5
Terhune, R. H. 5
Thies, Adolph. 6
Thomson, A. R. 6
Thompson Investment Co. 6
Trockmorton, H. W. 6
Tobert & Peckham. 20
Trent, L. C. 6
Trenton Iron Co. 6
Troemner, H. 46
Truax Mfg. Co. 18
Tulleys, L. W. 6
Tyler, S. W. 6
Tyler Wire Works Co. 1, 25
Union Boiler Tube Cleaner Co. 1
Union Iron Works. 17
Union Pacific R. R. 34
Union Smelter Mfg. Co. 14
United Correspondence Schools. 12
Unzicker, Hermann. 6
Urie Mining Machine Co. 23
Van Slooten, Wm. 6
Vivian, Younger & Bond. 24
Vogel, Hermanos. 6
Vuican Iron Works, San Francisco. 6
Ward & Olyphant. 33
Warwick, A. W. 6
Wartenweiler, A. 6
Weber Gas & Gasoline Eng. Co. 25
Webster, Camp & Lane Mach. Co. 40
Wefugo Co., The. 2
Weir, T. 6
Wells Light Mfg. Co. 29
Western Chemical Co. 1
Westervelt, Wm. Young. 6, 24
Western Forge & Rolling Mills. 26
Weston, W. 14
West Pulverizing Co. 41
Westinghouse Electric & Mfg. Co. 44
Weston Electrical Instrument Co. 28
White Mfg. Co., The. 6
White, Edw. F. 6
Wiley, W. H. 6
Williams Bros. 31
Williams, J. H., & Co. 3
Winslow, Arthur. 6
Wishon, W. W. 6
Wittstock, P. & R. 20
Wood, R. D., & Co. 36
Worthington, Henry R. 1
Wyckoff & Son, A. 1
Yawger, I. C. 41
Young, J. Dunraven. 4, 14
Zeitschrift Praktische Geologie. 26

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.

1705 WANTED IN CIRCULATION DEPARTMENT of the ENGINEERING AND MINING JOURNAL, a first-class correspondent familiar with the mining and metallurgical fields, and with newspaper work. Address CIRCULATION, ENGINEERING AND MINING JOURNAL, New York.

1711 WANTED—EXPERIENCED ASSAYER and smelter man, capable of calculating charges and making all necessary assays in connection with running a 50 ton copper furnace in Mexico. In writing for particulars state experience and salary expected. Address SMELTER, ENGINEERING AND MINING JOURNAL.

1712 WANTED—MILLMAN TO TAKE charge of silver stamp mill in Mexico (concentration, pans and patio process). Knowledge of Spanish desirable. Address, giving experience, testimonials and salary expected, CANNING, ENGINEERING AND MINING JOURNAL.

1713 WANTED—A FIRST-CLASS EXPERIENCED business manager for an electric power company; very large enterprise. Address, stating experience, reference, etc., POWER PLANT, ENGINEERING AND MINING JOURNAL.

1714 WANTED—A COMPETENT FURNACE man to take charge of a copper furnace in Arizona. State age, experience and references. Address C. H. F., ENGINEERING AND MINING JOURNAL.

1715 WANTED—A THOROUGHLY COMPETENT manager for a 20-stamp combination concentration and pan amalgamation mill. Treating custom ores. Mill located in town of 25,000 inhabitants, near railroad, in Mexico. Climate healthful. Must have necessary experience for both technical and business management. Good opportunity for the right man. Address, giving references and stating terms to AMALGAMATION, ENGINEERING AND MINING JOURNAL.

1718 WANTED—AN EXPERIENCED, thoroughly competent young man as superintendent of a copper mining property. Write full particulars and credentials. Address X. Y. Z., ENGINEERING AND MINING JOURNAL.

1719 WANTED—MINING ENGINEER for Australia and Tasmania; permanent position with good salary. Must have Freiberg or Clausthal training, possess considerable American experience and be fully conversant with American methods of ore extraction. Address, with full particulars and references, TASMANIA, ENGINEERING AND MINING JOURNAL.

1720 WANTED—A COMPETENT MILL man. One who speaks some Spanish and who is familiar with the best processes of milling gold and silver ores. Salary, \$175, gold, per month, and if perfectly satisfactory \$200, gold, per month will be paid. Steady employment to the right man. Address PLATA, ENGINEERING AND MINING JOURNAL.

1721 WANTED—ASSAYER FOR MEXICO. An assayer for ore purchasing agency, preferably single and one who can speak Spanish. Chances for advancement good. Address ORE, ENGINEERING AND MINING JOURNAL.

1722 WANTED—AN EXPERIENCED prospector with practical knowledge of minerals. In applying for particulars, state salary expected and give references. Address MINERAL, ENGINEERING AND MINING JOURNAL.

SITUATIONS WANTED.

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

MINING ENGINEER, AGE 29, COLLEGE graduate, B. S. & E. M. Practical Experience Gold and Copper Mining and Metallurgy in California and Alaska. At present Engineer and Surveyor for large well known Iron Company in Minnesota. Desires change of location and would accept position as Assistant Superintendent or Engineer and Surveyor for Gold or Copper Mine. Best References. Address MINER, ENGINEERING AND MINING JOURNAL. No. 18475, July 1.

ENGINEER AND METALLURGIST, LATE manager, desires position as superintendent or manager; middle-aged, experienced, reliable, highest references. Specialties: copper mining, smelting, converting and plant construction. Address, WADE STICKNEY, Antelope, Idaho. No. 18472, Aug. 19.

ACID, ALKALI AND FERTILIZER MANUFACTURERS—A competent chemist, experienced in the manufacture of sulphuric, nitric, muriatic acids in fertilizer production, and in the utilization of waste products, desires to make engagement with a live, progressive works, where his remuneration could be based largely upon the savings he would effect. Address WASTE UTILIZER, ENGINEERING AND MINING JOURNAL.

MINING ENGINEER AND METALLURGIST wishes to connect himself with consulting engineer or engineering firm; is graduate in mechanics, Louisiana State University, and graduate in mining and metallurgy, Lehigh University. Partial list of experience: two years in blast furnace department, Pennsylvania Steel Co., one year manager of a blast furnace in the South, two years managing engineer of iron and coal lands, four years operator of gas coal mines on personal account, two years owning and operating quartz and placer gold mines. Thorough in theory and practice, in field, mill or office. Address CONSULTING ENGINEER, ENGINEERING AND MINING JOURNAL. No. 18,478, June 24.

METALLURGICAL CHEMIST AND ASSAYER with experience in copper smelting is open for engagement (States or foreign) as chemist or assistant superintendent of smelting works. Address C. B. A., ENGINEERING AND MINING JOURNAL. No. 18,477, Aug. 5.

COMPETENT ASSAYER AND ANALYST desires position; experienced; will also assist in general office work; speaks Spanish; references. Address LEAD, ENGINEERING AND MINING JOURNAL. No. 18,489, June 24.

FOREMAN DESIRES POSITION WITH A copper or lead smelting plant; good all-round man; speaks Spanish; references. Address COBRE, ENGINEERING AND MINING JOURNAL. No. 18,479, June 24.

A MINING ENGINEER, GEOLOGIST AND Metallurgist, Associate of the Royal School of Mines, London; first-class government certificated mine manager, England (39), is open to an engagement with responsible gold or copper producing company as General manager, or superintendent. Has had 21 years' practical experience in all branches of mining work, and held the position of manager at some of the largest and important mines both in Europe and this country. Highest testimonials and references. Address QUARTZ, ENGINEERING AND MINING JOURNAL. No. 18,481, June 24.

WANTED—BY A MECHANICAL ENGINEER of ability, position as master mechanic or superintendent for a mining, milling or smelting company. Thoroughly competent to erect and operate all classes of mining, milling or smelting machinery. Several years' experience in Spanish American Republics. References A1. Address C. W. E., P. O. Box 673 El Paso, Texas. No. 18,488, June 24.

EXPERIENCED ASSAYER AND CHEMIST, with first-class recommendations from mining, milling smelting and refining companies, desires position, preferably with a smelting company, where chances of promotion in metallurgical operations were assured. Address N. F., ENGINEERING AND MINING JOURNAL. No. 18,484, July 8.

METALLURGIST—CYANIDE PROCESS A specialty; thorough chemist and assayer, well posted in the amalgamation of gold and silver ores, desires position. Address CYANIDE, ENGINEERING AND MINING JOURNAL. No. 18,485, Aug. 12.

WANTED—POSITION AS CHEMIST with a manufacturing house or firm, or as assistant; graduate of Lehigh University. Address BL., ENGINEERING AND MINING JOURNAL. No. 18,488, June 24.

ASSAYER AND CHEMIST, EXPERIENCED desires position. Have assay outfit. First-class references. Address ASSAYER, ENGINEERING AND MINING JOURNAL. No. 18,487, July 8.

MINING AND MECHANICAL ENGINEER of 30 years' experience desires engagement, for family reasons, in locality below an altitude of 6,500 ft. Mining and concentration a specialty. Address CONCENTRATOR, ENGINEERING AND MINING JOURNAL. No. 18,489, July 22.

EXPERT ACCOUNTANT WITH PRACTICAL knowledge of mill and mine assaying, versed in Spanish, wide experience with Mexican mine and store accounts, desires position in Mexico as business manager, accountant or assayer. References A1. P. O. Box 646, El Paso, Texas. No. 18489, July 8.

MINING ENGINEER, AT PRESENT EMPLOYED by copper mining company in Arizona, desires change. Prefers position with a coal mining company. Best of references from large coal mining company in Pennsylvania. Address RUBY, ENGINEERING AND MINING JOURNAL. No. 18,492, July 15.

METALLURGIST, TEN YEARS' EXTENDED experience in cyanide and chlorination, desires position. Thorough chemist and assayer. Willing to go anywhere. Address CHLORINE, ENGINEERING AND MINING JOURNAL. No. 18,491, July 1.

METALLURGICAL CHEMIST AND ASSAYER wants position, 8 years' experience. Address "H.", ENGINEERING AND MINING JOURNAL. No. 18,493, July 1.

MINING ENGINEER, 18 YEARS' PRACTICAL experience in all branches of mining work wants position as superintendent, assayer, surveyor or bookkeeper. Address POZO, ENGINEERING AND MINING JOURNAL. No. 18,497, July 15.

WANTED—BY WELL-EDUCATED MAN of 30, position in smelting works. Thoroughly posted in sampling ores, matte and bullion; has also had considerable experience in blast furnace work, copper and lead. Thoroughly competent to handle men, keep time, etc. Address K. G. B., ENGINEERING AND MINING JOURNAL. No. 18,498, July 1.

CHEMIST—UNIVERSITY GRADUATE with practical experience and best recommendations desires employment in experimental or industrial branch of the science. Has experience in assaying and metallurgy. Address CHEMIST, ENGINEERING AND MINING JOURNAL. No. 18,496, June 24.

METALLURGICAL CHEMIST, HAVING several years practical experience with Gold, Silver, Copper, Lead and Zinc ores, for unavoidable cause is out of employment, and desires position. Correspondence solicited. Excellent references. Address B. S. E., ENGINEERING AND MINING JOURNAL. No. 18,494, July 1.

WANTED—GRADUATE ENGINEER AND Chemist, with considerable experience as engineer, and thoroughly trained as chemist. Capable of doing any kind of chemical work, posted on commercial iron analysis, familiar with organic research work, desires a position with manufacturing or analytical chemist. Address B. MCF., ENGINEERING AND MINING JOURNAL. No. 18,485, July 1.

MINING AND MECHANICAL ENGINEER is open to engagement as superintendent or manager. Technical graduate. Fifteen years' experience as superintendent and engineer. References. Address ENGAGEMENT, ENGINEERING AND MINING JOURNAL. No. 18,500, July 1.

CONTRACTS OPEN.

Tenders for Placer Mining Claims on Dominion Creek, in the Yukon Territory.

SEALED Tenders addressed to the undersigned and marked on the envelope "Tender for a placer mining claim" will be received at this Department until noon on Friday the 1st day of September, 1899, for placer claims and fractions of claims on Dominion Creek reserved for the Crown.

The following is a list of the numbers of the claims and fractions and the approximate frontage thereof, as surveyed by Messrs. James Gibbons and R. W. Cautley, Dominion Land Surveyors:—

BELOW UPPER DISCOVERY.			
No.	Length in ft.	No.	Length in ft.
1A	5	10A	33.3
2A	19	15A	42.25
3A	30.5	31A	43
8A	87.4		
ABOVE LOWER DISCOVERY.			
No.	Length in ft.	No.	Length in ft.
1A	12	6A	35.00
2A	59.1	10A	143.25
4A	1.25		
BELOW LOWER DISCOVERY.			
No.	Length in ft.	No.	Length in ft.
1A	56.3	75A	24.7
2A	7.2	76	500.
2C	24.3	77	449.8
8A	34.00	16C	33.8
9A	39.25	18A	164.7
11A	98.4	78A	3.6
13A	68.5	80	431.3
16A	40.25	81A	15.3
20	202.1	83	500.
21A	71.9	84	500.
22	500.	85	5.0
22A	60.7	86	500.
23	446.2	87	500.
25	500.	87A	500.
26	120.66	87B	387.9
31	350.5	89A	35.1
33	500.	91	500.
34	500.	92	500.
36	500.	93	500.
37	500.	94	500.
38	352.	95	500.
68A	94.7	96	500.
69A	40.5	97	500.
70A	72.5	98	500.
71	414.4	99	500.
73A	12.3	100	478.7
74A	21.3	101	119.

Each tender shall specify the numbers of the claims and fractions tendered for and also the amount of bonus offered for each claim and fraction. The tender may be for the whole lot or any one or more of the claims and fractions and must be accompanied by an accepted check in favor of the Minister of the Interior for ten per cent. of the amount offered, one-half of the remainder to be paid into the Department of the Interior at Ottawa or to the Commissioner of the Yukon Territory at Dawson within thirty days from notice of acceptance of tender, and the balance within six months thereafter with interest at the rate of four per cent. per annum.

Entries for the claims and fractions will be granted in accordance with the Placer Mining Regulations on acceptance of tender. The entries will be subject to the usual royalty and the provisions of the said Regulations from time to time in force, except as to representation provided for by Clause 39, which will not be required.

The claims and fractional claims for which entries may be granted shall not include any portion of the bench or hill claims for which entry may have been previously granted.

The highest or any tender not necessarily accepted.

JOHN R. HALL,
Secretary.

Department of the Interior,
Ottawa, 27th May, 1899.

MACHINERY FOR SALE.

FOR SALE!
A Good Second-Hand
LIMA LOCOMOTIVE,

(Standard Gauge) and 10 Logging Cars.
Also a Saw Mill, Planing Mill and Dry Kiln.
All in good condition. Located in W. Va.
ROBINSON & ORR, 419 Wood St., Pittsburgh, Pa.

New—FOR SALE.—First Class

ore crusher 7 x 10, 8,000 lbs.; two sets crushing rolls, 14 x 20, with heavy countershaft and fly wheel, 13,000 lbs.; engine, 30 H. P. and boiler, 40 H. P., with fixtures complete, 14,000 lbs.; all new, on cars, at four cents lb. cash, **STICKNEY, Assignee, Antelope, Idaho.**

Pulverizer for Sale Cheap.

Wet or Dry process. Maximum Output. Minimum power. Degree of fineness positive.
THE LOCKWOOD MANUFACTURING CO., EAST BOSTON, MASS.

FOR SALE.

One 30 stamp mill, 850 stamps, Rapid drop, high motors, including all framing timbers, Bolts and Rods, also line shaft, all in fine condition, \$1,800.00.
6 Automatic Ore Feeders, \$35 each.
2 9x15 Blake Crushers, \$275.00
1 7x10 " " 150.00
1 300 H. P. Corliss Engine.
1 Multi Belt, Woodbury concentrating table, practically new, \$250.00. Engines, Boilers, &c.
THE S. S. MACHINERY CO., Denver, Colo.

FOR SALE.

Never used. Part of a Crushing or Sampling Plant, consisting of Small Engine, Stone Breaker, 15 x 9, Pair of Rolls, 24 x 13; Fly Wheels, Pulleys, Driving Rods, Belting and other accessories. Made by Fraser & Chalmers. Address
JOHN JAMES, 1813 Columbia Ave., Philadelphia, Pa.

FOR SALE.

To close estate, complete assay outfit, fine analytical and gold-button balances, furnace, appliances crusher, glass, fluxes safe, safe, office furniture, etc. Ready for business. **J. S. DANCER, Attorney, Colorado Springs, Colo.**

DIVIDENDS.

HOMESTAKE MINING CO.,
MILLS BUILDING, 15 BROAD STREET, }
NEW YORK, June 14th, 1899. }
DIVIDEND NO. 267.

The regular monthly dividend of TWENTY-FIVE (25) CENTS PER SHARE has been declared for May, payable at the transfer agency in New York, on the 26th inst. Also EXTRA DIVIDEND (No. 268) of Twenty-five (25) Cents Per Share, payable at the same time and place.
Transfer books close on the 20th inst.
LOUNSBERY & CO., Transfer Agents.

MEETINGS.

NOTICE.

ALICE A. MINE.

An important meeting of the stockholders of the American Canadian Gold Mining Company will be held at an early date, and all holders of certificates of stock which have not been transferred on the books of the company should be sent at once to the office of the company at West Superior, Wisconsin, for transfer.
Dated May 29th, 1899.
HENRY CLAY CLARK, Secretary.

THOMAS DREW STETSON;
23 MURRAY STREET.

Patent solicitor and expert; aid in questions, scope and infringement; superior foreign connections; established 1855. Telephone, 2136 Cortlandt.

Shaft Sinking Through Quicksands.

The cheapest and most rapid method ever applied for sinking shafts of any size to any depth through quicksands, or in any difficult ground, and for driving tunnels through clays or wet ground. **SUCCESS GUARANTEED.** Experienced workmen furnished or contracts taken.

C. C. LOVEJOY, care of ENGINEERING AND MINING JOURNAL, 253 Broadway, New York.

LANDS AND MINES FOR SALE.

E. HEDBURG & CO.,
LEAD ZINC MINES,

Mining investments in the Joplin District. Send for list and illustrated pamphlet. Twenty years in the district. References, local banks.
Suit, 18 and 20, Columbian Building, Joplin, Mo.

FOR SALE.

1,120 acres of Zinc and Lead Land in the Southern part of Newton County, South of Joplin. Price \$12.50 per acre. This land is in a locality where much interest is now being centered on account of splendid mineral prospects and the low prices at which such lands can be purchased.

A. B. McCONNELL REAL ESTATE CO., Joplin, Missouri.

ZINC LANDS

Examined and reported upon.
M. H. LYON, M. E., Joplin, Mo.
Bedford McNeill's Code used.

A PAYING MINE

and mill buildings with crushing machinery and power, for \$5,000. Has \$150,000 worth ore in sight. Will make \$61 per day net profit on \$15,000 capital. **STICKNEY, engineer, Antelope, Idaho**

CRIPPLE CREEK.

