

THE ENGINEERING AND MINING JOURNAL



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

Vol. LXI. JUNE 27. No. 26.

RICHARD P. ROTHWELL, C. E. M. E., Editor
 ROSSITER W. RAYMOND, Ph. D., M. E., Special Contributor.
 SOPHIA BRAEUNLICH, Business Manager.
 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.
 The address slip on the paper will show date of expiration of subscription. When change of address is desired both old and new address should be sent.
 NOTICE OF DISCONTINUANCE.—The JOURNAL is not discontinued at expiration of subscription but is sent until an explicit order is received by us, and all arrears are paid as required by law. The courts hold a subscriber responsible until the paper is paid for in full and ordered discontinued. PAPERS RETURNED ARE NOT NOTICE OF DISCONTINUANCE.

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

(Cable Address, "ROTHWELL," New York. Use McNeill's or A B C 4th Edition Code.)

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

CONTENTS.

	Page.
The Playa de Oro Placers, Ecuador.....	609
The Cycle and Horseless Carriage Boom in England.....	609
British Columbia.....	609
The Future of Gold and Silver Production.....	610
New Publications.....	610
Books Received.....	611
Butte & Boston.....	Leumas 611
Electrolytic White Lead.....	Charles P. Orne 611
Peculiar Perforation of Zinc Rods.....	Charles E. Munroe 611
The Geologic Polyolith.....	612
Gold Mining in the Khanate of Bokhara.....	David Ruffaann 612
A Device for Cyanide Experimenters.....	W. J. Sharwood 613
* The Dodge Pulverizing Mill.....	613
Lead and Zinc Deposits of Iowa.....	A. G. Leonard 614
* A Bodie Gold Stamp Mill.....	Robert Gilman Brown 615
A New Lubricant for Railway Car Axles.....	A. M. Gibson 616
* The Gold Mining Industry in Georgia and Alabama.....	Wm. M. Brewer 617
Recent Decisions Affecting the Mining Industry.....	618
Patents Relating to Mining and Metallurgy.....	618
Notes: The Hudson River Tunnel at New York, 613—The Eichenauer Geyser, 613—Cost of Electric Power with Producer Gas, 613—Korean Railway, 614—Aluminum Cooking Utensils, 614—The Corinth Canal, 618—Electric Lighting Safest, 618—Coarse Crushing, 618—German Iron Market, 618.	

* Illustrated.

Personal..... 619	Oregon..... 622	Gold & Silver 626	Denver..... 628
Obituaries..... 619	Pennsylvania..... 622	Prices, Statistics, Imports and Exports 626	Los Angeles.. 628
Societies and Technical Schools..... 619	South Dakota.. 622	Foreign and Domestic Coms..... 626	Salt Lake City 628
Industrial Notes..... 619	Texas..... 622	Copper..... 626	San Francisco 629
Machinery and Supplies Wanted..... 619	Utah..... 622	Tin..... 626	London..... 629
Mining News: United States: Alaska..... 619	Washington... 622	Lead..... 627	Paris..... 629
Arizona..... 619	West Virginia. 622	Spelter..... 627	
California..... 619	Wyoming..... 623	Antimony..... 627	
Colorado..... 620	Foreign: Brazil..... 623	Nickel..... 627	
Georgia..... 620	Canada..... 623	Platinum..... 627	
Idaho..... 620	Mexico..... 623	Quicksilver... 627	
Illinois..... 621	South Africa.. 623	Minor Metals. 627	
Indiana..... 621	Late News... 623	Chemicals and Minerals: New York... 627	
Kentucky..... 621	Markets: Coal: New York... 623	Liverpool... 627	
Michigan..... 621	Buffalo..... 621	Miscellaneous Dividends... 629	
Minnesota..... 621	Chicago..... 624	Meetings..... 629	
Missouri..... 621	Pittsburg... 624	Dividends..... 629	
Montana..... 621	Metals: Iron: Pig Iron Production..... 624	Assessments... 629	
Nevada..... 621	New York... 624	Mining Stocks: New York... 628	
Nevada..... 621	Buffalo..... 625	Boston..... 628	
New Mexico... 621	Chicago..... 625	Chicago..... 628	
North Carolina. 621	Cleveland... 625	Cleveland... 628	
	Pittsburg... 625	Colo. Springs. 628	
	Philadelphia. 625		

The Playa de Oro Placers, Ecuador.

The paragraph on the Playa de Oro Mining Company, which appeared in our editorial columns in our issue of May 30th, has caused considerable disturbance among English shareholders and among the directors and agents of the company. As a result of some correspondence in the London financial press between them and our London representative, the present directors admit the past mismanagement and disown the exaggerated estimates of the value of the property made when the company was first started. Instead of claiming above \$1 per cubic yard, they put the average contents at 20c., and state that with their incomplete plant they are obtaining 13c. We have no wish to cast any reflection on the honesty of the present management, but we have no reason to alter our opinion about the actual value of the property and as to the probability of its earning a satisfactory dividend on the \$10,000,000 capital of the company. We may also add that our information concerning the property does not come from "discharged employees," though this might well be an excellent and reliable source; but it comes from thoroughly competent mining engineers who are familiar with the property and know what has been done there, how it has been done, and the results of the work. The most thankless task in the world is to give advice to people who do not want it, but when working results are obtained they will, we doubt not, confirm our statements.

The Cycle and Horseless Carriage Boom in England.

The British public dearly love a boom. Mining speculation is pretty strong at present in London, but it is quite eclipsed by the rage for cycle and horseless carriage companies. A good many companies, which are obviously wildcats, have already made their appearance, and in every case have been subscribed. The most shameless promotion of the batch is the Britannia Motor Company. This company has been formed to buy the patent rights of the Britannia Motor, but absolutely no information is given as to whether the motor is operated by steam, electricity, gas or magic. A picture is printed in the prospectus showing a box fixed round the axle of the carriage, and that is all the information from which the intending investor is to judge of the value of the patent and the prospects of the company. It is probable that the thing is not a rank swindle of the Keely type, because among the directors are two of the most eminent carriage builders in England. Their method of promoting, however, is most reprehensible, and, in the hands of the unscrupulous, is open to the greatest abuse. Though it is not so stated in the prospectus, the motor is an electric one, and it is driven by accumulators; but the promoters state that nothing but the motor is required, forgetting, either by accident or by intention, to mention that storage batteries have to be bought and handled. Thus their estimates of cost and of weight to be carried are entirely misleading.