FOR SALE—Cyanide Plant; 100 tons daily capacity; in first-class condition to handle Cripple Creek Ores. Plant in full running order with all latest improvements. Address JOHN S. MACBETH, Equitable Bldg., Denver, Colo

FOR SALE.—Whole or part in a 30-ton concentrating works. New Process; saves 95 per cent. Trial runs made; rich ores in quantity; satisfactory reasons for selling. Address S. M. YOUNG, Washington, N. J.

MORGAN-WATSON MINING & CONSTRUCTION CO.,

New England Building, Cleveland, O.
Buy, sell, lease and bond mining properties, bonds and stocks of all kinds; good mines and prospects desired. Mining Plants, Mills, etc., furnished and erected. Members of Cleveland Mining and Stock Exchange; Mr. Morgan, Member Cleveland Chamber of Commerce.

Mines and Machinery

FOR SALE AT PUBLIC AUCTION.

The Harqua Hala Arizona Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door, at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40 stamp mill, cyanide plant, engines, boilers, machinery fixed and movable, and stock of merchandise situated at Harqua Hala, Yuma County, Arizona. Inventories and information may be obtained from C. Dallman, agent at Harqua Hala, or Lindley & Eickhoff, Attorneys, 530 California St., San Francisco. Terms of sale, Cash, U. S. Gold Coin, payable twenty per cent. on acceptance of bids, balance on delivery of possession. Title to mines U. S. Patents.

By order of the Board of Directors.



Independent Assay Office.

ESTABLISHED 1888.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY.
P. O. Box 68. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

SPOKANE MINING BOOM. Send 25 cents subscription for book containing maps and valuable information relative to mines and mineral deposits in Washington, Idaho and British Columbia. **Mining Information Bureau, P. O. Box 700, Spokane, Wash.**

CHAS. F. McKENNA, Ph. D.

Analytical and Consulting Chemist.

Complete Analytical, Testing and Experimenting Laboratories.
221 Pearl St., New York City.
Telephone, 1443 John.

Sulphuric Acid Plants; Five tons daily and up.

Pyrites Plants for Sulphite Pulp Manufacturers

PURE } GAS CHEAP }
COOL } UNIFORM } GAS

F. J. FALDING, Chemical Engineer, 48 Broadway, New York.

STEIN & BOERICKE, Ltd.

OFFICE AND WORKS:
1142-1144 Hancock St., Philadelphia, Pa.

MANUFACTURERS OF
Tungsten, Molybdenum and Chromium Metals and Alloys. Tungsten, Molybdenum, Chrome and Uranium Ores.

MISCELLANEOUS WANTS.

TO MINERAL DEALERS.

Works near New York, having surplus horse-power and crushing facilities, want to contract for crushing, pulverizing or fine grinding of minerals in carload lots. For particulars address "100 Mesh," care of Engineering and Mining Journal.

A GENTLEMAN DESIRES TO ASSOCIATE himself with capitalists, with a view to locating and developing deposits of **Uranium, Vanadium, Tin, Turquoise, Tungsten, Bismuth, Gold and Copper.** Has definite knowledge of territory and deposits in Arizona, Colorado and Utah from personal examinations. Reasonable salary and small interest desired. Address **ENGINEER, ENGINEERING AND MINING JOURNAL.**

WANTED.

A man who has had practical experience in the construction of apparatus and the manufacture of Ammonium Chloride and Ammonium Carbonate. State experience, with reference and salary expected. Address **AMMONIUM, ENGINEERING AND MINING JOURNAL.**

The Popular Artery of Travel South.

The Southern Railway, via Washington, maintains service of magnificently equipped trains, which leave New York daily at 2.55 and 4.25 p. m., and 12.10 midnight, reaching, without change of cars, all of the principal Southern cities. The Washington & Southwestern Vestibuled Limited, now has an added feature of attraction in the form of a Library and Observation Car, for the use of all passengers holding Pullman tickets on the train. Another great train is the "Washington & Chattanooga Limited," via Lynchburg and Bristol, which is composed of Pullman Drawing-room Sleeping cars, New York to Chattanooga, Memphis and New Orleans. Combined Parlor and Observation Cafe cars are attached to this train and are operated between Radford, Va., and Attalla, Ala., serving meals at all hours. New York & Florida Express, leaving New York 2.55 p. m., and the U. S. Fast Mail, 12.05 a. m., are two other fast trains giving through Pullman car service to Florida and all points South. For full particulars, call on or address **ALEX. S. THWEATT, Eastern Pass'r Agent, 271 Broadway, New York.**

Received Too Late for Classification.

MANAGER OR CHEMIST - POSITION wanted as manager or chemist in a chemical or fertilizer works. Have had experience in the construction and operation of a chemical fertilizer plant, experienced in fertilizer manufacture and analysis. Can take charge of and direct any kind of analytical work. Am a young man and a college graduate in chemistry. References unexcelled. Address **ANALYST, ENGINEERING AND MINING JOURNAL.** No. 18501, July 1.

FRED. F. HUNT,

77 PINE ST., NEW YORK,
ANALYST and ASSAYER.

Weighing, Sampling and Assaying of Ores,
Mattes, Lead Bullion and all Mineral Products.

Simonds & Wainwright,

LABORATORIES:

159 Front St. (cor. Maiden Lane), New York.

CHEMICAL AND MINING ENGINEERS AND
ANALYSTS.

Assays, Analyses, Experimental Research and Consultation

NICKEL

GRAIN—for Anodes,
German-Silver and Steel.

THE CANADIAN COPPER CO.,
Room 12, Wade 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.

ROBERTSON & ZIEGLER,

27 Thames St., cor. Greenwich St., New York.

Mining Engineers,
Metallurgists and Assayers.

Ores, Mattes, Lead Bullion, and all Furnace
Products Sampled and Assayed.

THE NICHOLS CHEMICAL COMPANY,

11 Broadway, New York.

COPPER REFINERS.

Consignments of Ores, Mattes and
Blister Copper solicited.

....MANUFACTURERS OF....

THE HERRESHOFF COPPER SMELTER.
THE HERRESHOFF ROASTING FURNACE.

LEWISOHN BROTHERS,

P. O. Box 1247. 81 and 83 FULTON ST., NEW YORK.

ADVANCES MADE ON COPPER MATTE AND ORES

Agents for the following Mining Companies: Boston & Montana C. C. & S. Mining Co.;
Butte & Boston Consolidated Mining Co.; Old Dominion Copper Mining and Smelting Co.; Ari-
zona Copper Co., Ltd.; Tamarack Mining Co.; Osceola Consolidated Mining Co.; Santa Fe Gold
and Copper Mining Co.; Tennessee Copper Co.; Utah Consolidated Gold Mines, Ltd.

DR. LUCIUS PITKIN, CHEMIST,

ASSAYER,

138 PEARL STREET, NEW YORK.

SAMPLING and WEIGHING

Gold and Silver Bearing
Copper Products a Specialty.

UMPIRE ASSAYS.

THE AMERICAN METAL CO., LIMITED.

Exchange Court Bldg., 58 Broadway, 10th Floor, 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-am-
Main; Williams, Foster & Co., Ltd., Swansea, Eng.; Societe
le Nickel, Paris, France; Balbach Smelting & Refining Co.,
Newark, N. J.

The Orford Copper Co., COPPER AND NICKEL.

Copper Ore, Matte or Bullion purchased. Ad-
vances made on consignments for refining and sale.

Specialty made of SILVER-BEARING ORES and
MATTE and NICKEL ORES and MATTE.

Sell INGOT and CAKE COPPER and Wire Bars,
Malleable Nickel, Shot, Plates, Ingots, Bars,
Sheets, Wire. Best quality for Anodes, German
Silver and Nickel-Steel.

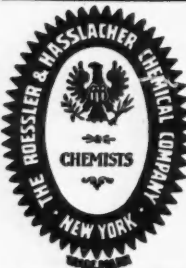
President, ROBERT M. THOMPSON.

OFFICE: 37 AND 39 WALL STREET, NEW YORK.

THE BRIDGEPORT COPPER CO., BRIDGEPORT, CONN.

REFINERS OF COPPER, ARGENTIFEROUS
MATERIAL TREATED ON FAVORABLE TERMS.

ADVANCES MADE ON CONSIGNMENTS.



CYANIDE

PEROXIDE OF
SODIUM
And all other Mining
Chemicals.

THE ROESSLER
& HASSLACHER
CHEMICAL CO.,
100 WILLIAM ST., NEW YORK.

BALTIMORE Copper Smelting & Rolling Company

(THE BALTIMORE COPPER WORKS).

Office: Keyser Building, BALTIMORE, MD.

INGOT COPPER. SHEET COPPER.

RICKETTS & BANKS,

104 John Street, 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,
Metallurgical and Chemical Processes investi-
gated.

ASSAYS and ANALYSES.

Assayers by appointment to New York Metal
Exchange.

William Young Westervelt, E. M.,

(Successor to Case & Westervelt)

MINING ENGINEER,

100 William St., New York.

Mining properties examined and valued
and work installed and managed.

Specialty—Low grade copper properties.

Cable address "Casewest, New York."

McNeil's code used.

BALBACH

Smelting and Refining Co.

EDWARD BALBACH, Jr., President.

J. LANGELOTH, Vice-Prest.

NEWARK, NEW JERSEY.

Electrolytic Copper Refiners.

SMELTERS AND REFINERS
OF GOLD, SILVER, LEAD AND
COPPER ORES.

BULLION AND ARGENTIFEROUS
COPPER MATTE Received on Con-
signment or Purchased.

ST. LOUIS Sampling and Testing Works,

1225 and 1227 Spruce Street,

ST. LOUIS, MO.



The largest and most
complete Ore Testing
Works in existence for
making all kinds of
practical working tests
of ores to determine the
most suitable method
of treatment.

Plant for Coal Washing, Coking and
Steaming Tests of Fuels.

Assays, Analyses and Chemical Investi-
gations.

Mines and Metallurgical Processes Ex-
amined and Reported upon.

LEDOUX & CO.

NEW YORK.

Sample and Assay Ores and Metals.

Independent Ore Sampling Works at
the Port of New York. Only two such on
the Atlantic Seaboard.

We are not Dealers or Refiners, but
Receive Consignments, Weigh, Sample and
Assay them, selling to highest bidders, ob-
taining advances when desired, and the
buyers of two continents pay the highest
market price, in New York funds, cash
against our certificates.

Laboratory and Office, 99 John St.

LEDOUX & CO.

Also Analyze Everything.

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.

A. O. IHLSENG,

Consulting Mining Engineer

JOPLIN, MO.,

WILL PURCHASE

ZINC

Ores and Concentrates.

Reports on Mining Property.

COLONIAL COPPER CO.,

32 Broadway, N. Y.

Buy stock now at bottom price (25 cents
per share). Mines in active operation. Stock
will advance as work progresses.

Can guarantee you absolutely against loss.

WRITE FOR PAMPHLET.

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-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, Morsing & Neal's.

Bullock Diamond Drills

Furnish absolutely correct logs of holes by extracting solid core up to 6,000 ft. in depth.

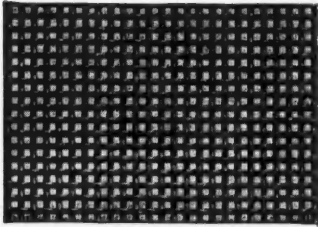
FIFTEEN STYLES AND SIZES.—SURFACE AND UNDERGROUND. Hand Power, Horse Power, Steam, Air and Electricity.

We make a specialty of prospecting by contract at stipulated price per foot.

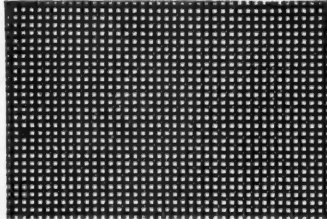
SMALL PORTABLE HOISTS. LARGE HOISTING PLANTS. MINE VENTILATORS. GENERAL MINING
MACHINERY. WILLAN'S CENTRAL VALVE HIGH SPEED ENGINES. MONARCH ROCK DRILLS.

M. C. BULLOCK MANUFACTURING CO., 1170 West Lake St., Chicago, U. S. A.

DON'T ORDER MINING SCREENS



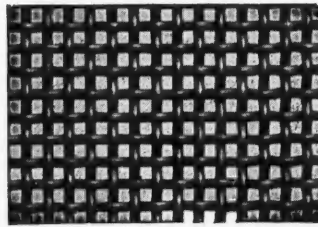
Unless You Get
THE TYLER
Double Crimped.
THE
Only Make



With the wires thoroughly crimped both ways. "We have originated," others have imitated.

THE W. S. TYLER WIRE WORKS CO.,

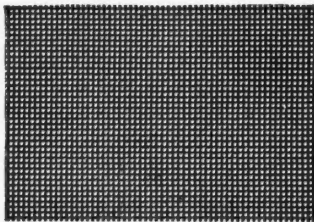
CLEVELAND, O., U. S. A.



MANUFACTURERS OF
Extra Heavy Iron, Steel, Brass,
Copper and Phosphor Bronze
Wire Cloth.

Write us direct for information.

Colorado concerns will find
a stock of our screens at
Hendrie & Bolthoff Mfg. Co.,
DENVER, COLO.



MINES SURVEYS.

By F. J. FRANKLAND, C. E.

An exceedingly able and reliable treatise on the subject, with elaborate divisions on Dialling with the Needle—Traverse Surveying—Protractor Plotting—Tangents, Latitudes and Departures—Underground Heading with and without the Needle, including a Table of Sines, Tangents and Secants for every ten minutes, and a Table of Chords for every five minutes of the Quadrant.
16mo, Flexible Cloth Cover for Pocket Use. Profusely Illustrated. Price, \$1.25.

THE SCIENTIFIC PUBLISHING COMPANY, 253 Broadway, New York

REDUCED

From \$7.50 to \$6.00.

The Best Mining and General Telegraphic Code.

—BY—
BEDFORD McNEILL, F. C. S.

MINING ENGINEER.

Arranged to meet the requirements of
**Mining, Metallurgical and
Civil Engineers.**
**Directors of Mining, Smelt-
ing and Other Companies.**
**Bankers, Stock and Share
Brokers.**

—O—
PRICE, \$6.00.

Scientific Publishing Co.

253 Broadway, New York.

FINANCIAL.

ORGANIZED APRIL 12, 1842.

THE MUTUAL LIFE INSURANCE CO. OF NEW YORK.

RICHARD A. McCURDY, PRESIDENT.

Insures every approved description of Life and
Endowment Policies on terms as favorable as
those of any other company.

Cash Assets, Over \$277,000,000.



SELDENS PATENT PACKINGS,

With Either Rubber or Canvas Core,

For Piston Rods, Plunners, Valve
Stems, etc.

Sold by the Supply houses in Denver
Butte, Helena, Chicago, St. Louis,
Kansas City, Omaha, and on the
Pacific Coast.

SOLE MANUFACTURER,
RANDOLPH BRANDT,
38 Cortlandt St., New York.

MINE SURVEYING.

By BENNETT H. BROUGH.

Including a Description of the Methods Adopted
in the Survey of Metalliferous Mine Claims in the
United States and Europe, with Appendix of
Problems and Questions for Examinations in
Mine Surveying at Institutes and Colleges.

8vo Cloth, Illustrated. Price \$2.50.

The Scientific Publishing Co.,
253 Broadway New York.

THE VERY FACT THAT

23,500 ROCK DRILLS



Have been made and sold by this Company carries
with it the assurance of long and successful experience.

500 at the Anaconda Mines, Butte, Mont.

80 at the Homestake Lead, South Dakota

14 by Thomas A. Edison, Edison, N. J.

THE "NEW INGERSOLL"

is the embodiment of all that there is good in
Rock Drills. Its popularity increases each day.

Catalogue No. 41, **ROCK DRILLS** Mines, Quarries, Tunnels,
Contract Work, Good Roads.

Catalogue No. 32, **AIR COMPRESSORS** 12 Standard Types and
many Special Patterns.

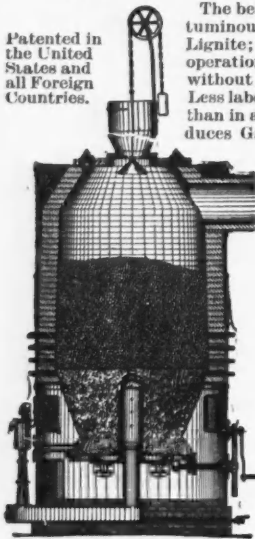
Catalogue No. 72, **POHLE AIR LIFT PUMP** Water Works, Irrigation, etc.

THE INGERSOLL-SERGEANT DRILL CO. Havemeyer Bldg., New York.
114a Queen Victoria St., London, Eng

R. D. WOOD & CO. 400 Chestnut St., Philadelphia, Pa.

SOLE MAKERS OF THE TAYLOR REVOLVING-BOTTOM Gas Producer.

Patented in the United States and all Foreign Countries.



The best Producer for either Bituminous or Anthracite Coal or Lignite; absolutely continuous in operation, as the fire is cleaned without stopping the flow of gas. Less labor required and less waste than in any other producer. Produces Gas for firing Lime, Brick and Pottery Kilns, Sugar-House Charcoal Kilns, Boilers, etc. Also applicable to all Regenerative Furnaces.

Send for pamphlet.

CAST IRON PIPE,

Mathews' Fire Hydrants, Eddy Valves, Valve Indicator Posts,

Heavy Locomotive Castings, Special Machinery.

WATER POWER PUMPS AND TURBINES.

Hydraulic, Jib and Traveling Cranes, Freight and Car Lifts, etc. Gas Holders and Gas Machinery.

EDDY STRAIGHT-WAY VALVES



(BRASS, IRON QUICK OPENING) FIRE HYDRANTS. THE EDDY VALVE CO., WATERFORD N. Y.

McMann & Taylor, 42 Cliff St., New York Agents.

CRIPPLE CREEK.

Big claim map of the district, measuring 3 x 4 feet and including 60 square miles and 6,000 claims,

FREE

with the 52-page

STATISTICAL MINING INVESTOR,

which is on sale at 25c. per copy.

(Death on Wild Cats and Fakes).

THE MINING INVESTOR COLORADO SPRINGS, COLO.

ZEITSCHRIFT FÜR PRAKTISCHE GEOLOGIE

mit besonderer Berücksichtigung der Lagerstättenkunde.

In Verbindung mit einer Reihe namhafter Fachmänner des In- und Auslandes herausgegeben

von Max Krahnmann.

Monatlich ein Heft von etwa 40 Seiten mit Uebersichtskarten, Profilafeln, u. s. w.

Preis des Jahrgangs von 12 Heften M. 18- Probehefte und Prospekte stehen auf Verlangen gern zur Verfügung.

Verlag von Julius Springer in Berlin N. Monbijouplatz 3.

The Berlin Iron Bridge Co.

Engineers, Architects and Builders of Steel Structures.

CHAS. M. JARVIS, President. GEO. H. SAGE, Secretary. FRANK L. WILCOX, Treasurer. D. E. BRADLEY, Manager Contracting Dept.



This illustration shows a large Market House provided with a large clock, ornamental cresting, etc. It is designed for use in large cities, providing ample protection from the sun, the sides being left open for free access of air. It is constructed entirely of steel, and, therefore, with a paved floor, can be easily cleaned.

NEW YORK OFFICE, 718 Bennett Bldg., cor. Fulton and Nassau Streets. BOSTON OFFICE, 200 Equitable Bldg.

Main Offices and Works: East Berlin, Connecticut.

stabilised a Century Ago.

JESSOP'S

THE BEST IN THE WORLD

DRILLS, TOOLS, ETC

FULL STOCKS CARRIED AT ALL MINING CENTRES.

STEEL

HIGHEST AWARD PARIS, 1889. CHICAGO, 1893.

Write us for your nearest point to obtain this steel.

Manufactory, Sheffield, Eng. WM. JESSOP & SONS, LTD. Chief American Depot, 91 John St., New York

THE GILLETTE-HERZOG MFG. CO. STRUCTURAL STEEL AND IRON WORKS (Largest in the Northwest.)

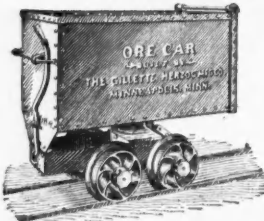
HEAVY PLATE WORK.

WATER TANKS, STAND PIPES, SMOKE STACKS, RIVETED STEEL PIPE, MALLEABLE IRON CASTINGS.

DESIGNS AND ESTIMATES FURNISHED.

OFFICE AND WORKS: Minneapolis, Minn.

BRANCH OFFICES: Pittsburgh, Pa.; Butte Mont.; Denver, Colo.; Salt Lake City, Utah; New Orleans, La.; Houston, Tex.; Kansas City, Mo.; Los Angeles, Cal.; Spokane, Wash.



THE WILSON

Forged High Grade Steel

SHOES AND DIES.

Guaranteed to Wear Longer and Prove Cheaper than any others. Made by use of Special Appliances, Patented. Made only by

WESTERN FORGE AND ROLLING MILLS, - St. Louis, Mo

SHOES and DIES

of SUPERIOR quality and at prices 20 to 30% lower than any other maker.

FURNISHED BY

ARTHUR KOPPEL, 66 Broad St., N. Y. City.

WRITE FOR PARTICULARS.



MINING CARS of every description.

PORTABLE RAILWAYS,

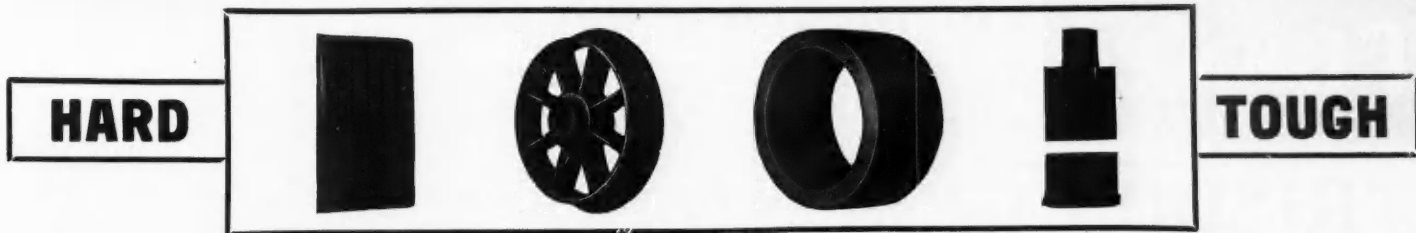
Rolling Stock, Railway Outfits

for Mines of every description.

Export Work a specialty.

ARTHUR KOPPEL, 66 Broad St., N. Y. City.

SEND FOR CATALOGUE AND ESTIMATES.



TAYLOR IRON AND STEEL COMPANY

HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for

MANGANESE STEEL

Best Metal known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyrotory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, etc.

Write for Information and Prices.

ADAMANTINE SHOES AND DIES

AND CHROME CAST STEEL.
THE CANDA PATENT SELF-LOCKING CAM.



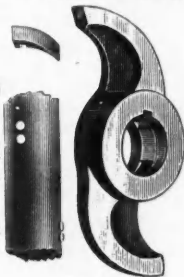
Tappets, Bosses, Roll Shells and Crusher Plates Also Rolled Parts for Huntington and Other Mills.

These castings are extensively used in all the Mining States and Territories throughout the world. Guaranteed to prove better and cheaper than any others. Orders solicited subject to above conditions. When ordering send sketch with exact dimensions. Send for Illustrated Circular.

C. P. HAUGHIAN, Pres't.
F. E. CANDA, Vice-Pres't.
C. J. CANDA, Vice-Pres't.
F. MORA CANDA, Sect'y.
T. I. JONES, Treas.

CHROME STEEL WORKS,

Kent Ave., Keap and Hooper Sts.,
BROOKLYN, N. Y.



CANDA CAM.

Lathes, Planers, Drilling, Bolt-Threading

and other Machines, especially desirable for Machine Shops of Mines, because of their thorough construction, efficiency and durability. Chucks, Renshaw Ratchet Drills, Lathe and Planer Tools, consisting of Holders and Inserted Cutters, which are much more durable and convenient and less costly than the ordinary forged tool. Illustrated in the Miner's Catalogue.

THE PRATT & WHITNEY CO.
HARTFORD, CONN. U. S. A.

BRAEBURN STEEL COMPANY, BRAEBURN, PA.

DIRECTORS—Wm. Metcalf, Charles Metcalf,
Ph. B. Hasbrouck.

R. P. KELLY, Sec'y and Treas.

MANUFACTURERS OF

Mining, Drill and Oil Well Steel a Specialty.



FINE TOOL STEEL.

Particular attention to Die Blocks and Cuttle Blanks and all Forgings for Tools and Machinery.

Trade Mark.

STEEL CASTINGS

FROM 1 TO 40,000 POUNDS WEIGHT.

OF OPEN HEARTH OR CHESTER STEEL

True to Pattern. Sound. Solid.

Gearing of all Kinds, Crank Shafts, Knuckles for Car Couplers Cross-Heads, Rockers, Piston-Heads, etc., for Locomotives. Steel Castings of Every Description.

CHESTER STEEL CASTINGS CO.

Works: Chester, Pa. Office: 407 Library St. Phila., Pa

HOBSON, SEAMAN & COMPANY,

Successors to FRANCIS HOBSON & SON,

DON STEEL WORKS, SHEFFIELD.

SOLE MAKERS OF

HOBSON'S "CHOICE" STEELS.

For the Finest Classes of Tools and Needle Wire.

BRIGHT DRILL RODS—None more Accurately Drawn.

CHAS. HUGILL, Agent.

98 JOHN STREET, NEW YORK.



BEST QUALITY.) LOW PRICE.

Famous everywhere for its toughness and rock-cutting qualities.

"THE RAND'S FUTURE RIVAL"

British Columbia is coming very rapidly to the front as a mining country of extraordinary promise. Last year the aggregate value of the precious metal output was over twelve millions, this year it will approximate sixteen. The list of dividend-paying mines is increasing very rapidly, and thousands of dollars have been expended this year in mine equipment and machinery. It is to the interest of every manufacturer of mining machinery to advertise in this field. The British Columbia Mining Record is admittedly the leading exponent of the British Columbia and Yukon mining industry. It is therefore the best advertising medium. Subscription price, \$2.00 per annum. Address,

H. MORTIMER-LAMB,
P. O. Box 685, VICTORIA, B. C.

Wealth In Sight.

The territory tributary to the

SANTA FE SYSTEM

in Indian Territory, Texas, Colorado, New Mexico, Arizona and California, offers to limited investments of capital, backed by energy and brains, unusual opportunities for the development of Great Mineral Properties.

Deposits of the following are known to exist on and within a few miles of our lines:

Antimony, Alum, Asbestos, Asphalt, Barytes, Bauxite, Borax, Cement Rock, Coal, Cryolite, Clays of all kinds, Copper, Gold, Graphite, Gypsum, Granite, Iron, Kaolin, Lead, Lithograph Stone, Manganese, Mica, Marble, Mineral Paints, Nitre, Nickel, Natural Gas, Onyx, Petroleum, Phosphate Rock, Pumice Stone, Pyrites, Quicksilver, Salt, Silica, Strontianite, Stone—Oolitic, Lime and Sand, Silver and Zinc.

For further information, address,

JAMES A. DAVIS.

INDUSTRIAL COMMISSIONER,

Atch., Top. and Santa Fe System
CHICAGO, ILL.

**THE
CUMMER
DRYERS.**

For Mechanically Drying Everything.

THE F. D. CUMMER & SON CO.,

HUNDREDS IN OPERATION.

Cleveland, Ohio.

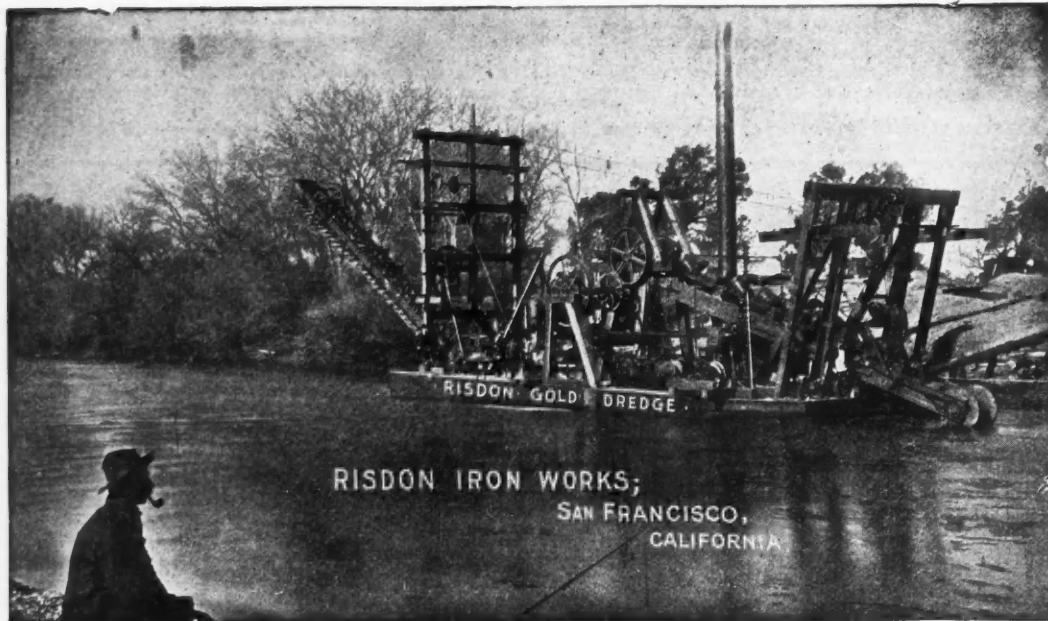
RISDON IRON WORKS, SAN FRANCISCO, CALIFORNIA.

Cable: RISDON'S
Code: A. B. C. and
LEIBERS.

... MANUFACTURERS OF ...

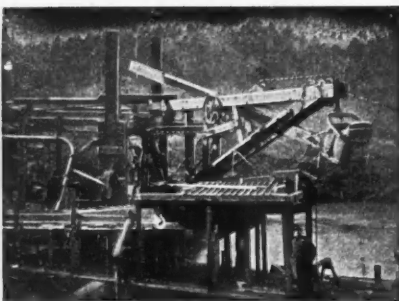
Gold Dredging Machinery and Complete Equipment for Placer Mines

— OUR SPECIALTY —



RISDON IRON WORKS;
SAN FRANCISCO,
CALIFORNIA

WE build Gold Dredges complete in running order to handle 2,500 cubic yards per day at a cost of 3 cents per cubic yard. We excavate 50 ft below water, 20 ft. above water, and handle boulders up to one ton weight. Send for Dredging Catalogue No. 17. We also build all kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery, Evans' Hydraulic Gravel Elevators. We publish 17 catalogues. Write for one in the line you are interested in.



THE MARION STEAM SHOVEL COMPANY,

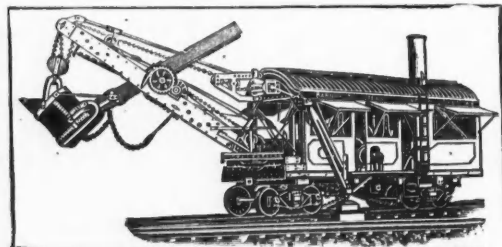
— MANUFACTURERS OF —

STEAM SHOVELS AND DREDGES

Suitable for all classes of work. We make a specialty of Machinery for Placer Mining where either Steam Shovels or Dredges can be used with appliances for disposing of the tailings. We also have Excavating Machinery suitable for Iron Mines and Phosphate Mines. In short, we can make it an object for you on Excavating Machinery for all classes of work. For information, write

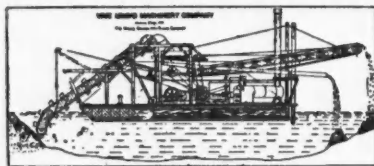
THE MARION STEAM SHOVEL CO.,
642 West Center St., MARION, OHIO.

Or our Western Manager, GEO. W. BARNHART,
No. 4 Sutter St., SAN FRANCISCO, CAL.



URIE MINING MACHINERY COMPANY

607 and 609 West 5th Street, Kansas City, Missouri.



MANUFACTURERS OF

All Classes of Dredging Machinery. Special Attention Given to Small Prospecting Dredges.

THE BUCYRUS COMPANY

DESIGNERS AND BUILDERS OF
**DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY
STEAM AND ELECTRIC AND LOCOMOTIVE CRANES
CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
PILE DRIVERS, WRECKING CARS, PLACER MINING MACHINES.
SOUTH MILWAUKEE, WISCONSIN.**

**The Florence &
Cripple Creek**

**and Golden Circle
Railroads.**

The Popular Route to Cripple Creek.

THE GREATEST GOLD CAMP KNOWN.

Two through trains daily from Denver, Colorado Springs and Pueblo. Through Pullman sleepers and free chair cars on night trains. The favorite route of the traveling public.

UNSURPASSED SCENERY!

Excellent service, attentive and accommodating employees. For all information address

**C. F. ELLIOTT, Gen'l Traffic Agent,
DENVER, COLO.**



ABSOLUTE SAFETY IS ASSURED ALL USERS OF
McINTYRE'S DRY BATTERY
PORTABLE ELECTRIC SAFETY LAMP

This is an Electric Lamp set in a White Enamel Parabolic Reflector, and can be attached to the cap or any part of the clothing by means of a stick-pin attached to reflector and connected to the battery with a flexible cord. The battery is arranged to be carried on a belt or in the pocket. So the user has free use of hands. The current can be turned off when not in use. Dry batteries are used and can be recharged from direct Incandescent Electric Current. Charger and full directions go with each Lamp.

IS USED BY THE FOLLOWING:

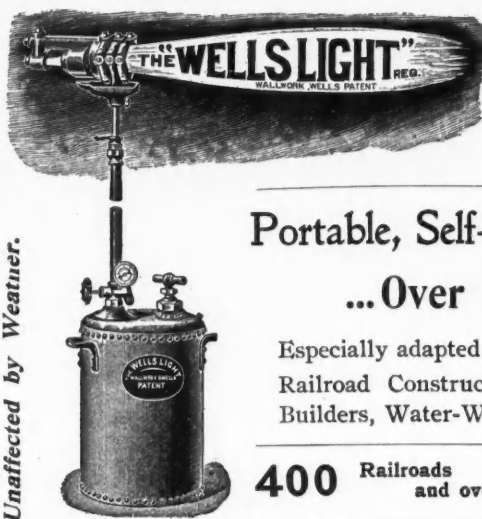
For Watchmen, Miners, Mine and Gas Inspectors, Oil and Gas Works Employees, Powder Mills and Warehouses where explosive materials are manufactured and stored; where it is impossible to carry an oil lamp or candle for fear of explosion—and all parties requiring a safe portable light. The whole outfit is neat and compact.

No. 1	weighs 2 lbs.,	1½ C. P.	Price complete,	\$4.50.	For meter reading only.
No. 2	" 3 "	4 "	" "	6.00.	For Miners and general use.
No. 3	" 12 "	10 "	" "	12.00.	For several persons to work by.
No. 4	" 3 "	4 "	" "	6.00.	Boiler Makers and Chimney Sweeps.

Illustrated Catalogue is yours for the asking.

MANUFACTURED BY

ELMER E. McINTYRE, Pittsburg, Pa., U. S. A.



Unaffected by Weather.

800 to 4,000

CANDLE POWER
FROM KEROSENE OIL.

Portable, Self-Contained, Automatic.
 ...Over 15,000 in Use...

Especially adapted for Contractors, Quarries, Shovels,
 Railroad Construction, Dredges, Bridge and Dock
 Builders, Water-Works, Brick Yards and Coal Docks.

400 Railroads and over **500** Contractors now use
 the WELLS LIGHT.

Wells Light Mfg. Co.

EDWARD ROBINSON, Sole Proprietor,

Send for Circular. 44 Washington St., New York.



Perforated Metals
 FOR ALL USES IN
MINING and ORE DRESSING.

The Mining Journal,
 RAILWAY AND COMMERCIAL GAZETTE.

ESTABLISHED IN 1835.

The Mining Journal circulates ALL OVER THE WORLD amongst Mine Owners, Capitalists, Investors, Mining, Metallurgical Engineers and Manufacturers.

The Mining Journal offers unusual advantages for Advertising Sales of Mineral Properties, Machinery, Commercial Notices, Inventions and all Articles for the use of those engaged in Mining, Engineering and Mechanical Work.

Annual Subscription, INCLUDING POSTAGE, £1 8s.
 Advertisements, one inch single column, \$1.00 per insertion,

Offices: 46 Queen Victoria St., London, Eng.

"BIG FOUR"
 THREE GREAT TRAINS.

"KNICKERBOCKER SPECIAL"

BETWEEN
 St. Louis, Indianapolis, Cleveland, Cincinnati,
 New York and Boston.

"SOUTHWESTERN LIMITED"

BETWEEN
 Cincinnati, Columbus, Cleveland, New York and Boston

"WHITE CITY SPECIAL"

BETWEEN
 Cincinnati, Indianapolis and Chicago.

WARREN J. LYNCH,
 Gen. Pass. & Tkt. Agt.

DEARBORN COMPOUNDS PREVENT NEW FORMATION.

Analizers of Everything—Makers of Boiler Compounds.

DEARBORN DRUG & CHEMICAL WORKS,

Manufacturing and Analytical Chemists.

WM. H. EDGAR, Prest.

CHICAGO.

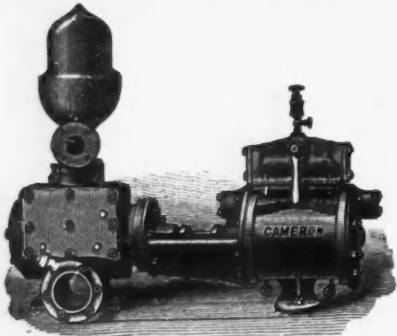
Offices: 29, 30, 31, 32 and 33 Rialto Building.

Telephone 3935 Main.

No. 7.

Works: 2325-27-29 La Salle Street.

Telephone 1130 South.

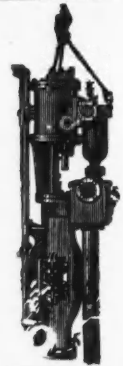


CAMERON STEAM PUMP.