British Columbia.

The attention that is now being paid to British Columbia as a promising and safe field for the investment of capital in mining enterprise is fully warranted by the past few years' development work carried out under great difficulties. These difficulties have consisted firstly, in the inaccessibility for many months in the year, under ordinary conditions, of some of the best mining territory, and secondly, even in the summer months, want of continuous communication by water and rail. The latter obstacle is being rapidly overcome, and the most important camps before snow comes again will be in much better shape for regular shipments and at fair freight rates instead of those they have hitherto experienced.

The former drawback, viz., that of a long and severe winter, cannot be changed, but it will be materially mended in the future by the railroad extensions now being carried out and which will be kept open just as are the Canadian Pacific and other Northern roads.

Trail Creek, with Rossland for its central point, has made already a remarkable record; in 1894 the total value of ore shipped was \$125,000, coming from three mines; while in 1895 the value of the shipments was more than \$1,000,000 and to judge from work now going on and shipments already made, it would not be surprising to see an aggregate of \$4,000,000 during the present year. Smelters are in successful operation, which will aid development materially, as hitherto only the higher grade ores have been able to stand the expense of freight, smelting charges and in some cases duty, by shipping to Helena, Tacoma, Kansas City and Omaha.

Nelson is also showing up as a most prosperous center to which the properties of the Hall Mines, Limited, most decidedly contribute in an important degree. The cost of fuel is not prohibitive, and the Hall Mines Company is sensible in matting its product before shipment, and we have no doubt that the example of this company will be followed by others and that both cost of treatment and freight to market will thus be materially reduced owing to increased and heavy tonnage over the railroads.

The Future of Gold Production.—II.

The active exploitation of the gold-bearing deposits which brought the production of the yellow metal in 1895 up to the highest point ever attained—to a total more than twice as great as that of 1896—is not by any means diminishing. Interest in gold mining is keener and more general than it has been for many years, and the amount of capital invested in the industry was largely increased during the year, while there is apparently no diminution of the willingness to invest further sums. The partial collapse of the great speculation in the Transvaal mining stocks and the disappointment encountered by English investors in West Australia, seem to have had little effect except to turn the tide of investment to the mines of other countries.

In the *Engineering and Mining Journal*, July 27th and August 3d, 1895, the peculiar conditions were noted which affect the mining of gold and silver, and the motives which lead men to engage in the pursuit of the precious metals, either as actual workers or as investors of capital. The experiences of the past year only serve to confirm the opinions then expressed, and to show that the causes there referred to are still producing, and will continue to produce the same effects.

While there is always a risk in predicting future events, at the present time it appears safe to say that the production of gold will continue to increase for some years to come. The yearly output may grow from \$200,000,000 to \$250,000,000, perhaps even to \$300,000,000, before the reaction sets in, and relative production begins to decline, as it has done in the past, and as experience leads us to believe that it will do again in the future. It will be of interest to review briefly the sources from which the never ceasing demand for gold is likely to be supplied in the immediate future.

The United States.—In our own country the growth of the past two or three years which culminated in 1895 with an output of \$46,830,200 has been founded in great part on a solid basis. The increase in California has come chiefly from the steady development of old mines, accompanied by improved methods and greater care and economy in milling the ores. Without counting on startling new discoveries there is abundant opportunity for further development in the mines of the Mother Lode and in other well-known and established fields.

In Colorado growth has depended much more than in California on new discoveries and the opening of new mines, but the record made in the old established mines of Gilpin County and other districts shows some notable gains. Cripple Creek has taught us also that the day of surprises is not yet over. In Utah there has been an increase which still continues, and there are great possibilities in the extensive deposits of low-grade ores now under development in the Mercur district. The ores of the Black Hills continue to yield steadily. Arizona and New Mexico are recovering from their period of depression. Perhaps the Northern gold fields present the greatest opportunities for future growth, since the undoubtedly great resources in Montana and Idaho have been but very little developed.

Australasia.—The increase in production in Australasia during the past two years from \$39,911,703 in 1894 to \$42,793,824 in 1895 has been to a considerable extent the direct result of the industrial and financial depression in the colonies. A business revival which would once more draw men back to manufacturing industries and the attractions of the towns would check this increase in some degree; but such a revival has not yet begun, and it would take two or three years to make its full effect perceptible. All expectations of any considerable increase from the widely advertised and heavily capitalized mines of West Australia are practically at an end. The variable and uncertain nature of the deposits has been pretty well demonstrated already, and the anticipations of extraordinary yields which the first discoveries of a few rich pockets excited have nearly all disappeared. The natural conditions of the Coolgardie gold region will always make mining expensive there and prevent the working of any but high-grade ores, and they never exist in any considerable quantity. Gold mining in some parts of West Australia may be profitable, but the very high-grade ores are rarely permanent dividend-payers, and the conditions are unfavorable for the cheap treatment of low-grade mines. Australia has still a vast unexplored territory, and it is quite probable that new discoveries may be made in the Northern Territory. The desert character of most of the country, however, with the lack of water and other difficulties have discouraged prospectors and make the discovery and opening of mines there a rather remote possibility. New Zealand is doubtless the most promising gold-producing colony of Australasia, and we look to it for very important development in the future.

South Africa.—At the beginning of 1895 there was a very common and generally expressed opinion that it was hardly possible to put a limit to the expansion of gold mining in the Transvaal, and many believed that an output of \$50,000,000 for the year was probable, while \$100,000,000 a year might be looked for by the year 1900, when all the deep-level mines of the