SIMPLE No Outside Valve Gear. **COMPACT**
EFFICIENT THE BEST PUMP MADE FOR **DURABLE**
 ENGINEERING AND MINING USE.

... For Illustrated Catalogue address ...

THE A. S. CAMERON STEAM PUMP WORKS,
 Foot of East 23d Street, New York.

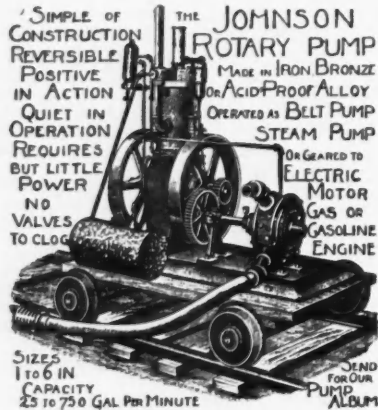


THE JOHNSON
ROTARY PUMP
 SIMPLE OF CONSTRUCTION
 REVERSIBLE
 POSITIVE IN ACTION
 QUIET IN OPERATION
 REQUIRES BUT LITTLE POWER
 NO VALVES TO CLOG

MADE IN IRON BRONZE
 OR ACID-PROOF ALLOY
 OPERATED AS BELT PUMP
 STEAM PUMP
 OR GEARED TO ELECTRIC MOTOR
 GAS OR GASOLINE ENGINE

SIZES 1 TO 6 IN CAPACITY
 25 TO 750 GAL PER MINUTE

SEND FOR OUR PUMP ALBUM



DAVIS JOHNSON CO., Prop.
 No. 1.
 41 W. RANDOLPH ST., CHICAGO

IMPULSE AND PRESSURE WATER WHEEL

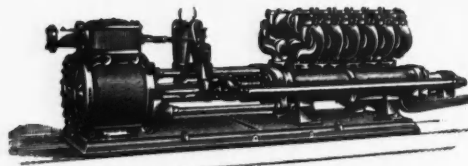
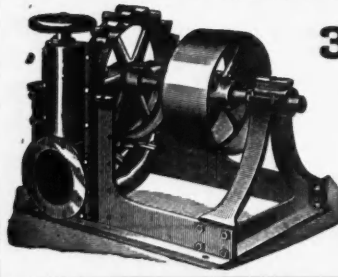
Adapted to all Heads from

3 Feet to 2000 Feet.

Our experience of 36 years in the Water Wheel business enables us to suit every requirement of Water Power Plants.

Send for Pamphlets and write full particulars.

JAMES LEFFEL & CO.
 SPRINGFIELD OHIO, U. S. A.



Mining Pumps.
Steam Pumps

.....for Heavy Pressure.
 ALSO

Sinking Pumps,

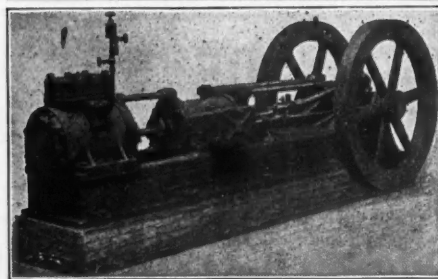
JET AND SURFACE CONDENSERS, AIR COMPRESSORS, TRIPLEX PUMPS.

THE STILWELL-BIERCE & SMITH-VAILE CO., DAYTON, O.

WHO BUILDS THE BEST MINE PUMP?

PRESCOTT

FRED. M. PRESCOTT STEAM PUMP CO., Milwaukee, Wis.



AIR COMPRESSORS for Air Lift Well Pumping.

AIR COMPRESSORS for Rock Drills, Coal Cutters, Air Hoists and Pneumatic Work generally.

PRESSURE PUMPS for Deep Mine Pumping.

STEAM PUMPS, Single and Duplex, of all sizes and for all purposes.

Duolux and Triplex POWER PUMPS.

HALL STEAM PUMP COMPANY,

Correspondence solicited. **PITTSBURG, PA.**

FOR PUMPING TAILINGS

Slimes, etc., in Concentrating Works, Sand or Shot for Sawing Stones, use our Spiral Sand Pump. Superior to any other system of Elevators. Circular Free. **FRENIER & LE BLANC,** Rutland, Vt., U. S. A. **STEARNS-ROGER MFG. CO.,** Denver, Colo., Agents.



THE MINERAL INDUSTRY,
 SEE PAGE 9.

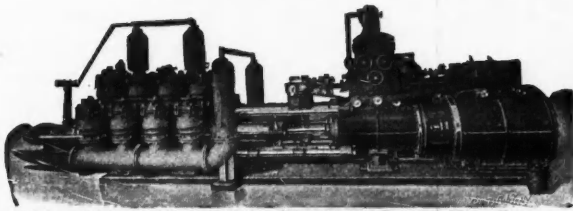
SCENIC LINE OF THE WORLD

THE POPULAR LINE TO
LEADVILLE, GLENWOOD SPRINGS, ASPEN, GRAND JUNCTION, CRIPPLE CREEK, SALT LAKE CITY AND THE PACIFIC COAST.

E.T. JEFFERY, Pres't Gen'l Mgr.
 A.S. HUGHES Traffic Mgr.
 S.K. HOOPER
 G.R. & T.A. DENVER.

The Best MINING PUMPS In the World.
OUR SPECIALTY.

Send for Catalogues and Estimates. We carry in our Denver store a stock of



24 in. x 40 in. x 16 in. x 48 in. Compound Duplex Mine Pump. Columbia Hotel Building, 1328 17th St., Denver, Colo.

Cameron Pattern Sinker and Duplex Station Pumps.
JEANESVILLE IRON WORKS CO.,
(Incorporated),
JEANESVILLE, PA.

WESTERN OFFICE:

Columbia Hotel Building, 1328 17th St., Denver, Colo.

HIGH GRADE PUMPING MACHINERY

MINE PUMPS A SPECIALTY.

CATALOGUE, DRAWINGS, ETC., ON APPLICATION.



STEAM PUMP WORKS

BUFFALO, N. Y.

NEW YORK,
PHILADELPHIA,
PITTSBURG.

OFFICES AT

CHICAGO,
DENVER,
SEATTLE.

DO NOT CONFOUND
THE MERRILL

Direct . . . **COMPRESSED AIR PUMPS**
Displacement

With the Air Lift System of Pumping, where air and water are discharged and where conditions govern its use.

With the Merrill System there is no air passing through the water pipe—a solid, steady stream is delivered to any point or elevation, from any desired source.

For Mine Use They Are Unsurpassed.

Suited to All Pumping Requirements.

Sold subject to Trial and Return if they do not perform the work as specified in a satisfactory manner. Any make of Air Compressor can operate them.

Write for "D." Circular

State your requirements.

MERRILL PNEUMATIC PUMP CO.,
141 BROADWAY, NEW YORK.

WRITE

JOS. DIXON CRUCIBLE CO.,

JERSEY CITY, N. J., U. S. A.,

For information about graphite, plumbago, black lead. Retorts for silver smelter crucibles for brass and steel melters. Graphite specialties. Lubricating graphite and graphite grease for wire ropes. We are miners, manufacturers and importers and solicit correspondence on all matters pertaining to graphite and its uses.

London Office: 28 VICTORIA STREET, WESTMINSTER



From Ridgway to Telluride, Sawpit Ophir, Rico, Dolores, Mancos, La Plata and Durango.

Opening up the most magnificent scenery in the Rocky Mountains, and passing through the

FAMOUS GOLD AND SILVER FIELDS OF SAN MIGUEL AND DOLORES COUNTIES.

AND THE

MONTEZUMA AND SHENANDOAH VALLEYS

The Great Agricultural Region of

THE DOLORES RIVER

This line brings the tourist within easy ride of the wonderful

HOMES OF THE CLIFF DWELLERS

In connection with the Denver & Rio Grande it forms the unsurpassed

All Rail "Around the Circle Trip."

E. T. JEFFERY, Receiver.

WELL DRILLING
Machines

Over 70 sizes and styles, for drilling either deep or shallow wells in any kind of soil or rock. Mounted on wheels or on sills. With engines or horse power. Strong, simple and durable. Any mechanic can operate them easily. Send for catalog.

WILLIAMS BROS., Ithaca, N. Y.



For Stationary, Portable, Traction Engines, Tugboats, &c. Thoroughly Reliable—Perfectly Automatic.
JENKINS BROS., - Selling Agents -
NEW YORK, PHILA., CHICAGO.



THE SOLVAY PROCESS COMPANY.

SYRACUSE, N. Y., and DETROIT, MICH.

Manufacturers of **SODA ASH** in all commercial tests.

CAUSTIC SODA all tests.

MONO-HYDRATE CRYSTALS, SNOW FLAKE CRYSTALS.

CROWN FILLER for Paper. **AMMONIUM CHLORIDE** for Electrical Uses

CALCIUM CHLORIDE for Refrigerating Use.

SOLE AGENTS, WING & EVANS, 22 William Street, New York.

THE PENNSYLVANIA SALT MANUFACTURING COMPANY.

INCORPORATED 1850.

Importers of Kryolith and Manufacturers of Pure Alumina (for Aluminum)
 Natrona Porous Alum, Lump and Ground Alum, Bicarbonate,
 Caustic and Crystal Soda, Saponifier Lye, Blue Vitriol,
 Lewis 98 Per Cent. Powdered Lye, Greenwich Crushed Potash,
 Copperas, Sulphuric, Nitric and Muriatic Acid, Refined Salt Cake, Etc.
115 CHESTNUT ST., PHILADELPHIA, PA.

Practical Notes on the Cyanide Process

By FRANCIS L. BOSQUI, Ph. B.,

Supt. of the Standard Consolidated Mining Company's Cyanide Works, Bodie, California.

CHAPTER.

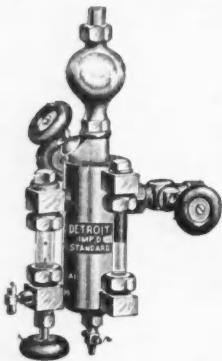
- I. History and Chemistry.
- II. Application of the Process.
- III. Laboratory Tests.
- IV. Design of Works.
- V. Details of Construction.
- VI. Arrangement of Pipes, Valves, etc.
- VII. Preparing Ores for Tailings and Charging Vats.
- VIII. The Leaching Process.
- IX. Precipitation by Zinc.

CHAPTER.

- X. Cleaning Up and Refining the Precipitates.
- XI. Technical Results.
- XII. Modifications of the Simple Cyanide Process.
- XIII. Exemplifications of Practice—South Africa.
- XIV. Exemplifications of Practice—Australia, New Zealand and India.
- XV. Exemplifications of Practice—United States.
- XVI. Conclusion.

CLOTH, ILLUSTRATED. PRICE \$2.50.

THE SCIENTIFIC PUBLISHING CO., 253 Broadway, New York



INCREASING THE NET EFFICIENCY OF AN ENGINE.

The more friction developed in an engine the less work it can do. Prevent this friction, or reduce it to a minimum, and the energy which was spent in overcoming friction will be converted into useful work. The smaller the element of friction, the greater will be the net efficiency of the engine.

THE DETROIT LUBRICATORS

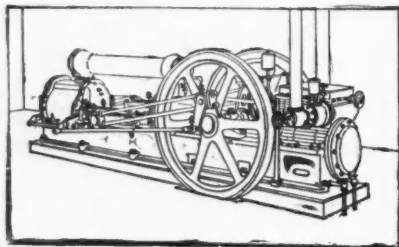
furnish perfect lubrication and reduce the waste from friction to the smallest possible amount. This is why engines having Detroit Lubricators on give such good results and this is why 90 per cent. of the prominent American engine builders use Detroit Lubricators on their engines.

Catalogue on Application.

DETROIT LUBRICATOR CO., DETROIT, MICH.

THE NORWALK IRON WORKS CO.

SOUTH NORWALK, CONN.



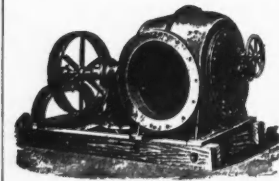
MAKERS OF
**AIR and
 GAS
 COMPRESSORS**

For any Volume and for any Pressure.

VICTOR TURBINE

WATER WHEEL,

UPRIGHT OR HORIZONTAL



Possesses more than DOUBLE THE CAPACITY of ordinary Water Wheels of same diameter and highest efficiency.

MADE BY

The Stilwell-Bierce & Smith-Vaile Co.,
 DAYTON, OHIO, U. S. A.

MIDLAND RAILWAY

OF KENTUCKY.

... THE SHORT LINE BETWEEN ...

CINCINNATI AND FRANKFORT

AND

FRANKFORT, GEORGETOWN AND PARIS.

C. D. BERGAW, General Passenger Agent.

Thro'
 Ute Pass



The Line to
 Manitou
 Cascade
 Green Mt.
 Falls
 Manitou Park
 Cripple Creek
 Buena Vista
 Leadville
 Aspen
 Glenwood
 New Castle
 Grand Junct.
 Salt Lake
 Ogden
 and the
 West



Pullman
 Sleeping
 Car
 and
 Reclining
 Chair Cars
 on
 Thro' Trains



Colorado
 Midland
 Railway
 Company

Shortest
 AND
 Best
 Route

General
 Offices
 Denver

GEO. W. RISTINE,
 PRESIDENT AND MGR.

W. F. BAILEY,
 GEN. PASS. AGT.

COPPER COMPANIES.

ARIZONA COPPER COMPANY,
Producers of "A. C. C." BRAND, and
COPPER PRECIPITATE.
MINES AND SMELTERS AT CLIFTON, ARIZONA.
Agents:
LEWISOHN BROTHERS, New York.

ATLANTIC MINING COMPANY.
Joseph E. Gay, President.
John Stanton, Secretary and Treasurer.
Eastern Office, 11 and 13 William Street, New York.
Main Office, Atlantic Mine P. O., Houghton Co., Mich.

**THE BUNKER HILL & SULLIVAN
Mining & Concentrating Co.**
Mines and Works at WARDNER and
KELLOGG, IDAHO.
OFFICE: CROCKER BUILDING, SAN FRANCISCO, CAL.
Producers of Lead Concentrates.

COPPER QUEEN CON. MINING CO.
J. Douglas, President.
J. Van Vleck, Vice-President.
G. Notman, Secretary and Treasurer.
Office, 11 Cliff Street, New York City.

**DETROIT COPPER MINING CO.
OF ARIZONA.**
J. Douglas, President.
Joseph Van Vleck, Vice-President.
G. Notman, Secretary and Treasurer.
Office, 11 Cliff Street, New York City.

MARKEEN COPPER CO.
PRODUCERS OF
COPPER.
Mines and Works: CLIFTON, ARIZONA.
TREASURER'S OFFICE:
66 BROADWAY, NEW YORK.

**The Mountain Copper Co.,
LIMITED,**
PRODUCERS OF
ELECTROLYTIC COPPER,
Wire Bars, Cakes or Ingots.
M^o C^o C^o BRAND.
MINES: KESWICK, CAL. SMELTING WORKS: ELIZABETH, N. J.
VIVIAN BOND & CO., Agents,
66 Beaver Street, New York.

LEWISOHN BROTHERS,
P. O. Box 1247. 81 & 83 Fulton St., New York.
METALS.
Producers of NEC Electrolytic Copper in
Cathodes, Wirebars, Cakes and Ingots; also
casting Copper, MA and ABS Brands.
REFINERIES.
Central Falls, R. I.
Perth Amboy, N. J.
Ansonia, Conn.

COAL PRODUCERS AND DEALERS.

STICKNEY, CONYNGHAM & CO.
..... Agents for.....
Franklin Coal (of Lykens Valley), Susquehanna
(White and Red Ash), Kingston (White Ash),
Cameron, Shamsokin, Pancoast, Wilkes-
Barre, Gaylord (White and Red Ash),
and Eureka Bituminous Coals.
1 Broadway, New York. 10 Congress St., Boston.
308 Walnut St., Philadelphia.

THE MINERAL INDUSTRY, VOL. VI.

"Upon examination of THE MINERAL INDUSTRY,
Volume VI., we find that the volume incorporates
a vast amount of useful and instructive informa-
tion."
THE MOUNTAIN COPPER CO., Limited,
New York.

WARD & OLYPHANT,
Delaware & Hudson Canal Co.'s
Lackawanna. Also Lehigh,
Cumberland and Clearfield....
GOAL.
OFFICES: { 21 Cortlandt Street, New York City.
30 Kilby Street, Boston, Mass.
Boston Agents, DARROW, MANN & CO.

Established 1860.

**THE COLLIERY GUARDIAN AND JOURNAL OF THE
COAL AND IRON TRADES**
Published every Friday in London, England, by
the Colliery Guardian Co., Ltd. Per annum, post
free, to U. S. A. and Canada, £1 7s. 6d., or \$6.00.
THE RECOGNIZED ORGAN OF THE COAL AND IRON TRADES.
H. KIRBY ATKINSON, F. G. S., Manager.
Offices: Essex Street, Strand, London, W. C.

THE CONSOLIDATION COAL COMPANY
MINERS AND SHIPPERS OF THE SUPERIOR
"GEORGE'S CREEK BIG-VEIN CUMBERLAND COAL"
FOR RAILROAD, STEAMSHIP AND GENERAL USE.
Principal Office: 44 SOUTH ST., BALTIMORE, MD.
DARROW, MANN & CO., Agents, 30 Kilby St., Boston, Mass. C. K. PITTMAN, Agent, Old Colony Bldg., Chicago, Ill. ROUSSEL & HICKS, Agents, 1 Broadway, N. Y.

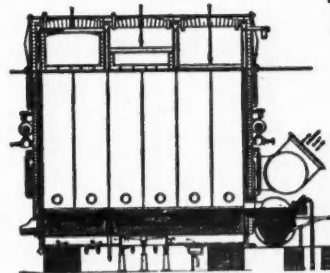
CASTNER, CURRAN & BULLITT,
SOLE AGENTS **POCAHONTAS COAL,**
AN UNKUALED STEAM FUEL.
MAIN OFFICE: 328 CHESTNUT STREET, PHILADELPHIA.
BRANCH OFFICES:—
1 Broadway, New York. 4 Fenchurch Avenue, London, Eng. Neave Building, Cincinnati, Ohio.
70 Kilby Street, Boston, Mass. Terry Building, Roanoke, Va. Calle Reconquista, 399, Buenos
Citizens Bank Bldg., Norfolk, Va. Old Colony Building, Chicago, Ill. Aires, Argentine Republic, S. A.

BERWIND-WHITE COAL MINING CO.

MINERS AND SHIPPERS OF THE
EUREKA BITUMINOUS COAL.
—OFFICES:— —SHIPPING WHARVES:—
Betz Building..... PHILADELPHIA. PHILADELPHIA.....Greenwich Point,
1 Broadway.....NEW YORK. NEW YORK.....Foot 6th Street, Jersey City, N. J.
19 Congress Street.....BOSTON, MASS. BALTIMORE.....Canton Piers
S. B. ELKINS, President. H. G. BUXTON, Vice-President. F. S. LANDSTREET, Gen'l Manager
DAVIS COAL & COKE COMPANY,
SOLE AGENTS FOR THE CELEBRATED ELK GARDEN BIG VEIN CUMBERLAND COAL.
Miners and Shippers of the Unequaled "DAVIS" and other Superior Smithing and Steam Coals.
Manufacturers of COKE-FURNACE, FOUNDRY and CRUSHED.
OFFICES: New York City; Philadelphia, Pa.; Baltimore, Md.; Boston, Mass.; Trenton, N. J.; Wilming-
ton, Del.; Washington, D. C.; Chicago, Ill. and St. Louis, Mo. MAIN OFFICE: PIEDMONT, W. VA.
Tide-water Shipments from Philadelphia Baltimore, South Amboy and Elizabethport.
Agencies in Europe, South America, West Indies and Mexico.

WEST VIRGINIA FLEMINGTON COAL.

Big Pittsburgh Seam—Powerful Steamer—Unequaled for Gas.
FLEMINGTON COAL & COKE COMPANY,
OFFICES: NEW YORK, 44 Broadway; PHILADELPHIA, Betz Building.



THE GARRETSON METHODS

OF SMELTING AND CONTINUOUS CONVERTING.

Reducing Unroasted Sulphide Ores to Metallic
Copper, carrying the precious metals at one
operation. By this method there is a

BIG PROFIT IN LOW GRADE ORES GOLD, SILVER
or COPPER.

OLIVER S. GARRETSON, or
GARRETSON FOREIGN PATENTS CO., Buffalo, N. Y.
786 Ellcott Sq.

SULPHURIC ACID.

We Design, Build and Guarantee Capacity of Sulphuric Acid
and Fertilizer Plants.

Undertake Utilization of all Waste Sulphur Gases.
Guarantee to Secure Increased Production from any Existing
Sulphuric Acid Chambers.

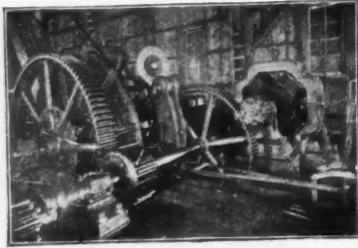
Report on all Questions Concerning Sulphuric Acid and Fertilizer.

PRATT PROCESS COMPANY,

GEO. J. BALDWIN, President, Cotton Exchange Bldg., New York, N. Y.

MINE ECONOMY

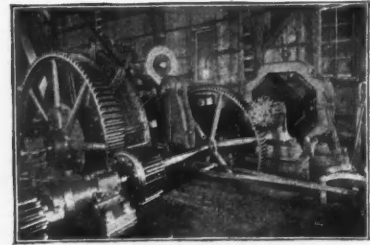
No. 3



Hundreds of mines use General Electric Hoists.

THE ELECTRIC HOIST . . .

For Raising Your LOADED SKIPS.



THE ELECTRIC MOTOR WILL DRIVE ANY HOIST.

GENERAL ELECTRIC COMPANY.

Main Office, SCHENECTADY.

Sales Offices in all large cities of the United States.



Reaches the Heart of the Best Zinc Mining Districts in

SOUTHWEST MISSOURI,
EASTERN KANSAS and
NORTHERN ARKANSAS.

It is the shortest and most comfortable route to that important Territory, as well as to OKLAHOMA and TEXAS.

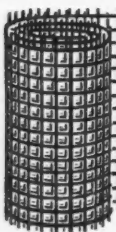
BRYAN SNYDER,
General Passenger Agent,
ST. LOUIS, MO.

Many Hours Quicker



TO THE **PACIFIC COAST**
Than by any Other Line
"The Overland Limited"
Carries the Government Fast Mail.
SAN FRANCISCO PORTLAND
Only 60 Hours to San Francisco
58 Hours to Portland
FROM MISSOURI RIVER.

For time tables, folders, illustrated books, pamphlets descriptive of the territory traversed, call on your nearest agent, or address
E. L. LOMAX, G. P. & T. A., Omaha, Neb.



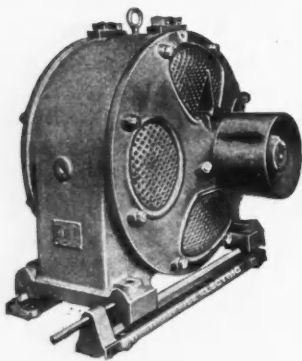
THE LUDLOW-SAYLOR WIRE CO.

N. E. COR. 4TH AND ELM STREETS, ST. LOUIS, MO.

MINING SCREENS AND MINING CLOTH.

INDIAN ENGINEERING.

Edited by PAT. DOYLE, C. E.
The recognized Organ of the Profession in India taken by most of the C. E.'s of the P. W. D.
A more extensive circulation than any other weekly paper in the country.
Lists Open to Inspection. Specimen Copies Free.
Address PAT. DOYLE, C. E., Calcutta, Ind.



Westinghouse DUST PROOF MOTORS

are designed for direct and alternating currents. Specially adapted to crane or elevator service. The best motor for use in mines, etc.

Westinghouse Electric & Mfg. Co., Pittsburg, Pa.

Smelting Furnaces,
Converters, Ladles.

WM. B. POLLOCK CO.,
YOUNGSTOWN, OHIO.

Boilers Stacks
Riveted Pipe.



Manufactured of Steel or Refined Iron. Lengths up to 25 feet.
Each length tested to margin of safety. Great strength combined with lightness. Fittings and connections to suit service required. Do not hesitate to send for Catalogues.

Black, Galvanized or Asphalted. Diameters, 3 to 24 inches.
ONLY manufacturers under original **ROOT** patents. Name "**ROOT**" stamped on each piece. Apply to large dealers and supply houses anywhere.

ABENDROTH & ROOT MANUFACTURING CO., 99 John St., New York.
Monadnock Block, Chicago, Ill.

PROOF

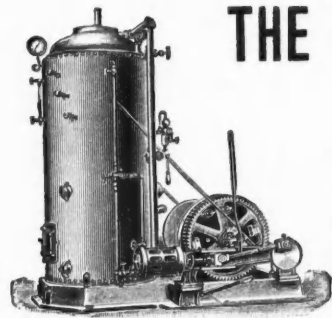
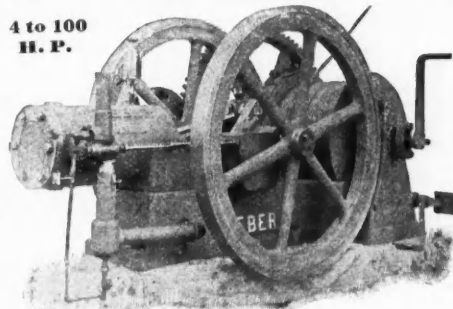
of the satisfactory working
and great economy of

Weber Hoists

furnished on application.

Gasoline, Distillate and Kerosene for Fuel.
Every Machine Guaranteed.

WEBER GAS & GASOLINE ENGINE CO., 446 S. W. Boulevard, Kansas City, Mo., U. S. A.



THE EXETER MACHINE WORKS

.....MANUFACTURERS.....

Steam and Electric Hoisting Engines,
Elevators, Conveyors and Cableways.

PITTSTON, PA.

A. WYCKOFF & SON.

No. 110 East Chemung Place,
ELMIRA, N. Y.



Patent Waterproof
Steam-Pipe Covering.
For Underground Steam Pipes.
WOOD WATER PIPE.

For Coal and Iron Mines, Coke
Works and General Water Supply.



Send for catalogue and price lists.

ACID PROOF.

THE PRIESTMAN ENGINE.

For all Power Purposes. Burns Kerosene Oil. Is
Safe, Automatic, Durable, Reliable. Let us tell
you all about it.

PRIESTMAN & CO., Inc.,

No. 530 BOURSE,

PHILADELPHIA.

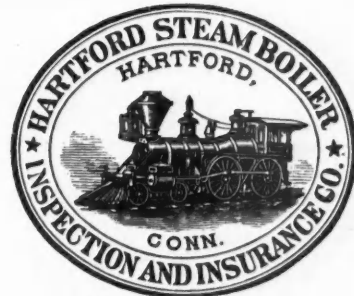
"El Minero Mexicano."

THE MINING AND INDUSTRIAL JOURNAL OF MEXICO:
Goes to Mine Owners, Capitalists, Manufacturers,
Merchants and People with Money to Spend,
all over Mexico.

Advertising Rates Low.

3a INDEPENDENCIA No. 1, CITY OF MEXICO,

RICHARD E. CHISM, Editor and Proprietor.



J. M. ALLEN, PRESIDENT.

W. B. FRANKLIN, VICE-PRESIDENT.

F. B. ALLEN, 2D VICE-PRESIDENT.

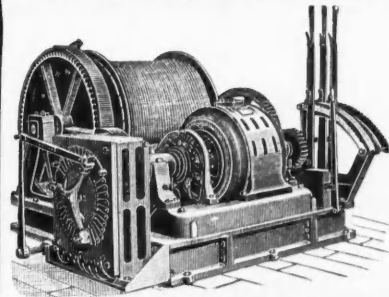
J. B. PIERCE, SECRETARY AND TREASURER.

L. B. BRAINERD, ASSISTANT TREASURER

L. F. MIDDLEBROOK, ASSISTANT SECRETARY

LIDGERWOOD HOISTING ENGINES

ARE BUILT TO GAUGE ON THE DUPLICATE PART SYSTEM.
QUICK DELIVERY ASSURED.



STEAM
AND
ELECTRIC
HOISTS

STANDARD for QUALITY
and DUTY.
LIDGERWOOD MFG. CO.

Chicago, Philadelphia, 96 Liberty St., New York. Portland, Ore., New Orleans, Cleveland, Boston.

CABLEWAYS
HOISTING AND
CONVEYING DEVICES
For Mining, Quarrying,
Logging,
Dam Construction, Etc.

HAULAGE HOISTING ENGINES.

STEAM TIPPLES.

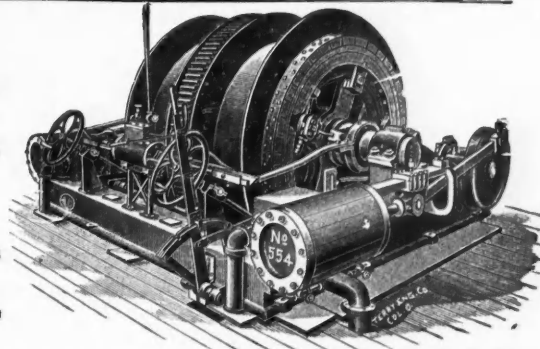
Self-Dumping Cages. Complete Mining Equipment.
Mine Buildings and Structures Designed and Erected.

COAL GRADING MACHINERY.

Elevators and Conveyors for Coal Storage Plants and Merchant Coal Yards

We Send Competent Representatives
to learn your wishes if wanted. . .
Write for Catalogue and Photos.

THE NELSONVILLE FOUNDRY & MACHINE CO.,
NELSONVILLE, OHIO.



The following are but a few names of users of our . . .

Boiler Compound

- The Mississippi Steamboat Co.
- The Fulton Distributing Co.
- The Phoenix Wire Works.
- The Wheeling Car Wheel Co.
- The Aurora Furnace Co.
- The Swift Beef Packing Co.
- The White Sons & Co., Flour Mills.
- The American Wire Co.
- The United States Glass Works.
- The Steamer Oakes Ames.
- The Boston Shoe Co.
- The New York and New Jersey Tin Co.

A GUARANTEED SAVING OF

15 to 75 per cent.

An absolute prevention against the formation of scale, and an infallible remedy for the removing where scale has been formed.

Clean, wholesome water can be obtained by our process, *for every purpose, without ill effects*, on live steam, and at the same time prolong the life of your boiler

Send for Catalogue C

METROPOLITAN STEAM BOILER COMPOUND CO.,

26 Court Street, Brooklyn, N. Y., U. S. A.



Lead and Zinc Mining Industry in Missouri and Kansas.

BY

JOHN R. HOLIBAUGH.

Tersely presenting a complete history, up to date, of the most important lead and zinc producing district of the United States, beginning with the time, early in this century, when ground was first broken in the search for lead ore. Each important mining property is described separately, and full statistics of production are given. An excellent map has been especially prepared to accompany the work. It is the only chart of the district on so large a scale, and it shows in detail the location of all the mining properties now being worked, and gives the position of all the smelters. This feature will be found especially valuable to prospective investors. Illustrated.

PRICE, 50 CENTS.

SCIENTIFIC PUBLISHING CO.,
253 Broadway, New York.



ALONG THE LINE OF

The Spokane Falls & Northern Ry.

are located the valuable mining camps of Washington and continuing through a mineral belt to Rossland and Nelson. No mining district in the world has ever shown such marvelous resources.

The Spokane Falls & Northern Ry.

is the only route from Spokane to this rich mining country. Immediate connection is made with the Great Northern Railway.

Detailed information relative to the camps reached by the Spokane Falls and Northern Railway will be cheerfully furnished on application to

C. G. DIXON, G. F. & P. A.,
Spokane, Wash

BARGAINS IN DYNAMOS, ENGINES, PUMPS.

We have the following apparatus which has been removed from our own central stations to make room for larger units, and is therefore in excellent condition, and we guarantee it: Direct Current Dynamos, Alternating Current Dynamos, Arc Dynamos, Engines, Boilers, Heaters, Steam Pumps.

CHICAGO EDISON COMPANY. 139 Adams Street, Chicago.

For Painting Laboratories, Factories, Workshops

and all buildings exposed to the action of sulphur gases or chemical fumes,

ZINC WHITE

is the only white paint which will remain white.

THE NEW JERSEY ZINC COMPANY

52 WALL STREET, NEW YORK CITY.

DUSTLESS **ECONOMICAL** **EFFECTIVE**

Continuous Operation.
Uniform Product.



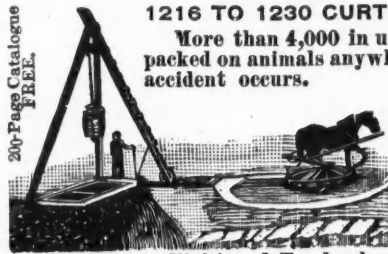
Enormous Capacity.
No Bolting.

Improved **PEBBLE TUBE MILL** for **Fine Grinding**.
The best Mill for handling **Cement, Refractory Ores, &c.**

THE MAX F. ABBÉ MFG. CO., 26 Cortlandt St., NEW YORK CITY.
PULVERIZERS AND DRYERS FOR ALL PURPOSES.

THE J. H. MONTGOMERY MACHINERY COMPANY.

1216 TO 1230 CURTIS ST., DENVER, COLO., U.S.A.
More than 4,000 in use. Made of wrought iron and steel. Can be packed on animals anywhere. The deadlock holds the load when an accident occurs.



- Price of One-Horse Whim, complete, with shieves.....\$90.
- Two-Horse Whims, complete, with shieves.....\$150.
- Pumping Attachment with Pipe for either.....\$40.
- Blower Attachment with Pipe for either.....\$30

Also Four, Eight and Twelve-horsepower Whims.

THE *Oldest Paper on Lake Superior.*
ESTABLISHED IN 1858.

ONTONAGON ALFRED MEADS,
Editor and Proprietor

MINER. ONTONAGON, MICH.
Send for Sample Copy. Subscription \$2.00 Per Year.

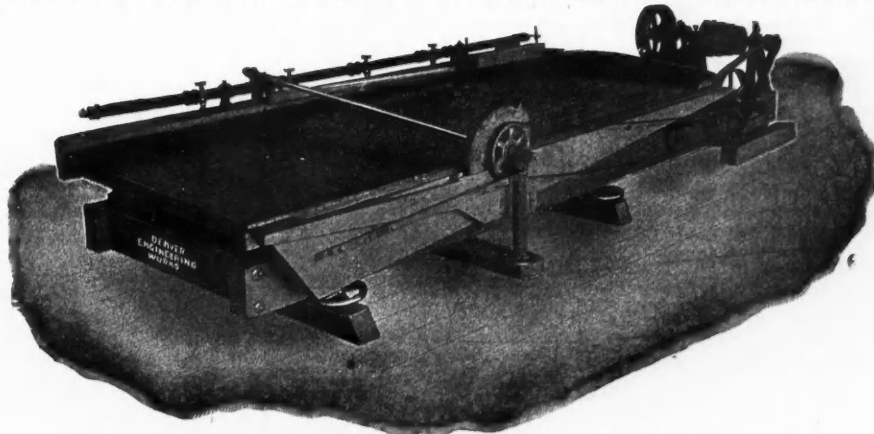
IN PRACTICAL AND SUCCESSFUL OPERATION MORE THAN A YEAR—
SUBSTANTIALLY BUILT—
RIFFLES INLAID TO PREVENT WARPING.
TABLE TOP ABSOLUTELY WATER PROOF.
PERFECT VANNER MOTION GIVEN TO PULP.
THREE ADJUSTMENTS TO HEAD MOTION—
THREE ADJUSTMENTS TO TABLE—
CLASSIFICATION SO PERFECT THAT SEVERAL DISTINCT GRADES OF ORE MAY BE OBTAINED SIMULTANEOUSLY FROM THE SAME TABLE.

CAMMETT CONCENTRATOR

The Most Recently Developed and Scientifically Designed Concentrator on the Market.

CAPACITY, 15 to 30 TONS PER DAY.

PRICE, COMPLETE WITH ALL EXTRA ATTACHMENTS, \$450. DENVER, COLO.



THOROUGHLY PROTECTED BY STRONG PATENTS.

WRITE FOR SPECIAL CIRCULAR.

DENVER ENGINEERING WORKS, Sole Manufacturer.

UNION IRON WORKS.

MINING AND MILLING MACHINERY

- All Classes of Marine Work.
- Hoisting and Pumping Engines.
- Copper and Lead Furnaces.
- Rolls and Concentrating Machinery.
- Ship and Engine Builders.

MAIN OFFICE: SAN FRANCISCO, CAL.,
222 Market Street.

(Cable Address: "UNION.")

Send for Circular.

BRANCH OFFICE: NEW YORK,
115-119 Gerken Building, West Broadway and Chambers Street.

MECKLENBURG IRON WORKS,

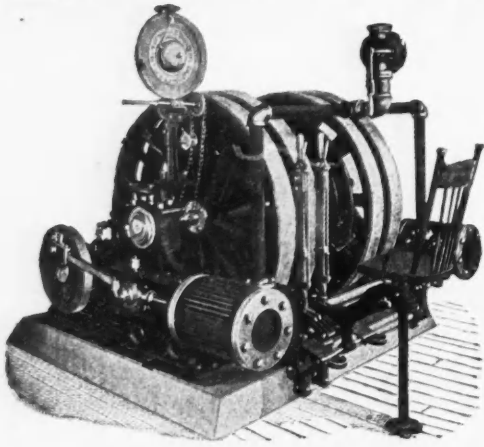
CHARLOTTE, N. C.,

BUILDERS OF THE **ONLY SUCCESSFUL PLANT** FOR THE

TREATMENT OF SOUTHERN GOLD-BEARING SULPHURETS.

PARTICULARS FURNISHED ON APPLICATION.

Bolthoff's Lightning Quadruple ... Friction Hoist.