Witwatersrand would be at work. The actual results obtained in 1895 were \$42,993,869, which though a substantial increase over the previous year, was much below the expectations indulged in a year ago. The check to mining from the political troubles has been a serious one for the time, but its effects will be temporary only. In the end the majority will rule in the Transvaal, as it has finally done everywhere under parallel circumstances. The interests involved are too great to admit a doubt as to the final result; however it may be delayed by the stubbornness of the Boers and the able diplomacy of their leaders, who have understood so well how to take advantage of the mistakes of their opponents and the jealousies of the European powers. A much more serious question is the supply of labor for the mines. This has already proved insufficient, and the short supply has had a much greater share in checking the increase in production than the political troubles. The newer mines have been unable to get the men they need, and some of the older ones have had to postpone extensions which were planned, while the difficulty is increasing in spite of all the efforts made to remove it, which have thus far been confined to endeavors to induce natives to come to the Witwatersrand in greater numbers. The trouble is not in the absence of men, for the native population of the Transvaal and the neighboring countries is large enough to furnish more men than are wanted, if they could be induced to work steadily. The Zulus and Kaffirs make very fair miners and laborers under proper direction, but they will stay in the mines only for a short time. Their wants are few, and, like most Africans, they have little desire to accumulate wealth; a few months' work gives them all that they need for the time, and the motive for labor is gone. The suggestions so far made have not promised any solution of the problem. One proposal has been to import Italians from the sulphur mines of Sicily, where there is a surplus of labor; but poor as the miners there are, they have European wants and standards of wages, and they would not be content to live under discipline or to accept the fare and pay with which the African is content. Others have claimed that the natives can be taught civilized wants and the need of money to supply them; but this would be a long and difficult work, and, if successful, would involve demands for higher wages. We have dwelt on the question for the reason that it is by far the most important one affecting the future production. The Transvaal is a country of low-grade ores, and its growth and prosperity depend upon the possibilities of working cheaply. Cheap and abundant labor is an essential element, and without this no great advance in production is to be expected.

The poor results obtained in the first of the deep-level mines of the Witwatersrand must also be considered in forecasting the future of the country, though it is hardly possible to come to any definite conclusion on this point until more mines of this class are in working condition.

The mines of the Chartered Company's territory still remain chiefly in the prospect stage, and the developments of 1895 hardly give grounds for believing that they will be large producers at any early date.

Russia.—There is hardly any doubt that the Russian production, which in 1895 amounted to \$33,990,000, will continue to grow with increasing rapidity. Capital is being attracted to these mines both at home and abroad, and a beginning has been made in the introduction of improved methods and processes. The extension of the Siberian Railroad will cheapen the cost of supplies, provide labor and permit the introduction of machinery. There is every promise of the opening of new districts and of closer working in the old ones. Moreover, quartz or vein mining in Russia—especially in Siberia—has hardly been begun, and in this direction there are great possibilities in the future.

Other Countries.—Outside of the four great gold-producing countries, a considerable increase is probable. In Mexico gold mining is steadily increasing. There is a notable revival of interest in the mines of those South American countries which furnished the chief part of the world's supply in the sixteenth and seventeenth centuries. In the East capital is already going to work the gold deposits of the Malay Peninsula and the Philippine Islands, and it is quite possible that those of Borneo and the Dutch Islands will be developed. The demand for gold is not to be satisfied, nor will its pursuit become less attractive in the future than it has proved to be in the past.

NEW PUBLICATIONS.

CLAPP & COMPANY'S THIRD ANNUAL SOUVENIR BOOK COVERING THE BUSINESS OF LEADING AMERICAN EXCHANGES IN 1895. New York; Clapp & Co. Pages, 360.

The letters of Messrs. Clapp & Co., bankers and commission merchants, are admitted to be among the best that are sent out. They deal with all facts that either directly or indirectly affect prices, and their comments are so brief and pointed and so well supported by figures and facts, that no thinking business man can afford to be without this weekly visitor. The book is a reproduction of the weekly letters of 1895 and is illustrated. Prominent commercial and government buildings are shown, accompanied by a condensed history of the business done by the exchange and the department of Government occupying the building in the picture. Hardly any question can be asked by any person in regard to bonds, stocks, grain, provisions, cotton, wool, coffee, gold, silver or other United States

products that is not statistically answered in this book, and the tables are so well arranged that in very small space they generally tell the whole story for 10 or 20 years past. Banks will find more thorough condensations of all they want to know about the government finances, national and other banks, and the monetary system of the United States and the world than can be found elsewhere.

JOHNSTON'S ELECTRICAL AND STREET RAILWAY DIRECTORY FOR 1896. 832 pp., cloth; New York: The W. J. Johnston Company. Price, \$5.

This publication contains a list of electric light central stations, isolated plants, mining plants, street railways, telegraph, telephone and district messenger companies and manufacturers of and dealers in electrical and street railway apparatus, machinery and supplies. Attention is given to making the work strictly up to date, and its arrangement, the classification of names, companies and interests is made with its practical value for quick reference in mind. The names of managing officers, superintendents, electrical engineers and purchasing agents are given as well as prices paid for city lights in various parts of the country, number of electric cars in operation, etc. The scope of the work includes besides the United States, Canada, Mexico, Cuba, Central and South America, and its statistics show that in all these countries there are 2,711 electric lighting central stations with an aggregate paid-in capital of \$320,049,518, and 1,140 street railways with a paid-in capital of \$890,828,120. Of these railways, 828 with a mileage of 14,850, are operated by electricity, and 312 with a mileage of 2,300 by horse, steam or cable power. The directory shows 7,150 manufacturers, dealers and electrical engineers engaged in electrical pursuits, and these names are arranged in geographical order by states, cities and towns, in a classified order according to lines of business and alphabetically. The publishers deserve recognition for a valuable work.

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.

Jaarboek van het Mijnwezen in Nederlandisch Oost-Indië, 1895. Amsterdam, Holland; H. M. Printers. Pages, 131; illustrated.

Ministere de l'Industrie et du Travail de Belgique; Annales des Mines, 1896. Bruxelles; H. M. Printers. Pages, 272; illustrated.

The Distribution of Wealth. By Prof. John R. Commons. New York and London; Macmillan & Co. Pages, 258; with diagrams. Price, \$1.75.

Transactions of the Association of Civil Engineers of Cornell University, 1896. Ithaca, N. Y. Published by the University. Pages, 120; illustrated.

L'Or et le Diamant au Transvaal et au Cap. A Reprint from the Memoires de la Societe des Ingenieurs Civils de France. By Jules Garnier, Paris, France; Baudry & Cie. Pages, 33; illustrated.

CORRESPONDENCE.

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

Butte & Boston.

Sir: A few weeks ago the Butte & Boston reorganization committee had a meeting behind closed doors; according to the Bigelow methods the stockholders and bondholders were not informed of the result. The plan seems to be to ask stockholders to pay an assessment of \$10 per share; at least insiders and friends were asked to underwrite that amount with a liberal commission of \$1 per share. Whether underwriters are eager to come to the front with their signatures is doubtful. Why should they?

Stockholders wish to know, first, what has become of \$5,000,000 of capital and \$1,000,000 of bonds; second, what will this large assessment of \$2,000,000 be used for? It is reported that the Butte & Boston is not to be freed of its mortgage obligations under the proposed reorganization; third, stockholders expect an official statement by the receiver and his colleagues of the administration showing the true financial condition of the company, also a report on the condition of the mines and plant; and a statement as to the status of the litigation concerning certain mines. If this is not done, the stockholders should refuse to pay assessments and the stockholders should appeal to the courts for their rights. LEUMAS.

NEW YORK, June 8, 1896.

Electrolytic White Lead.

Sir: In your issue dated May 16th, 1896, I read an article entitled "Electrolytic Manufacture of White Lead," and as the statements are so contradictory, and the reactions are so different from those given by Fowne's and other standard works on chemistry, that either the author of this new process, or the compilers of the different chemistries, are wrong, and if the latter are right (and from personal experiments made on this process I have proven to my satisfaction they are), on what grounds does the writer of the article form his conclusions, and what authority does he have for stating that such results are produced as he claims in his article? First step in the process he decomposes a solution of nitrate of soda by electricity, using a pig of lead for the positive (+) electrode forming nitrite of lead, and hydroxide of soda at the negative (-) electrode, the electrolyzing tank being divided by a porous diaphragm, and the different solutions being removed constantly and fresh solution of nitrate of soda being admitted to the electrolyzing tank.

There is now a solution of nitrate of soda and hydroxide of soda collected in one of the vats, and a solution of nitrate of soda and nitrite of lead in the other. These two solutions are now mixed together and a precipitate formed, which is hydroxide of lead, and the resultant liquid or filtrate left after removing the hydroxide of lead he uses again to form a new portion or solution of soda hydroxide and solution of lead nitrite. Now, this is where the standard authors named disagree

with the writer. Soda hydroxide and lead nitrite mixed in solution form soda nitrite, and when the solution is used a second time it consists of a mixture of soda nitrite and soda nitrate, instead of all soda nitrate which was originally used. Now, when an electric current is passed through a mixture of different solutions, each solution is decomposed in amounts in proportion to their atomic weights and their resistance as conductors of the current. So when this new solution of soda nitrate and soda nitrite is placed in the electrolyzing tanks and submitted to the action of the electric current, we have a number of new and different compounds formed. The nitrate of soda forming nitrite of lead and hydroxide of soda. The nitrite of soda being decomposed, forming hydroxide of soda, part of the oxygen from the nitrous acid formed, oxidizing the lead forming oxide of lead, which unites with the nitrite of lead and precipitates in the electrolyzing tanks causing loss and trouble, and the nitrogen uniting with the hydrogen at the negative electrode forming ammonia.

Now this is what takes place practically and as the inventor does not add any free acid to the solution, how does he replace the nitric acid which is constantly being destroyed? and how does he render the solutions neutral, instead of alkaline as it must now be from the surplus hydroxide of soda and ammonia which is now in it?

I do not think any of the corrodors who are at present using the old Dutch process in the manufacture of white lead need fear much competition from this new process as far as producing white lead at a reduced cost is concerned.

CHARLES P. ORNE.

CAMBRIDGEPORT, Mass., June 12th, 1896.

Peculiar Perforation of Zinc Rods.

Sir: Apropos of your interesting note on the perforation of copper wire when converted into sulphide ("The Action of Sulphur Vapor on Copper," *Engineering and Mining Journal*, Vol. LXI, 541, June 6th, 1896). I send you the following extracts from a paper read by me before the American Chemical Society, which describes an analogous condition and which is little known.

CHARLES E. MUNROE.

WASHINGTON, D. C., June 11, 1896.

EXTRACTS.

Through the courtesy of Assistant Engineer B. C. Bryan, U. S. N., of the U. S. Torpedo Boat "Cushing," I received a short time since some fragments of zinc rods which after exposure to the action of hot water in the wing cylinders of the Cushing's boilers had become perforated throughout their entire length with a central canal. These boilers are of the Thornycroft pattern.

As, owing to the disastrous effect of scale in these multitubular boilers, soft water only can be used in them, it is essential to condense the exhausted steam, but as the condenser is made of tinned brass tubes with a copper shell the electro-chemical action between the metals tends to pit and corrode the steel boiler; hence to prevent this, and also the pitting, which, as I have elsewhere shown, may be caused by the action between masses of steel in different physical or chemical conditions, zinc, which is electro-positive to the steel, is put in the boiler in such a way as to be in close metallic contact with it. This practice has long been in vogue for the protection of boilers, but more recently it has come into use for the preservation of the vessels themselves, Mr. Thornycroft, in his "Instructions of March 15, 1889," for the care and preservation of steel hulls of his torpedo boats, recommending that, in order to protect them from pitting, pieces of zinc be placed on the inside of the vessel at intervals of from 5 to 6 ft. apart from stem to stern and as low down as possible, so that they may be immersed in any bilge water present, and so fastened as to be in close metallic contact with the frames of the vessel, the arrangement being made under the supervision of the naval chemist.

Usually zinc for boilers is employed in the form of plates which are suspended in the boiler, and this is the form in which it is used in the separator of the Cushing's boiler, but it is introduced into the wing cylinders, which are 14 in. internal diameter by 8 ft. in length, in the form of cylindrical rods, 1 1/4 in. in diameter by 5 ft. in length, which are squared off for about 1 in. in length at each end, so as to fit into notches in a steel frame from which they are suspended by their ends in the center of the wing cylinder. These rods have evidently been cast vertically, and when an unused one is fractured the exposed surface of the interior shows a mass of feather-like fretted crystals radiating in pyramidal groups from the center, but forming a compact mass, except for an occasional, but non-continuous, small cavity at the centre. The exterior of the rod is of a dull blue color, and appears to have been "chilled" in casting.

The rods, from which the pieces exhibited were taken, had been exposed in the boiler for about two months, but the steam was on during this time for but 608 hours, the pressure varying from 50° to 250° lbs., which is equivalent to temperatures of from 137° to 205° C.* When taken from the boiler these rods were found to have increased considerably in diameter; to have become oval in form; to be perforated throughout their entire length, with a hole at the center of somewhat irregular shape, and varying in diameter from 1/8 to 1/4 in.; to be more or less corroded at intervals on the surface; to be bent down between the points of suspension; and to be so rotten as to easily break under their own weight.