Extensively used in all mining regions.
Every user an endorser. We claim for this Hoist

**DURABILITY, HIGH SPEED, COMPACTNESS,
SIMPLICITY, SAFETY, STRENGTH.**

We are prepared to ship from stock complete Hoisting Plants, consisting of Hoist, Boiler, Pump, Wire Rope, Buckets, Cars, etc.

WRITE FOR WHAT YOU WANT.

THE HENDRIE & BOLTHOFF MFG. & SUPPLY CO.
No. 31. 1601-1615 SEVENTEENTH STREET, DENVER, COLO.

The WM. HAMILTON MFG. CO. Limited

Manufacturers of

**Rock Crushers, Stamp Mills, Crushing Rolls,
Concentrating Machines, Hoisting Engines, Boilers, Etc**

PETERBOROUGH, ONTARIO,

Branch Office, Vancouver, B. C.

CANADA.

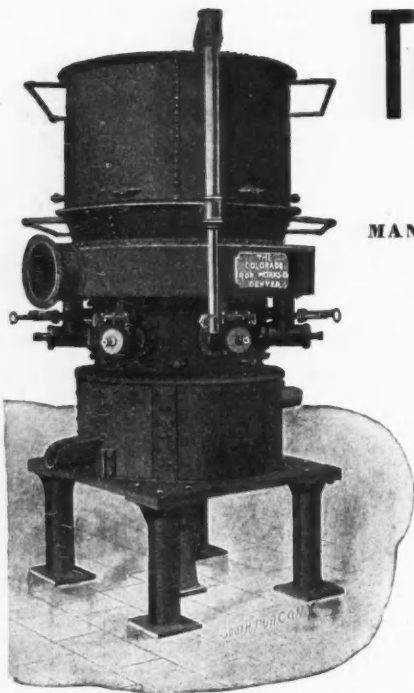
THE COLORADO IRON WORKS CO.,

DENVER, COLO., U. S. A.

MANUFACTURERS OF.....

Ore Milling and Smelting Equipments

For the treatment of Gold, Silver, Lead, Copper & Zinc Ores.

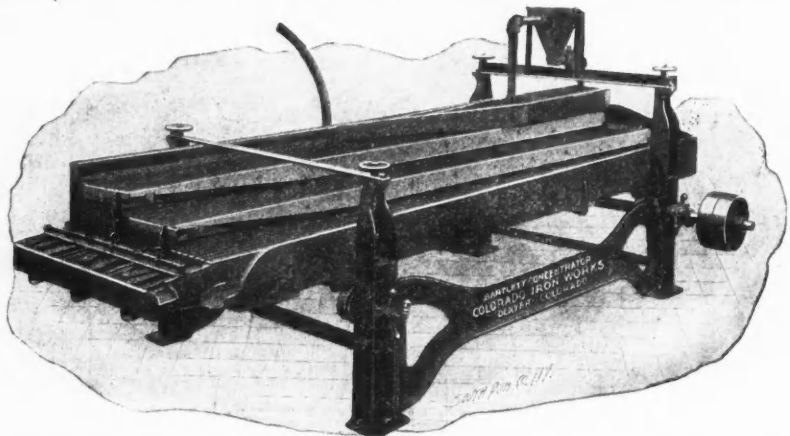


MODERN ROUND FORM COPPER FURNACE.

THE BARTLETT CONCENTRATOR.

Floor space, 4x12 feet. Capacity, 12 to 30 tons daily. Concentrates from 8 mesh to slimes. Makes three grades of concentrates. Separates Zinc from Galena. Takes the place of Jigs.

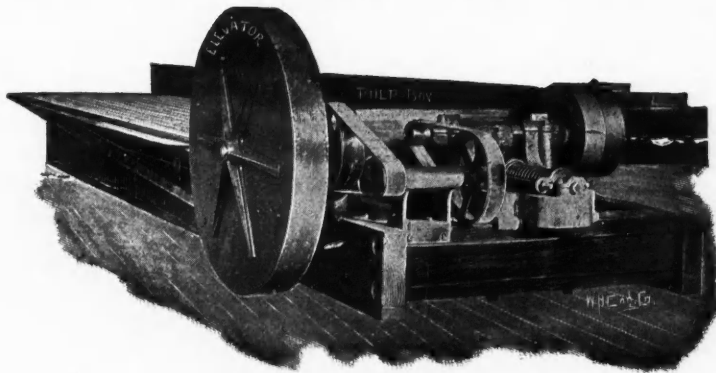
...SEND FOR CATALOGUE...



THE MINE AND SMELTER SUPPLY COMPANY

EBEN SMITH, JOHN S. CARY, R. J. CARY, F. L. SMITH.
DENVER, COLO. SALT LAKE CITY, UTAH. CITY OF MEXICO, MEXICO.

We Sell Everything from a Belt-Lace to a Locomotive.



THE WILFLEY TABLE.

We are the Sole Agents for the WILFLEY CONCENTRATOR. It is in use to-day in every part of the globe. You will find them in the gold diggings of Cape Horn, in Equatorial Africa, and beyond the Arctic Circle.

Took FIRST PRIZE and Gold Medal at the Auckland, New Zealand, Exposition last month over Vanners and Union Concentrators.

Will handle several times more material than any belt Concentrator made—bar none.

It will save more concentrates in proportion while so doing, and will catch any float gold, amalgam or quicksilver which may escape from the mortars or plates.

It will reduce smelting and transportation charges by making cleaner and more valuable concentrates than any other table.

It takes up less room and needs less power in proportion to work done—more money saved.

No expert is required to adjust or run the machine; its construction is simple and it is easily kept in repair.

It has no expensive belts to crack and wear out.

No belt machine will treat all kinds of materials. The Wilfley will. *It is the only sensible plan of concentration.*

These Tables have displaced belt tables of almost every make, as shown by letters in our possession.

PRICE, \$450.

The Wilfley Table is fully covered by United States Patents Nos. 580,338 and 590,675.

The Wilfley Table is acknowledged the best on the market. It therefore has many imitators. We will put up \$1000 to \$5000 against an equal amount that the Wilfley Table will do better than any other.

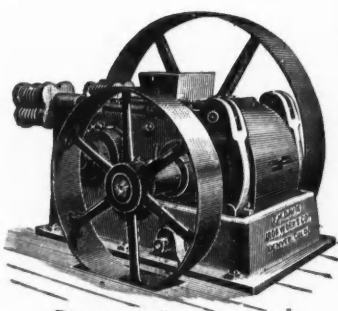
WE CARRY THE LARGEST STOCK OF MINING AND MILLING MACHINERY AND SUPPLIES IN THE UNITED STATES.

Our stock of exclusive specialties is large and complete. Our connections with the best machine shop and foundry equipment in the West enable us to execute orders promptly and efficiently, and at the lowest market prices. We have exceptional facilities for fitting up complete: Concentrating Mills, Stamp Mills, Chlorination Mills, Cyanide Mills, Pan Amalgamation Mills, Sampling Mills, Hoisting Plants, Steam, Gasoline and Electric; Air Compressing and Drilling Plants; Power Plants, Steam, Gasoline and Water; Pumping Plants, Wire Rope Tramways, Placer Mining Plants. Write for Catalogues and Prices before purchasing.

WE ARE AGENTS FOR

THE F. M. DAVIS IRON WORKS CO., DENVER, COLO., U. S. A.

Manufacturers of High-Grade Mining and Ore Milling Machinery and Appliances.

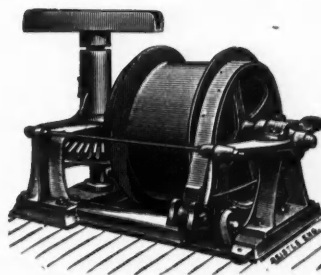


The Davis Crushing Rolls.

SIMPLE,
DURABLE,
EFFICIENT.

These Machines are built in five sizes.
27 in. x 14 in., belt driven, \$950.
Weight, 13,000 lbs.

The Davis Automatic Safety Brake Horse Hoister.

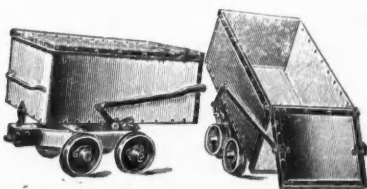


SIMPLE, DURABLE, EFFICIENT.

This Hoister is built entirely of iron and steel, and is provided with a patent automatic safety brake, holding the load at any point, and making the working of the Hoister perfectly safe, a feature not possessed by any other horse hoist. These Hoisters are built in five sizes. Capacity of Machine No. 1, with one horse and single line, 800 pounds, 75 feet per minute.

Price, complete with sheaves, \$90.

THE DAVIS AUTOMATIC ORE CAR.

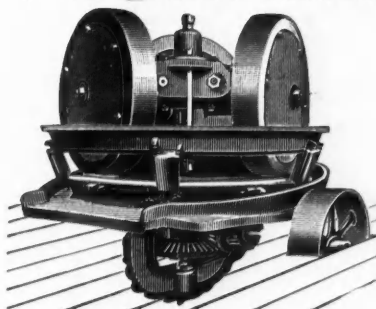


SIMPLE,
DURABLE,
EFFICIENT.

The best Ore Car in the field.

No. 2—44x24x20 in.	Weight, 425 lbs.	\$30.00
" 3—48x24x20 in.	" 525 "	34.00
" 4—48x24x20 in.	" 600 "	45.00
" 5—48x24x20 in.	" 700 "	50.00

THE DAVIS IMPROVED CHILI MILL.



SIMPLE,
DURABLE,
EFFICIENT.

Five ft. Mill; weight, 24,000 lbs
\$1,350.

Send for New Catalogues:—"No. 18, Milling Machinery." "No. 19, Mine and Mill Supplies."
"No. 20, Power and Power Transmission Machinery."

MINING AND SMELTING PLANTS

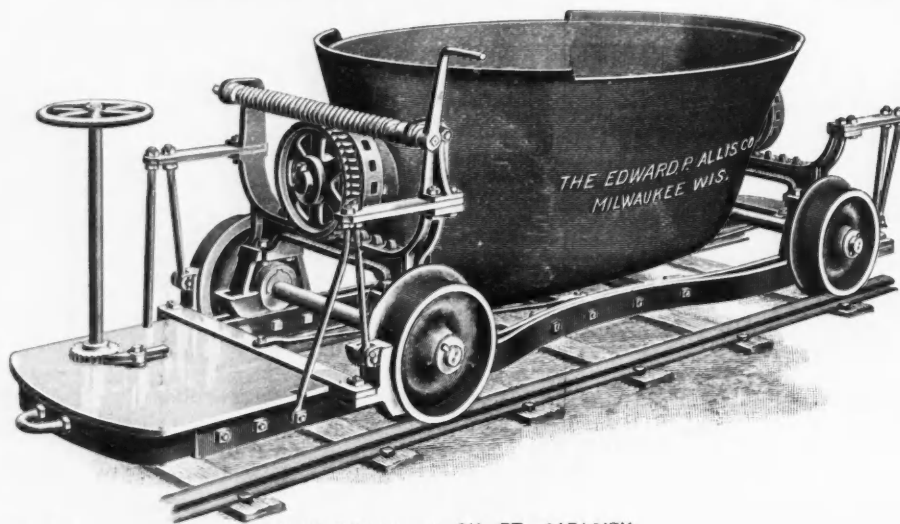
AND THEIR EQUIPMENT

BLAST FURNACES

CALCINING FURNACES

CONVERTERS

BLOWING ENGINES



Ad. No. 9.

SLAG TRUCK, 43 CU. FT. CAPACITY.

◆◆
**The Edward
P. Allis Co.**

Milwaukee.

◆◆
**CATALOGUES
ON**

APPLICATION

FRIED. KRUPP CRUSONWERK

Magdeburg-Buckau (Germany).

MINING MACHINERY.

Ore Crushing:

Stone Breakers of especially strong construction.

Roller Mills, Chilian Mills,
Ball Mills,

for dry and wet crushing. More than 1,800
at work.

Stamp Batteries.

Shoes and Dies of Krupp's Special Steel.

Amalgamation:

Amalgamation Tables and Pans, Laszlo's Gold
Amalgamators, Settlers, etc.

Separation and Concentration:

Separators, Exhaustors, Hydraulic Classifiers,
Percussion Tables, Jiggers, Rotating
Round Tables.

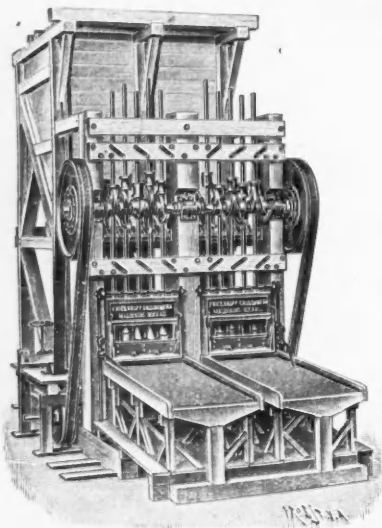
Leaching Plant.

Complete Gold Ore Dressing Plant.

- a. For treating by the wet method with Stamp Batteries, Amalgamation and Concentration.
b. For dry crushing by Ball Mills, Dust Extraction and Leaching.

Coal Washing Plant.

Large Testing Station for Crushing and Dressing Ores at the Works.



AGENTS:

{ FOR CANADA: Jas. W. Pyke & Co., 35 St. Francois Xaver Street, Montreal.
FOR THE UNITED STATES: Thos. Prosser & Son, 15 Gold Street, New York.
FOR MEXICO: Pablo Bergner, Apartado 519, Mexico.
FOR SOUTH AFRICA: United Engineering Company, Ltd., P. O. Box 399, Johannesburg, S. A. R.

WEBSTER CAMP & LANE MACHINE CO.

—MANUFACTURERS OF—

MINING MACHINERY.

Improved Band Friction Hoisting Machinery, Geared or Direct Acting
FOR ROUND OR FLAT ROPE.

— WIRE ROPE HAULAGE MACHINERY.

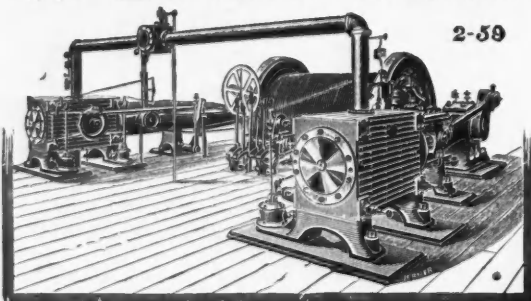
(ENDLESS OR TAIL ROPE SYSTEMS).

AKRON CORLISS ENGINES.

Boilers, Cages, Sheaves, Buckets, etc.

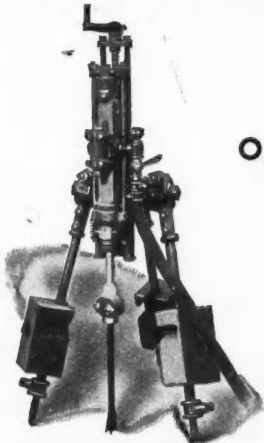
AKRON, OHIO, U. S. A.

CABLE ADDRESS: WEBCAMPOO, AKRON—A. B. C. Code, 4th Edition.



Sullivan Rock Drills.

RAPID, STRONG, CONVENIENT, FOR MINING, SHAFT SINKING, TUNNELING.



SULLIVAN DIAMOND PROSPECTING DRILLS

Operated by Hand, Horse Power, Steam, Compressed Air and Electricity.

CONTRACTORS FOR PROSPECTING WITH THE DIAMOND DRILL.

SULLIVAN MACHINERY CO.,

Cable Address, Diamond, Chicago.

Codes:
A. B. C., 4th Edition.
Postal Directory.
Western Union.
Lieber's

54 to 60 North Clinton Street, Chicago, Ill., U. S. A.

AGENCIES—339 5th Ave., Pittsburg, Pa.; 332 17th St., Denver, Colo.;
Empire Building, 71 Broadway, New York; Henshaw-Bulkley
& Co., San Francisco, Cal; H. P. Simpson, Agent for Penn-
sylvania, Scranton, Pa.



JOHN MUIRHEAD & SON, ESTABLISHED 1869.

CONTRACTORS.

Prospecting for Coal, Iron, Lead, or other Minerals, with
Diamond Core Drills, Removing a Complete Core. . . .

Bore Holes for Rope, Steam, Water and Culm, any depth and
any size up to and including 24 in. in diameter. . . .

CARBONS FOR DIAMOND DRILLS. . . .

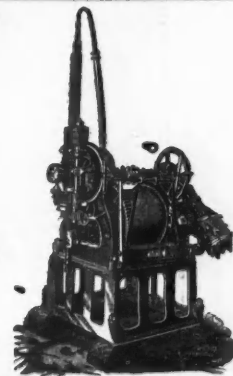
OIL, GAS and ARTESIAN WELLS.

DIAMOND SETTING A SPECIALTY.

State Agents for Pennsylvania for the M. C. Bullock Mfg. Co.'s
Diamond Prospecting Core Drills and Supplies. . . .

All Work Guaranteed.

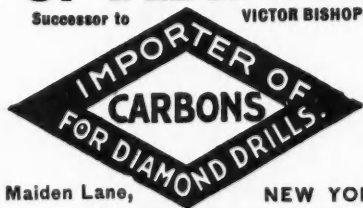
PITTSBURGH, PA.



THEODOR LEXOW
12 to 16 JOHN STREET
(Near Broadway)
IMPORTER OF

CARBONS
FOR
DIAMOND DRILLS
and all Mechanical Purposes.
HENRY DEMMERT.

Established 1837.
I. C. YAWGER,
Successor to VICTOR BISHOP & CO.



21 Maiden Lane, NEW YORK.

Diamond Prospecting Drills

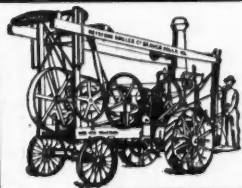


AMERICAN
DIAMOND ROCK
DRILL CO.,
120 Liberty Street, N. Y.
P. O. Box 1442.

The BEST PULVERIZER

is the WEST for grinding all
kinds of substances. Both wet
and dry.

THE WEST PULVERIZER CO.,
St. Paul Building, NEW YORK.



THE KEYSTONE DRILLER

FOR TESTING PLACER GROUND,

Or drilling deep test holes in ANY formation—gravel, boulders, and rock.
Drives 6 and 8-inch pipe, or drills holes that size in rock and produces at the
surface everything found. Can be used on boat to explore river beds to bed-
rock. Water no hindrance. Drills water and oil wells quickly, cheaply,
without skilled labor. Self-moving; each outfit complete

Unexcelled for Zinc and Lead Testing.

Multitudes In Use.

THE KEYSTONE DRILLER CO., BEAVER FALLS, PA., U. S. A.

The Miners' Pocket-Book. By C. G. W. LOCK

An admirable pocket book for miners, mine surveyors, mill-men, geologists, assayers, mineralogists,
metallurgists, and others interested in these subjects, with divisions on motive and transmitting power,
prospecting tools, drilling and blasting, shaft sinking, pumping, ventilation, lighting, coal cutting,
hauling and hoisting, ore dressing, mine surveying and assaying; including a complete and inexhaustive
glossary and index, together with numerous tables.

18mo, Cloth, Flexible Leather. PRICE, \$5.00.