When split longitudinally these sections were found to be filled with radial fissures, and the bundles of feather-shaped crystals were coated superficially with oxide.

From consideration of the circumstances I am of the opinion that the formation of the tubular canals in the rods is due to the fact that, as cast, the radiating crystalline mass is held in place by the outer envelope of metal which is produced by the contact of the exterior portion of the molten mass with the cooler walls of the mould, and that when, through the erosion or corrosion of this envelope by the rapidly circulating heated water, the tension is removed, the crystals are free to move over one another; and that when cooled from the high temperature to which they have attained the bundles of crystals contract along the transverse axis of the rod, away from the center, and since there is no longer a contracting, continuous exterior envelope to bring them back to their original positions the canals result. The oval form which the rods assume is due to the action of the force of gravitation at the time when the force of attraction of cohesion

* J. Perry, *Treatise on Steam*, p. 42, 1874.

among the particles of the mass is least. And the action is aided by the fact that the higher limit of temperature which obtains in the boiler is approximately that at which cast zinc becomes quite easily disintegrated.

I am informed by Lieut. Cameron McR. Winslow, U. S. N., commanding the "Cushing," to whose courtesy I am much indebted, that 250 lbs. of zinc are used for a single charge in one boiler, and that when the boilers are first run this charge is so completely destroyed in seven days' steaming, that sometimes only small fragments and sometimes no portion whatever of the zinc is found remaining in the boiler at the end of this time.

THE GEOLOGIC POLYLITH.

This is the somewhat pedantic name of a structure, the nature and purpose of which are in the highest degree practical, namely, a truncated pyramid of 220 representative building stones, now in process of erection on the campus of the State College, Centre County, Pa. The name, with its suggestion of theoretical science, may indicate to those who need such enlightenment, that under the abstruse terminology of the professors there are facts and principles of direct industrial importance. The polylith itself will appeal to all classes, as a picturesque and instructive object-lesson, and also as an advertisement of the fact that the Pennsylvania State College is earnestly engaged in the erection and equipment of a complete bureau of information concerning the distribution and qualities of building stones. Incidentally, it will exhibit also the geological order, from the ashlar course of granites and massive rocks up to the uppermost layer of Triassic sandstone, and the boulder from the glacial period, which will surmount the whole.

For further particulars concerning this interesting structure and the useful plan of which it stands as the symbol, I must refer the reader to the May number of the *Mining Bulletin*, an attractive little periodical issued six times a year, and "sent to any one desiring a copy." The Pennsylvania State College is distinguishing itself by activity calculated to be immediately helpful to the mining industries of that region; and nothing could more effectively recommend it to the popular, as well as scientific, support than the issue of this modest but valuable journal. I notice in this number that the Department of Mining of the college offer to deliver courses of free lectures to mine employees at their customary places of assembly, on such topics as "Mine Gases," "The Care of Explosives," "The Danger of Safety-Lamps," etc., and that, besides the regular four years' course in mining engineering, there are shorter and special courses for those who lack the time and means for a thorough professional training.

The May number is devoted to the subject of building-stones; and it would be hard to find a more compact and useful statement of facts within the same space than is here given. It would not be fair to call it merely a compilation. The principal article, by T. C. Hopkins, Assistant Professor of Geology in the college, treats of the commercial and scientific names of building-stones, and exhibits critical discrimination, as well as the industrious consultation of authorities. Indeed, an uncritical collection of current definitions in this department would simply picture, to the embarrassment of the student, the confusion which exists both in practice and in literature. As Professor Hopkins justly observes, the advance of the microscopic petrography has rather increased than diminished this confusion. This is most conspicuous in the classification of the crystalline rocks. According to my observations, mining engineers, encountering such rocks in the field, usually either fall back on the vague popular usage of such terms as granite, diorite porphyry, gneiss, trap, etc., or suspend judgment until they can get an authoritative definition from some microscopic petrographer. On the other hand, quack "experts" make free use of the more modern terms, by way of showing their erudition, and thus distinctly mislead their readers.

In the trade, names are used which sometimes conform to science, sometimes contradict science, and sometimes cover totally different rocks. Thus, as Professor Hopkins points out, a quartzitic sandstone, containing nearly 98 per cent. of silica, is advertised and sold in Pennsylvania as "red granite"; while "bluestone" means in Pennsylvania and New York a variety of sandstone; in Ohio another variety of sandstone; in Maryland a gray gneiss; and in the District of Columbia a mica-schist; besides all which, it is, throughout the mining communities of the West, the familiar name for the sulphate of copper.

It is perhaps with regard to trade usage that Professor Hopkins' paper will be most useful to mining engineers, by enabling them to understand what is meant by the terms used by practical operators in different localities, when these terms are presented in oral, written or printed reports, without scientific explanation, and without illustrative samples of the rocks themselves. In this respect, his article is based upon his own experience among quarrymen in different parts of the country; and, while it may be enriched hereafter by contributing from the experience of others, it is authoritative so far as it goes.

In his scientific definitions, Professor Hopkins has followed modern authorities. In this department, as in that of trade usage, he frankly asks for criticism; but, taking into consideration the limitations of his space, I do not see where or how his statement could be improved. It is not his fault, and it is too late to complain, that modern authorities have attached new, or enlarged, or restricted meanings to old, familiar names. For example, granite was once defined as a crystalline aggregate of quartz, mica and feldspar, and syenite as a similar aggregate, in which hornblende predominantly replaced the mica. No doubt this was a crude classification, ignoring the different species of the constituent minerals, and the gradations between the two rocks. No doubt more careful study has justified the inclusion of both under one name—but that name might better have been a new one. To learn that what was formerly syenite is now hornblende-granite is, however, not so bad as to find that the term syenite itself is retained with an entirely new definition, according to which it "differs from granite in having little or no quartz." The practical consequence is that in reading geological books or reports no one can tell what the author means by "syenite."

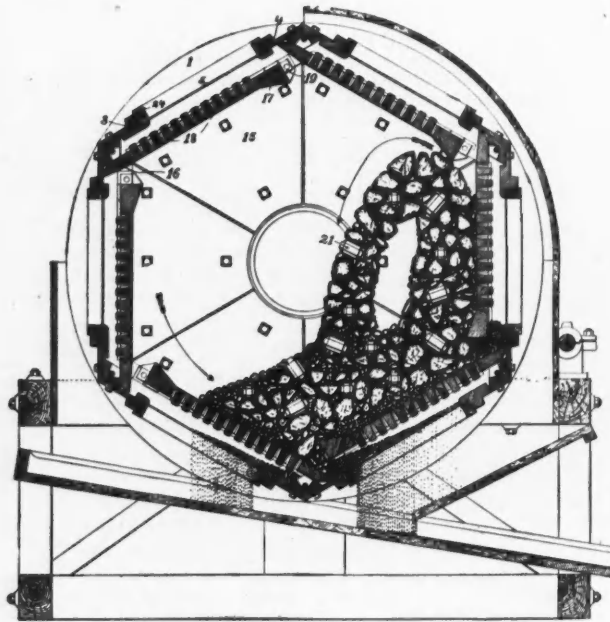
Vigorous protests are occasionally made against the introduction of new and formidable names into science. But to use old names in a new sense is an infinitely greater evil. However, as I have already said, it is too late to protest in those cases now under consideration; and I return

from this digression to repeat my hearty praise of Professor Hopkins' article, of the *Mining Bulletin*, of the work of the State College of Pennsylvania, and of the "Geologic Polylith." R. W. R.

GOLD MINING IN THE KHANATE OF BOKHARA.

By David Ruffmann.*

One of the most considerable and profitable branches of industry in the Khanate of Bokhara is the gold industry, which has not been thoroughly exploited (only eight poods are obtained in a year), and only requires undertaking energetically. Of course such pioneers can be English capitalists and engineers, in conjunction with Russian gentlemen, who, on account of the friendly relations now existing between Russia and Bokhara, will not meet with any difficulties except purely technical points, which are inseparable from the work of prospecting for the considerable amount of gold which is known to exist in Bokhara. A very interesting account is given with regard to the above, founded upon explorations of a mining engineer. The conglomerates comprising the ridges of the Western Darvasa Mountains consist of round pebbles, the size of an ordinary hazel nut, 1 cm. and more in diameter. The gold bearing conglomerates, deeply worn in consequence of the influence of the atmosphere, deliver a material which forms itself into auriferous sand in some places; for instance, on the lower and middle current of the Ak-Su, and also on some other small rivers. There, where the sides of the defile are composed of conglomerate, auriferous sand is practically absent, and the small rivers are only mellowing the



formation of the material, and might be also the concentration of gold. The gold-bearing conglomerates comprise a very large area; on the bottom of the defiles turf is mostly absent, and the sand taken from the very surface contains gold, although frequently in very small quantities. The gold industry of Bokhara has already existed for several hundred years past; according to tradition gold mining was carried on there in the reign of Chunghis-Khan. At present the gold mining, as well as the gold trade in the Khanate of Bokhara, are free, and everyone paying a certain tax in favor of the Emir has the right of prospecting and mining. Although the gold workings have existed there for centuries, the means of extraction are quite primitive; principally washing the sand—i. e., panning or washing the sand over thin felt, in both cases without any preliminary preparations. With the primitive means of acquiring the result the labor is very small, and the loss of gold enormous; only fair sized pieces of gold are retained on the felt, while the small ones and dust are carried away with the water; the clay being undissolved the gold contained therein is lost; the pebble, containing apparently a good deal of gold, is thrown away. The mines are insignificant and primitive in construction. These low, narrow, gallery-like constructions, reaching to 60 fathoms in length, are quite irregular. To enter these mines one has to bend himself, and in some places an entrance is only possible by means of crawling. Pots made of clay and filled with sesamum or sheep's tallow are used for lighting purposes, the wick being substituted by a piece of rag. The material mined is raised to the surface in little baskets, which are carried by boys. The work is far from being carried on through the whole year, and, coupled with the above-mentioned methods of obtaining the gold, the quantity secured at present is small. In spite of these imperfect constructions, it is possible, however, to form an idea of the richness of the conglomerates. The engineer referred to made a few pannings in some places and found that they give from 60 to 80 doljas to every 100 poods (96 doljas are equal to 2,408 drachms, and 1 pood to 36,113 lbs. English). According to his opinion, this is only the minimum which can be secured, as the loss is enormous when extracting with the local old-fashioned means; the present explorers themselves estimate the loss at 50%, but even then they do not take in consideration the clay, which, being undissolved, carries away a considerable quantity of gold, nor the

* London Mining Journal.

pebble containing not a little metal. It will be thus easily understood that the loss is far greater than 50%.

In general the gold industry of Eastern Bokhara has a good future; and by employing more perfect mechanical and chemical means of extracting the gold, the same will show a splendid opening for a sound and profitable investment of capital.

A DEVICE FOR CYANIDE EXPERIMENTERS.

Written for the Engineering and Mining Journal by W. J. Sharwood.

In experimenting on the relative efficiency of cyanide and other solutions for dissolving gold the real object is to find the weight dissolved from a given area in a given time; it may also be attained by noting the thickness of the layer of gold removed in a given time by the solvent, or the time required to dissolve a layer of known thickness.

The value of many published results is lessened by the omission of data regarding the superficial area of the pieces of metal employed.

When rolled foil is used two weighings are necessary for each piece, beside the area measurement; this occupies much time when many tests are made. When, on the other hand, gold leaf is used and the time necessary for complete solution noted, the results are usually invalidated by the folding of the leaf, so that certain portions are but little exposed to the solvent. Sticking the leaf to cardboard has been suggested as a remedy, but has some objections.

The following device I have used for some time. It gives really quantitative results with very little trouble.