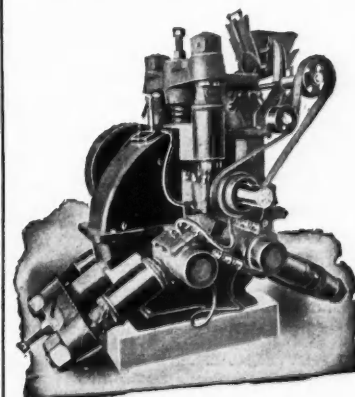
THE SCIENTIFIC PUBLISHING COMPANY, 253 Broadway, New York.

BLAKE PATENT STONE BREAKERS.

PIG IRON BREAKERS.

THEO. A. BLAKE, New Haven, Conn.

A DRY PULVERIZER.



FOR ORES, CEMENT and
HARD SUBSTANCES.

Equals a 50-ton stamp mill. Grinds 8 to 250 mesh.
No slimes, no choking.
No special foundation.
No internal screens.
No oil in product.
Can be used wet.
Guaranteed for one year.
Little wear, no duplicate parts, no breakdowns.
Cost 1/4 to 1-10 of any installation of same capacity.
Takes only one-half the horse power.

For particulars and catalogue

KENT PULVERIZER.

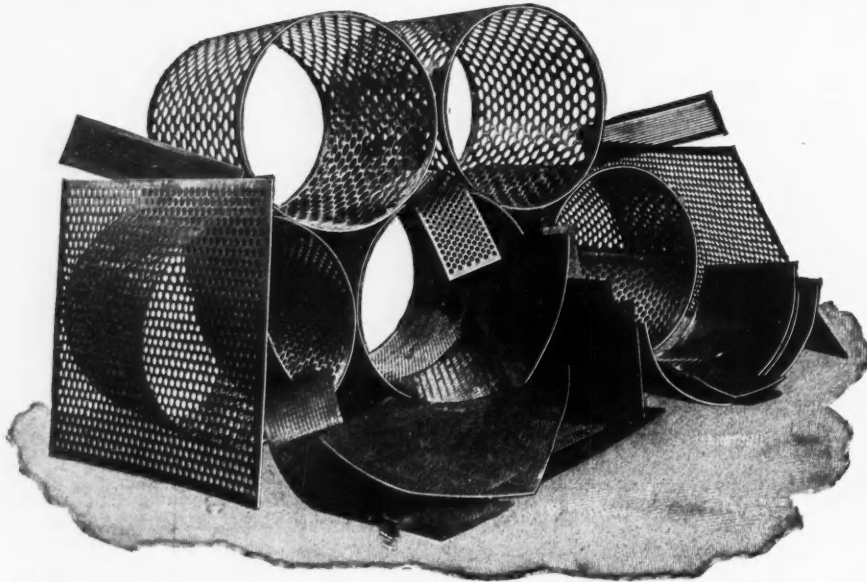
KENT MILL CO., 5 Beekman St
NEW YORK.

FRASER & CHALMERS,

CHICAGO, ILL., U. S. A. LONDON, ENGLAND.

Mining Machinery.

Stamp Mills, Rock Crushers, Smelting Furnaces, Huntington Mills.



PERFORATED METALS A SPECIALTY.

Samples sent on request.

HOISTS—Exclusive makers of Riedler Pumps and Air Compressors.

ROLLS.

When in need of any mining or metallurgical machinery be sure and get our figures "We like to make estimates," and will give your inquiries careful attention.

General Agency for Green Blowers.

FRASER & CHALMERS.

SHIFFLER BRIDGE COMPANY,

PITTSBURGH, PA.

STEEL BUILDINGS FOR MINES, BRIDGES and GENERAL STRUCTURAL WORK.

1214 Betz Building, Philadelphia, Pa.
45 Broadway, New York, N. Y.

BRANCH OFFICES:

228 Lumber Exchange, Minneapolis, Minn.
1243 Marquette Building, Chicago, Ill.

Office Room 903-906,
Schiller Building,
103 Randolph Street.

CARL BINDER, Engineer and Contractor,

CHICAGO, ILL.

Sole Licensee for United States, Canada and West Indies of

OTTO AERIAL WIRE ROPEWAYS

The best and most economical method of transportation. Applicable for any desired length and in the most difficult country. Estimates furnished, Plants designed and built in full working order. Also other systems of wire rope transportation

BRIDGES AND STRUCTURAL IRON WORK OF EVERY DESCRIPTION.

WITH THE LATEST
PATENTED
IMPROVEMENTS.

STEDMAN'S FOUNDRY AND MACHINE WORKS,

17 GEORGE ST., AURORA, INDIANA,

MANUFACTURERS OF IMPROVED

Disintegrators and Pulverizers

FOR REDUCING

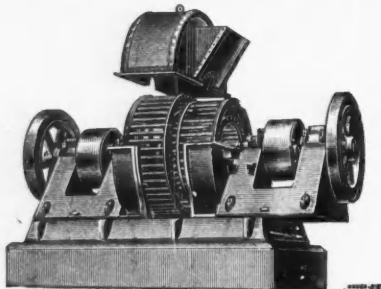
CLAYS, IRON ORES, COAL, ETC., FOR
VARIOUS PURPOSES.

Graphite Crucibles and Slag for use in Rolling Mills.
Guano, Phosphate, Bones, etc., for Fertilizers.

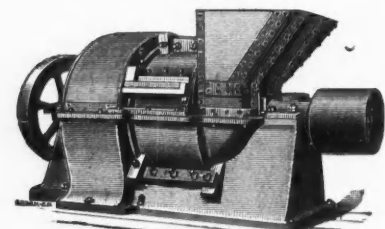
We have positively the best and most satisfactory mill on the market. This machine is a perfect success for breaking up or pulverizing GOLD and SILVER SLIMES.

Write for Illustrated Catalogue and Prices.

Our Mills for Crushing Coal to Make a Superior Quality of Coke are Indorsed by all the Leading Coal and Coke Companies.



STEDMAN'S DISINTEGRATOR.



STEDMAN'S HAMMER PULVERIZER.

All the Mining Camps of
UTAH
are located on or reached by



Eureka, Mammoth, Silver City,
Bingham, Park City,
Mercur, Gold Mountain,
Marysvale,

**LA SAL MOUNTAINS,
HENRY MOUNTAINS
BLUE MOUNTAINS**

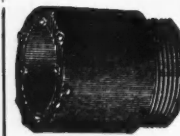
Tintic Mining District,

And the Promising Placers of the
Green, Grand and Colorado Rivers
Are best reached by the

Rio Grande Western Railway.

For information concerning any of
the above mentioned districts,
write the General Passenger Agent.

D. C. DODGE, S. H. **BABCOCK,**
Vice-Pres. and Gen. Mgr. Traffic Manager.
F. A. WADLEIGH,
General Passenger Agent, Salt Lake City.



HERMAN LEVY,

65 Nassau St., New York.
(Prescott Building)

—IMPORTER OF—

CARBONS

FOR

DIAMOND DRILLS

And all Mechanical Purposes.

The Manufacture of Briquettes

BY PHILIP R. BJORLING.

The only treatise extant on this particular industry, written and compiled with the utmost care and faithfulness, and profusely illustrated with illustrations, diagrams and working drawings. Can be exclusively secured in Volume VI. of **THE MINERAL INDUSTRY.** Price (post paid) \$5.00.

THE SCIENTIFIC PUB. CO., 253 Broadway, N. Y.

THE ACKNOWLEDGED

PERFECT

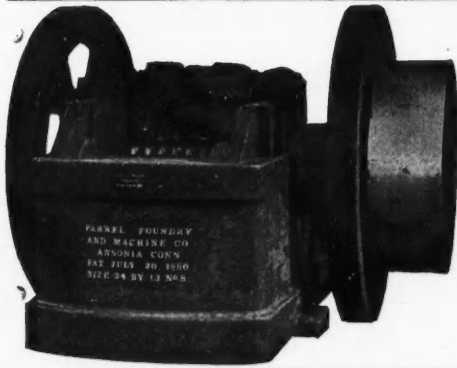
PULVERIZER

OF ALL REFRACTORY SUBSTANCES IS
"THE GRIFFIN MILL."

MANUFACTURED EXCLUSIVELY BY

BRADLEY PULVERIZER COMPANY, Boston.

SEND FOR CATALOGUE.

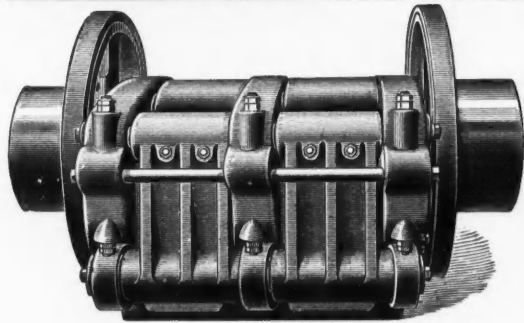


THE FARREL } Blake Pattern CRUSHER

Standard of the World
Strongest and Best. ORE and ROCK

FARREL FOUNDRY AND MACHINE CO.

EARLE C. BACON, Engineer,
HAVEMEYER BUILDING, NEW YORK.



BUCHANAN'S ROCK AND ORE BREAKER.

GEO. V. GRESSON CO.
PHILADELPHIA, PA.

BUCHANAN ORE CRUSHERS.

All parts subjected to direct strain made of Open Hearth Steel Made Single or Duplex.

MAGNETIC SEPARATORS

For all classes of work. (Three styles.)

BUCHANAN CRUSHING ROLLS.

Phosphor Bronze Bearings. Highest Grade Built. Automatic Feed. Three Sizes.

C. G. BUCHANAN,

Consulting Engineer.

141 Liberty St., NEW YORK, U. S. A.

WRITE FOR SPECIFICATIONS AND PRICES.

KROM'S PERFECTED STANDARD STEEL ROLLS

AND

ORE BREAKERS

For Crushing and Pulverizing Ores. Ore Feeders, Dry Kilns, Pneumatic Jigs. Plans for Crushing, Leaching and Concentrating Mills.

SEND FOR CIRCULARS.

S. R. KROM, 118 Plymouth St. JERSEY CITY, N. J.

THE McCULLY CRUSHER

ROCK and ORE

Greater than the Greatest on Earth.

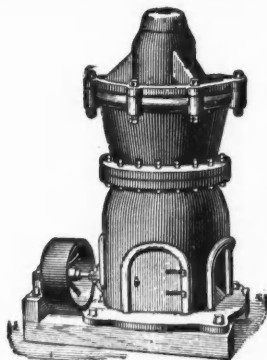
GUARANTEED to do more work with one-half less power than any other Crusher now known.

Received two Awards at the World's Columbian Exposition at Chicago, Medal and Diplomas. The only awards given for this type of Crusher.

And received an Award and Medal at the "Mid-Winter Fair, '99, San Francisco, Cal.; and also First Premium Diploma of Honor and Gold Medal at the Atlanta, Ga., Exhibition, 1895. Send for Catalogue or further information to

R. McCULLY,

1334 Callowhill Street, PHILADELPHIA, PA.



THE DENVER REPUBLICAN.

THE LARGEST AND BEST DAILY PAPER IN COLORADO.

The latest mining news from all Colorado mining camps, including Cripple Creek and Leadville. Subscription price, 65 Cents per month. \$7.50 PER YEAR.

ADDRESS: DENVER REPUBLICAN, Denver, Colorado.

ONLY

FINE CRUSHER

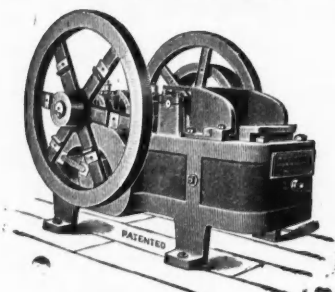
FOR ORES.

DOES THE WORK OF

CRUSHER AND ROLLS

COMBINED.

BREAKS LARGE, or when set close reduces to GRAVEL and SAND.

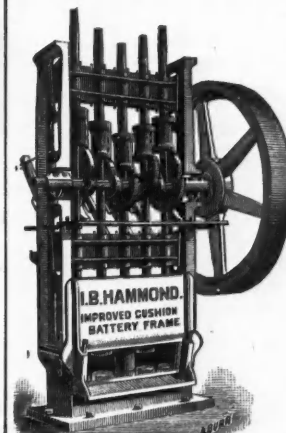


ROLL JAW CRUSHER.

STURTEVANT MILL CO., BOSTON, MASS.

HAMMOND MAN'G CO.

MANUFACTURERS OF
Iron-Framed
Self-Contained
Cushion
Battery



Stamp Mill.

Patented in the United States and Foreign Countries.

ORE FEEDERS,
TRAMWAYS,
ETC., ETC.

Send for Catalogue and Price-List.

69 First St. Portland, Ore

Self-Contained Five-Stamp Mill.

JEFFREY

**ELEVATORS
 AND
 CONVEYORS**
**WIRE CABLE
 CONVEYORS**
 For long and short
 distance conveying.
THE JEFFREY MFG. CO., Columbus, Ohio
 SEND FOR CATALOGUE. 41 DEY STREET, New York.

The Jeffrey Manufacturing Co.,

COLUMBUS, OHIO, U. S. A.
 DENVER BRANCH: No. 521 Seventeenth Street,

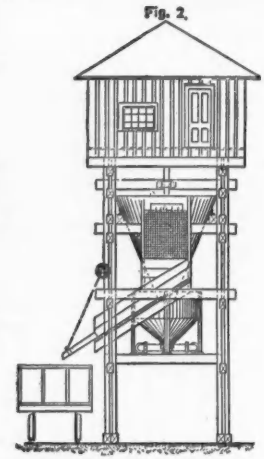
Elevating and Conveying Machinery

DESIGNED TO SUIT ALL CONDITIONS.

ALSO MANUFACTURE

Coal Mining Machines, Coal Washing Machinery,
 Electric Locomotives, Screening Machinery,
 Electric Drills, Electric Pumps, Dynamos, Motors, Etc.

SEND FOR 1899 CATALOGUE



JEFFREY COAL WASHER

ROBINS BELT CONVEYORS

FOR ORE, TAILINGS.

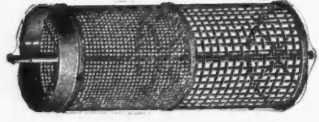


FOR COAL, GRAVEL.

AVOID REPAIRS, SHUT DOWNS, SCRAPING.
 Cut shows Belt Conveyors carrying Coal from Rolls to Bins at Plant of Davis Coal and Coke Company, Thomas, W. Va.

ROBINS CONVEYING BELT CO., 147-9 Cedar St., NEW YORK.

Aultman



Double discount the cost of handling material by using our special labor saving appliances for this purpose.

Write us, giving conditions and requirements. Catalogue "C" on application.

THE AULTMAN COMPANY,
 920 South Market Street,
 CANTON, OHIO, U. S. A. No. 6.

BRODERICK & BASCOM ROPE CO.,
 SOLE MANUFACTURERS OF

ESTABLISHED 1875.

"PATENT STEEL" ROPE.

ST. LOUIS, MO.

The Most Durable Rope Made. It Has No Equal.
 SEND FOR ILLUSTRATED CATALOGUE.

The Mineral Resources of Colorado.

Colorado is now acknowledged to be the greatest mineral producing state, and yet its treasure vaults have hardly been opened. The hills in whose bosoms still lie untold riches have only been scratched over.

Concise and carefully prepared pamphlets have been issued by the Passenger Department of "The Colorado Road," Colorado & Southern Ry., on the different mining districts of the State. These publications will be sent upon receipt of stamps to prepay postage, as follows:

Breckenridge Gold Belt.....1c.
Hints to Prospectors.....1c.
Pine Creek.....1c.

Address T. E. FISHER,
 General Passenger Agent, Denver, Colo.

A NEW BASIS FOR CHEMISTRY.
 By THOMAS TERRY HUNT.

A phenomenally interesting chemical philosophy written in an absorbing and happy style, appealing directly to the student and general reader who are employed in the study of the ultimate nature of material and the elemental methods engaged in the formation of the different species. Skillfully subdivided in important divisions consisting of The Proposed New Theory of Chemistry—Nature of the Chemical Process—Chemistry Distinguished from the Physics—Genealogy of Species—Genesis of the Chemical Elements—Gases, Liquids, Solids and the possibility of fixing their equivalent weights—The Law of Numbers—Hardness of Chemical Indifference—The Atomic Hypothesis—The Law of Volumes—Metamorphosis of Chemistry—The Law of Densities and a Historical Retrospect. 16mo, Cloth, in compact size equally available for the Pocket or Library shelf.

PRICE, \$2.00.

THE SCIENTIFIC PUBLISHING CO., 253 Broadway, New York.

GATES IRON WORKS

Not only build Mining Machinery, but

CEMENT MACHINERY.

Modern Plants Designed and Built. Crushers, Barrel Pulverizers, Rotary Kilns, Etc.

WE ARE UP TO DATE ON THIS.

ADDRESS DEPT. E. 650 ELSTON AVE., CHICAGO, ILL.

COAL AND ORE HANDLING MACHINERY.

Cranes of all Types, Electric, Steam and Hand Power.

BROWN HOISTING & CONVEYING MACHINE CO., CLEVELAND, O.

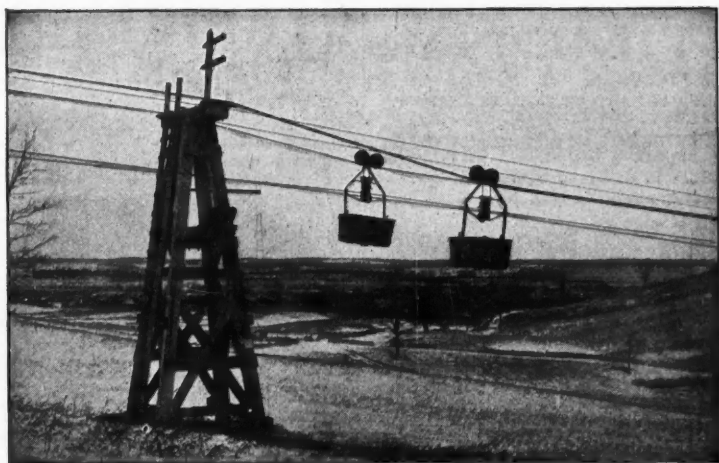
NEW YORK, Havemeyer Building.

LONDON 39 Victoria St., Westminster, S. W.

PITTSBURG, Carnegie Building.

The Bleichert Wire Rope Tramway,

AND OTHER SYSTEMS OF AERIAL TRANSPORTATION.



Bleichert Tramway of the Solvay Process Co., Transporting Rock.

MANUFACTURED BY **THE TRENTON IRON CO., TRENTON, N. J.**
 Engineers and Contractors, and sole licensees in North America for the Bleichert System. Also Wire Rope
 Equipments for Surface and Underground Haulage, etc.
 NEW YORK OFFICE—Cooper, Hewitt & Co., 17 Burling Slip. CHICAGO OFFICE—1141 Monadnock Building.

CHEAP TRANSPORT IMPROVED

AERIAL WIRE ROPEWAYS

(Roe & Bedlington Patents).