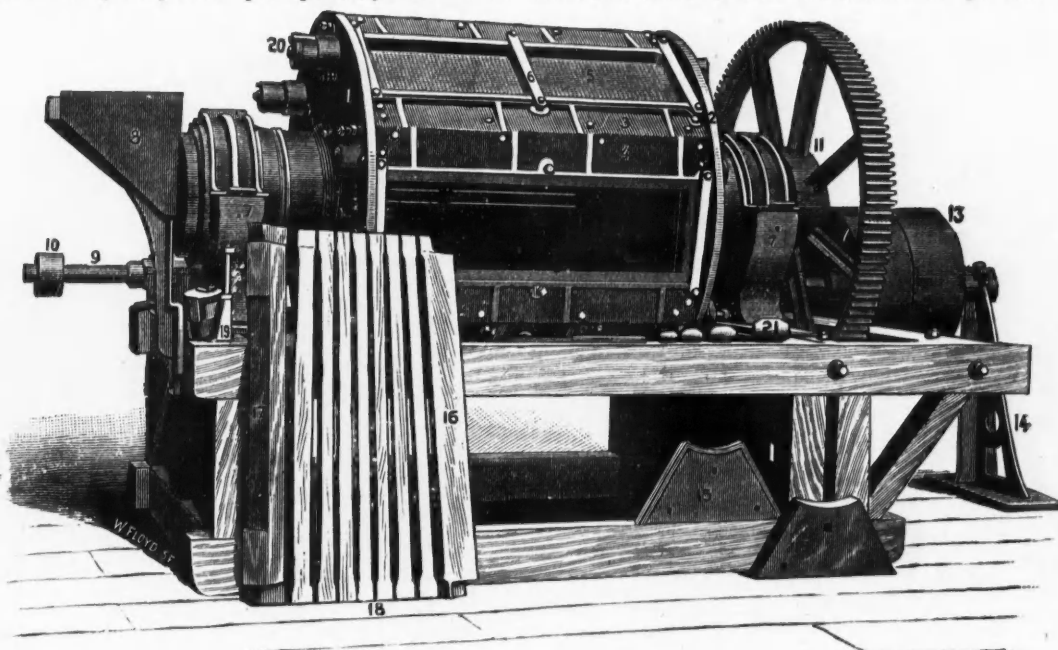
Ordinary square microscope "cover-glasses" are carefully cleaned and coated on one side with an alcoholic solution of shellac. When most of the alcohol has evaporated they are pressed upon a perfectly smooth sheet

THE DODGE PULVERIZING MILL.

This mill, for pulverizing ores either for amalgamation or concentration, has now gone through sufficient test during the past four years in California, Arizona and elsewhere to have been proved either a success or a failure. The first thing in its favor is the excellent work done by the Dodge crusher, and that it should still be on the market and improved over the original pattern, which was certainly practical and efficient in Arizona in 1893, is evidence enough that there is no failure about it, as has been the case with so many new pulverizers and mills. The description of the mill is as follows:

It consists of a hexagonal drum or barrel, as shown, into which the ore, after passing through the rock breaker, is fed by a Challenge ore feeder through the feed hopper 8. The barrel is lined with forged steel bars which are held in place by wedges, secured by bolts and steel springs to prevent their working loose. These bars are so placed that there is a space of $\frac{1}{4}$ in. between each, and form a grating through which the ore passes to the screens, which are on each side of the hexagon, and afford a ready means of discharge for any ore that is crushed fine enough to pass through them, while the coarser particles are returned to the interior of the barrel for further crushing. The mill being hexagonal in shape, the ore does not slide in mass, as is the case in cylindrical mills, but is raised to a certain point and dropped by each side of the hexagon as the mill rotates, thus insuring more effective crushing and less wear on the bars. Pieces of hard quartz or ore are used for crushing. Steel grinders, weighing about 15 to 30 lbs. each, may be used for this purpose; or preferably, both steel and quartz are employed.

The mill is arranged for either dry or wet crushing. The jar, caused by the falling of the ore and steel grinders on the bars as the mill rotates, tends to clear the screens and prevents "choking," which



SECTIONAL VIEW OF THE DODGE MILL.

of gold leaf. After leaving some hours for the shellac to harden, the ragged edges can be rubbed off without disturbing the flat surface. In taking gold leaf from the "book" it is best not to remove it from the paper, but to cut out the paper bodily and lay it on a smooth surface. Oil-size was tried, but appeared to ooze through the gold and retard solution.

The cover-glasses used were Chance's $\frac{1}{4}$ -in. These exposed an area of almost exactly 3.7 sq. cm.

The pieces of metal thus prepared are of uniform weight and thickness, and present uniform surfaces to solvents, so that tests made with them, noting the minutes or hours necessary to effect complete solution, are strictly comparable.

By repeated trials the thickness of gold leaf, in two books used, was found remarkably uniform; the extreme variations observed in the weight of sheets of equal size was under $\frac{1}{4}$ of one per cent., and there was no appreciable variation in the green color of the gold by transmitted light. The average weight of a sheet (of 8.5 cm. sq.) was 15.01 mgms, hence the weight per square centimeter was 0.2 mgm., and the gold on each cover weighed 0.75 mgm. very approximately. The thickness calculated from this is 102.5 millionths of a millimeter, about $\frac{240000}{100000000}$ in.

When working with 10 to 30 cu. cm. of solvent $\frac{1}{4}$ or 1-in. test tubes are convenient; with larger vessels and quantities care must be taken to keep the plates on edge, or suspend them during experiment.

Cost of Electric Power with Producer Gas.—In an English electric railway power house, where two gas engines of 130 H. P. each are used in driving the generators, a very economical working is claimed. The engines are made by Messrs. Crossley, and use producer gas. The generators are belted to the flywheels, and the best result obtained has been an expenditure of 1.2 lb. of anthracite coal per horse-power-hour in ordinary service. The engines are run on an average 18 to 20 hours per day. A careful calculation has shown that the amount of fuel used is 4.5 lb. of anthracite per car-mile.

very materially adds to the capacity of the mill. Due to the immediate discharge of the ore through the screen 5, as soon as it is crushed fine enough to pass the mesh used, the percentage of slimes is reduced to a minimum, and the loss in the tailings correspondingly decreased as compared with stamps and other forms of mills in which the discharge is accomplished by a "swash" in the mortar or pan through which the pulp is raised and thrown against the screen.

The above cut represents the mill in section, from which its operation can be readily seen. Each set of bars, Nos. 16, 17 and 18, forms a side of the hexagon, each overlapping the preceding side, and leaving a space between for the return of such ore to the machine as may be crushed fine enough to pass between the bars, but not fine enough to go through the screens. Looking at the top of the cut the direction of rotation is to the right, and when ore confined between the bars and screens reaches the highest point and begins to go down on the right hand side as one looks at the cut, it will fall back into the machine between bar No. 17 and bar No. 16 of the succeeding set. When wet crushing is desired, a constant stream of water plays on the outside of the screens, washing the pulp that comes through down to the apron below. This mill is manufactured by the Dodge Mining Machinery Company, of San Francisco.