ADVANTAGES OVER OTHER SYSTEMS

- Economy in Cost of Working.
- Simplicity of Construction with High-Class Materials.
- Long Spans and Steep Gradients Overcome.
- Reduced Wear of Cables and Few Supports.

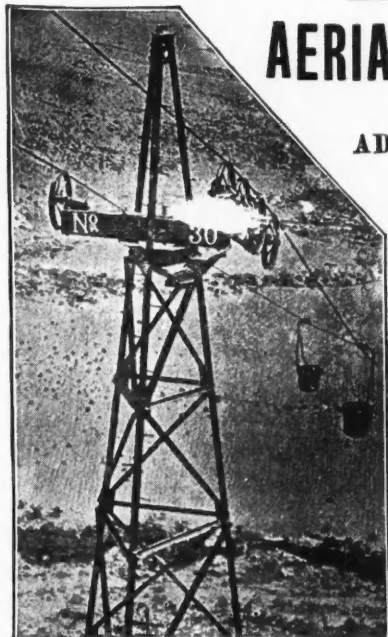
A System Unequalled for Cheapness of Transport, Especially in Mountainous Districts.

Estimates, Pamphlets and Full Particulars on application, to the Proprietors of the Patents:—

ROPEWAYS SYNDICATE Ltd

150, Leadenhall St., LONDON, E. C.

Telegrams, "Ropeways, London."



New Jersey Foundry & Machine Co.,

Havemeyer Building, New York.

TELEPHONE 1272 CORTLANDT.

Will Travel in 30-inch Radius.



Conveying Machinery.

Overhead Trackage Systems, Electric Power and Lighting Plants,

Mining, Foundry, Quarry and Contractors' Supplies
 Worm Wheels and Worms
 Spur Gears, Cut Grooved Sheaves and Sprocket Wheels.

No. 3.

Hand-Made Chains for Mining, Hoisting and Wrecking Purposes.
FOR CRANES, STEAM SHOVELS, ETC.

Locations for Industries.

The Chicago, Milwaukee & St. Paul Railway Company has all its territory districted in relation to resources, adaptability and advantages for manufacturing, and seeks to secure manufacturing plants and industries where the command of raw material, markets and surroundings will insure their permanent success.

A number of new factories and industries have been induced to locate—largely through the instrumentality of this company—at points along its lines.

The trend of manufacturing is Westward. Confidential inquiries are treated as such. The information furnished a particular industry is reliable.

Address

LUIS JACKSON,

Industrial Commissioner, C., M. & St. P. Ry.
 660 Old Colony Building, Chicago, Ill.



WHY NOT PRESERVE YOUR

**WIRE ROPES,
 MANILA ROPES,
 GEARING.**

THE IRONSIDES COMPANY,

COLUMBUS, OHIO, U. S. A.

Catalogue S tells how.

THE HALLIDIE ROPEWAY

FOR TRANSPORTING ORE, FUEL, MERCHANDISE, ETC., IN BULK OR IN PACKAGES.

SIMPLE - ECONOMICAL - INEXPENSIVE - PRACTICAL
LOADS MECHANICALLY DUMPS AUTOMATICALLY

SEND FOR ROPEWAY PAMPHLET NO. 20.

- CABLEWAYS INCLINE PLANES
- DOUBLE ROPE TRAMWAYS LOGGING MACHINERY
- WIRE ROPE TRANSMISSIONS SUSPENSION BRIDGES

DESIGNED, FURNISHED, ERECTED. WRITE FOR ESTIMATES.

CALIFORNIA WIRE WORKS, 11 Tremont St. San Francisco, Cal.

C. PASS & SON, LTD., BRISTOL, ENGLAND.

Sell { Soft Pig Lead, Antimonial Lead, Tin
and Antimony Alloys.
Buy { Dress or Residues Containing Tin,
Copper or Lead.

QUICKSILVER FOR SALE

BY
THE EUREKA COMPANY
OF SAN FRANCISCO.
426 California St., Room 1, San Francisco, Cal.
HAAS BROTHERS, Agents, 77 William St., New York.

JULIUS STERN & CO., NURENBERG, GERMANY, METAL MERCHANTS.

Buyers of all kinds and any quantities
of Ores, Old Metals, Ashes and Residues.
Brass Turnings and Chips Bought in any Quantities.

REFERENCES:
LADENBURG, THALMANN & CO., NEW YORK.

A NEW SOURCE OF IRON ORE SUPPLY.

The Spanish-American Iron Company's Bessemer, Hematite Ores.

Iron Mines near Santiago de Cuba, Island of Cuba.

These ores are in use in the United States of America and in England, Scotland, Wales, Germany and Belgium. Annual capacity, 300,000 tons.

London Office:
No. 7 Whittington Avenue, Leadenhall Street.

PICHER LEAD COMPANY,
MANUFACTURERS
SUBLIMED WHITE LEAD
AND
PIG LEAD.
Rooms 319-320, Western Union Building,
CHICAGO, ILL.

American Hypo-Sulphite of Soda and Miners' Chemicals.

F. E. ATTEAUX & CO.,
176 Purchase Street, - BOSTON, MASS.

ANTIMONY. MATHISON & CO.,

Office: 25-27 CEDAR STREET, NEW YORK.
Works: CHELSEA, STATEN ISLAND, N. Y.
BUY ANTIMONY ORES and CRUDE ANTIMONY.
Manufacturers U. S. Brand Star Antimony.

PHELPS, DODGE & CO.

SELLING AGENTS OF THE
Copper Queen Consolidated Mining Co.
Detroit Copper Mining Co., of Arizona.
United Globe Mines.

Dealers in TIN PLATE, SHEET IRON, PIG TIN,
LEAD, SPELTER, SHEET ZINC, INGOT
COPPER, SHEET COPPER, BRASS, ETC.

Cor Cliff and John Sts., NEW YORK.

CYANIDE BLEACHING POWDER.

MINERS' CHEMICALS.
ARSENIC.
FUERST BROS. & CO., 2 Stone St.
New York.

FILTER PRESSES



Denver.—WM. R. PEREIN & CO.,—Chicago.

A. M. DONALDSON & CO., WASTE PRODUCT
SMELTERS.
1661 Larimer Street, Denver, Colo.

We buy small lots very rich Ores, Tellurides, Gold and
Silver Bullion and Values of any kind. Will smelt
Souvenir Bar from original ore

PENN SMELTING and REFINING WORKS.
ASSAYING, REFINING, TESTING, Etc.
GOLD, SILVER, PLATINUM, ETC., BOUGHT
903 FILBERT STREET, PHILADELPHIA, PA.

The Denver, Leadville & Gunnison Railway.

The Colorado Scenery Route.

70 to 128 miles shorter than other
lines Denver to Leadville. . . .
Through wonderful Platte Canon.

T. E. FISHER, Ass't Gen'l Pass'r Agt.,
DENVER, COLO.

Witwatersrand

GOLD FIELDS.

THE SOUTH AFRICAN MINING JOURNAL
AND FINANCIAL NEWS,

Published in Johannesburg, Transvaal, South
Africa, every Saturday. Address P. O. Box 963.
Annual subscription, £2 2s. od.; half yearly,
£1 5s. od., payable in advance by bank draft or
P. O. order.

It is the best medium for advertising all kinds
of machinery and farming implements. See the
number of successful American mine managers
now on these fields.

Agents for the Journal wanted all through the
United States. Liberal commission paid to good
men.

Johannesburg, South African Republic,
SOUTH AFRICA.



The Gold and Silver Extraction Co. of America, Ltd.

CAPITAL \$550,000.

THE ORIGINAL CYANIDE PROCESS.

SIMPLE, RELIABLE, ECONOMICAL.

MINE Owners and others having Refractory and Low Grade Gold and
Silver Ores and Tailings should have their material tested by . . .

THE MACARTHUR-FORREST CYANIDE PROCESS.

Samples assayed and fully reported upon. Properties examined.
Designs furnished. Particulars upon application.

Geo. A. ANDERSON, General Manager. J. STANLEY MUIR, Technical Manager.
210 McPHEE BUILDING, DENVER, COLORADO.

FILTER PRESSES FOR FILTERING SLIMES,

.....ALSO FOR.....

OIL, CHEMICALS, ETC.

Also Manufacturers of Air Compressors and Pumping Machinery for all purposes.

THE STILWELL-BIERCE & SMITH-VAILE CO., DAYTON, OHIO.

Matthiessen & Hegeler Zinc Co., LA SALLE, ILLINOIS.

Special Sizes of Zinc cut to order. Rolled
Battery Plates. Selected Plates for Etchers'
and Lithographers' use. Selected Sheets for
Paper and Card Makers' Use. Stove and
Washboard Blanks.

—ZINCS FOR LECLANCHE BATTERY.—



SMELTERS OF SPELTER

..... AND MANUFACTURERS OF

SHEET ZINC and SULPHURIC ACID.

Lead Lining for Chlorination Tubs.

Aluminum Copper Anti-Friction Metal, Standard Babbit
Metals, Ingot Brass and Bronze.

RAYMOND LEAD COMPANY, Chicago, Ill.

—Write for Prices.—

Mine Accounts and Mining Book-keeping,

BY JAMES GUNSON LAWN,

A Manual for the Use of Students, Managers of Metalliferous Mines and Collieries,
and Others Interested in Mining.

WITH NUMEROUS EXAMPLES FROM THE ACTUAL PRACTICE OF LEADING MINING COMPANIES,
including elaborate divisions on pay sheets due bills and pay tickets, engagement and payment of
workmen, purchase and distribution of stores, sales of product, summaries of minerals raised, dressed
and sold, labor analyses, head office accounts and the redemption of capital, reports of inspections of
mining companies and general mining statistics. Royal 8vo, cloth, price, \$4.25.

THE SCIENTIFIC PUBLISHING CO.,
253 Broadway, New York,

 **Buy the Best.** **None Better.** 

IN TWO STYLES.—LIBRARY EDITION, CLOTH, 12mo. \$2.00.
POCKET EDITION, FLEXIBLE MOROCCO COVER, SPECIAL PAPER, 2.50.

Prospecting, Locating and Valuing Mines.

A Practical Treatise for the use of Prospectors, Investors and Mining Men generally; with an account of the Principal Minerals and Country Rocks; Ore Deposits; Locations and Patents; the Early Development of Mines; Earthy Mineral Products; Coal; Gold Gravels and Gravel Mining; Measurement of Water; and Artesian Wells.

WITH FIFTEEN PLATES.

By **R. H. STRETCH, E.M.**

BY FAR THE BEST BOOK OF ITS KIND. INVALUABLE TO ALL WHO ARE INTERESTED IN MINING.

CONTENTS.

<p>CHAPTER</p> <p>I. Introductory—Mistakes in Mining.</p> <p>II. What Constitutes a Mine.</p> <p>III. Rock-forming Minerals and Rocks.</p> <p>IV. Physical Character of Mineral Deposits.</p> <p>V. Origin of Veins.</p> <p>VI. Filling of Mineral Veins.</p> <p>VII. Influence of Rocks on Vein Filling.</p> <p>VIII. Mineral Deposits Other than Veins.</p> <p>IX. Prospecting.</p> <p>X. Making Locations.</p>	<p>CHAPTER</p> <p>XI. Patents to Mining Ground.</p> <p>XII. Early Development of Mines.</p> <p>XIII. Ores.</p> <p>XIV. Useful Earthy Minerals, etc.</p> <p>XV. Coal.</p> <p>XVI. Gold Gravel Deposits.</p> <p>XVII. Water and Its Measurement.</p> <p>XVIII. Artesian Wells.</p> <p>Useful Tables.</p> <p>Good Books of Reference.</p>
---	--



8vo, Cloth. Price, \$6.00 Postpaid.

THE METALLURGY OF LEAD

and the Desilverization of Base Bullion.

By **H. O. HOFMAN,**

Professor of Metallurgy, Massachusetts Institute of Technology.

FIFTH EDITION, REWRITTEN AND ENLARGED.

The Recognized Standard Authority Describing Advanced American Practice, Replete with Illustrations and Working Drawings.

DESCRIPTION.

The **Metallurgy of Lead**, by Prof. H. O. Hofman, the fifth edition, which has just been published, has been entirely rewritten from the fourth edition and greatly enlarged, both in text and illustrations. This treatise since its first publication has been the standard authority on the metallurgy of lead as practiced at the present time, and has received the highest praise from metallurgists practically engaged in lead smelting. The new and enlarged edition is more valuable than its predecessors, on account of its introduction of much new matter, while the accounts of practice in all parts of the world, but especially in the United States, have been brought strictly up to date. The new engravings, based on actual working drawings, which have been added to the book, are in themselves worth its price. Hofman's **Metallurgy of Lead** treats of lead smelting by all the methods which are in vogue to-day, and the refining and desilverization of the base silver-lead bullion. No space is wasted upon antiquated methods, and the treatise as it is presented is indispensable both to the student beginning the subject and to the experienced metallurgist.

TABLE OF CONTENTS.

Part	I. Introductory.
Chapter	I. Historical and Statistical Notice.
Chapter	II. Properties of Lead and of Some of Its Compounds.
Chapter	III. Lead Ores.
Chapter	IV. Distribution of Lead Ores.
Chapter	V. Receiving, Sampling and Purchasing Ores, Fluxes and Fuels.
Part	II. Metallurgical Treatment of Lead Ores.
Chapter	VI. Smelting in the Reverberatory Furnace.
Chapter	VII. Smelting in the Ore Hearth.
Chapter	VIII. Smelting in the Blast Furnace. General Smelting Operations. Furnace Products.
Part	III. Desilverization of Base Bullion.
Chapter	IX. Pattinson's Process.
Chapter	X. Parkes' Process.
Chapter	XI. Cupellation.
	A. German Cupellation.
	B. English Cupellation.

THE SCIENTIFIC PUBLISHING CO., 253 Broadway, New York

"BURLEIGH"
ROCK DRILLS.
AIR COMPRESSORS,
 General Filing Machinery.
BURLEIGH ROCK DRILL CO.,
 Fitchburg, Mass.

The Engineers' Favorite.
POWELL'S SIGNAL OILER.



LEVER UP,
 Oil dropping.
 LEVER DOWN,
 Oil shut off.
 Movement of the lever
 doesn't interfere with
 the adjustment.
**THE MOST PERFECT
 OILER IN THE WORLD.**
 TRY IT AND BE CONVINCED.
 SEND FOR SAMPLE.
 MANUFACTURED BY
THE WM. POWELL CO.,
 CINCINNATI, O.
 NEW YORK AGENCY:
H. H. BEALS, 51 Cliff Street.

A GOLD MINE, the ENGINEERING AND MINING JOURNAL. Send postal for a copy.

MONTANA ORE PURCHASING CO.

F. AUG. HEINZE, Pres. and Genl. Mgr. ARTHUR P. HEINZE, Sec.
 JOHN MACGINNISS, Vice-Pres. STANLEY GIFFORD, Treas.
 Authorized Capital, \$2,500,000; Issued, \$2,000,000.
 Surplus, \$1,250,000.

PURCHASERS, SMELTERS AND REFINERS OF
COPPER, SILVER AND GOLD ORES.

Smelting Works: BUTTE, MONT.
 Offices: BUTTE, MONT., and 100 BROADWAY, NEW YORK.

WESTON ELECTRICAL INSTRUMENT CO.,



WESTON STANDARD PORTABLE DIRECT READING VOLTMETER.

114-120 WILLIAM ST., NEWARK, N. J. U. S. A.
 Weston Standard Portable Direct Reading Voltmeters, Millivoltmeters, Voltammeters, Ammeters, Milliammeters, Ground Detectors and Circuit Testers, Ohmmeters, Portable Galvanometers.

OUR Portable Instruments are recognized as THE STANDARD the world over. The Semi-Portable Laboratory Standards are still better. Our Station Voltmeters and Ammeters are unsurpassed in point of extreme accuracy and lowest consumption of energy.

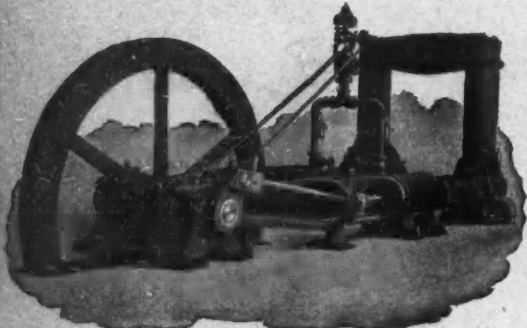
LUBRICATES ANY THING

HELMET OIL

10-12 N. CANAL ST.
C.H. BESLY & CO.
 CHICAGO, ILL. U.S.A.

THIS SPACE FOR SALE.
 \$169.50 a Year.

AIR COMPRESSORS AND ROCK DRILLS.



ALL SIZES.
 ALL PURPOSES.

RAND DRILL CO.,
 100 BROADWAY, NEW YORK CITY.

FIRE SAND FOR COPPER AND STEEL FURNACE BOTTOMS.

The fire sand we are producing has been used for many years by the leading copper works and manufacturers of open hearth steel. It is especially adapted for making furnace bottoms, fettling and other purposes. We are now turning out various grades of fineness, and samples will be cheerfully sent on application. Regular shipments guaranteed at all seasons.

THE JAMES D. PECK FIRE SAND CO.,
 68 Beaver Street, NEW YORK.

For Sale.
 Silica sand land, tract 61a.; been tested with best results in Copper Smelting, Steel and Glass Furnaces; same vein as the Jas. D. Peck Sand Co. Sand can be put on cars for 60 cts. per ton. Price \$4,000 if sold at once.
THOMAS EACHUS, East Downington, Pa.

THIS SPACE FOR SALE.
 \$130.50 a Year.

THIS SPACE FOR SALE.
 \$205.50 A Year.

CHEMICAL AND GEOLOGICAL ESSAYS.

By **THOMAS STERRY HUNT, M. A., LL. D.**
 A Prominently Brilliant Work on the Fundamental Principles of Geogeny, Mineralogy and Geognosy with Special Divisions on the Chemistry of Metamorphic Rocks—Chemical Geology—Igneous Rocks and Volcanoes—Dynamical Geology—Chemistry of the Primeval Earth—Genesis of Mountains—Limestones—Dolomites and Gypsums—Chemistry of Natural Waters—Origin of Metalliferous Deposits—Cambrian and Silurian Geology—The Object and Methods of Mineralogy and Petroleum Asphalt Pyrochists and Coal.

Royal 8vo, Cloth. Price, \$2.50.
THE SCIENTIFIC PUBLISHING CO., 253 Broadway, New York.

Peter T. Austen, Ph.D. Frederick J. Maywald, Lawrence S. Mott,
 President. Vice-President. Sec. and Treas.

The Austen Chemical Research Co.
 Experimental Investigation of Technical Problems. Research work for Manufacturers. Improvement and Invention of Processes and Products. Utilization of Wastes and Unapplied Substances. Reduction of Manufacturing Costs. Testing, Perfecting, Introducing and Disposing of Processes and Products. Manufacturing Formulas.

CIRCULAR ON APPLICATION.
 TELEPHONE, 2142 BROAD. 52 Beaver Street, New York.

THIS SPACE FOR SALE.
 \$169.50 a Year.

THIS SPACE FOR SALE.
 \$306 a Year.

S.
ne
ly
be
is.
K.