The Eichener Geyser.—According to *Nature*, the phenomenal Eichener Lake, in the Grand Duchy of Baden, which has the peculiarity of appearing and disappearing at uncertain periods, has recently again made its appearance after a lapse of time.

The Hudson River Tunnel at New York.—The tunnel under the Hudson River at New York, which was partially built several years ago, has been closed up for over three years, and no work has been done upon it. The tunnel is the property of an English company, the Hudson Tunnel Railway Company. At a meeting of the bondholders in London, June 11th, it was voted to foreclose the mortgage and turn the property over to a new company, which will raise the money necessary to finish the tunnel.

LEAD AND ZINC DEPOSITS OF IOWA.

Written for the Engineering and Mining Journal by A. G. Leonard.

Lead has been mined in Iowa ever since Julien Dubuque in 1788 obtained from the Sacs and Foxe Indians a lease of land for mining purposes and commenced operations near the site of the city which now bears his name. It was not, however, until about 1833 that settlers were free to take possession of the much-coveted territory. Soon after this date large numbers of miners flocked into the State, prospecting was actively carried on, and many mines were opened. The most productive period of the Iowa mines was probably during the years 1835 to 1849.

It was not until 1860 that Iowa zinc came into the market and since then the production of this metal has rapidly increased. During the ten years 1872 to 1882 the output of zinc more than doubled that of lead, while in 1889, according to the United States Census, the production of the mineral was in the ratio of 13 to 1 for the entire region. The principal ore of zinc now shipped from the Iowa mines is the carbonate or "dry bone" of the miners. Until some thirteen years ago this material was thrown away on the dump piles. In the fall of 1880 two wagon loads were taken to Benton, Wisconsin, and sold for \$16 a ton. So far as known this was the first zinc ore marketed from the mines of the State, and from this time on the carbonate has been marketed in rapidly increasing amounts.

The Iowa lead and zinc deposits occur in the northeastern corner of the State and form part of a large area known as the Upper Mississippi lead and zinc region as distinguished from the Lower Mississippi or Missouri region. The Upper Mississippi area has a length east and west of 96 miles and a width north and south of 55 miles, embracing the southwest portion of Wisconsin, northwest corner of Illinois and adjoining parts of Iowa. This region, embracing some 3,000 square miles, lies wholly within the limits of the driftless area. The geologic formations all belong to the Upper and Lower Silurian, and the ores are confined to certain members of the latter, namely, the Galena and Trenton limestones. The strata have been practically undisturbed and show no evidence of having been subjected to powerful dynamic forces nor of having been affected by igneous intrusions. It is true that slight anticlinal folds exist in the region, but these are of minor importance, and have not given rise to profound fissures or faults.

The minerals appear to have been originally thrown down as sulphides along with the limestone. They have subsequently been leached out by surface waters and have been deposited in the crevices by lateral secretion.

The beds have a gentle dip to the southwest so that in ascending the Mississippi the lower members of the series are successively met with. Over most of the area the Galena limestone forms the country rock, and in it occur most of the lead and zinc deposits of the State. Overlying the limestone are the soft and easily decomposed Maquoketa shales, which have been largely removed by erosion. The Galena rock is a heavily bedded and nearly pure dolomitic limestone, coarsely granular and filled with numerous small cavities. Many of the beds have a thickness of 7 ft. and more, ranging from this to thin, evenly bedded layers near the top. Where fully developed, as at Dubuque, the formation has a thickness of 250 ft.

The lead and zinc deposits are found in crevices in the Galena limestone. The strata of the region are cut by fissures of greater or less extent and in the expansions or "openings" of these the ores occur. There is a very noticeable uniformity in the general direction of the crevices, the great majority and all of those which carry the large ore bodies having an approximately east and west course. A less important set of fissures bears north and south; the fissures are narrow, without any true openings, and in them the ore occurs without exception in vertical sheets.

The characteristic feature of the east and west crevices is the openings. These are widened by a process of decomposition and solution of the limestone in these particular layers and serve as channels for underground drainage and have thus in many instances been greatly enlarged, and are usually enclosed by several strata, whose rough edges form an irregular wall on either side. At the surface the fissure commonly appears as a mere seam or crack in the rock, which when followed down is probably found to contain little or no mineral until it suddenly widens out into the space where the ore, if anywhere, will be found. These openings vary greatly in dimensions; in height from a few feet to 40, and in width from a few inches up to 20 and in rare cases even to 40 ft. They are usually limited above by the "caprock," a hard and persistent layer of limestone 4 ft. in thickness. A crevice does not widen out into a single opening only, but into several, one below another, called, in descending order, first, second, third and fourth openings. The upper opening, found 45 to 50 ft. below the Maquoketa shale, is usually the main and most productive one, while the lower are smaller and contain less clay, the ore in them being therefore clean and bright.

In these openings the lead and zinc ores occur either pure or mixed with more or less of clay and fragments of rock, and often attached to the top and sides of the cavities or fallen to the floor where they lie partially buried in clay. The Galena is frequently suspended in large masses from the roof and extending up into the crevice in the cap rock. The zinc carbonate, besides lining the crevice, is also found in large loose masses nearly filling the opening and coating the rock fragments.

A very noticeable feature of the Iowa deposits is the manner in which the lead and zinc occur concentrated at certain points into ore bodies. The crevices are not productive throughout their entire length, but only here and there where for some reason the conditions have been especially favorable for the concentration of the minerals. It may be that quartering crevices or a north and south fissure intersect the main one at such points and have brought in the waters from which the ore was deposited. At any rate these ore bodies frequently occur where several crevices cross. In a great many cases also they appear to accumulate and "make back" as the miners say from some obstruction in the crevice such as "key rock." These concentrated masses of mineral do not usually extend more than 200 or 400 ft. in horizontal length though they may occasionally go 800 or 1,000 ft. The crevice, on the other hand, may be and often is several miles in length.

The lead and zinc deposits of the State are confined mostly to the upper part of the Galena limestone, comparatively little ore having been mined from a greater depth than 100 ft. below the Maquoketa shale. Both lead and zinc frequently occur in the same opening, though they are not usually intermingled, the zinc occurring a short distance beyond the lead. Where the ores are mixed their amount is small.

In working the Iowa mines the very simplest methods and inexpensive machinery are used. Only a few of the shafts have reached a depth greater than 200 ft. and the most common method of hoisting is the windlass, though in the larger mines a gin is used, which consists of a large wooden drum, 6 to 8 ft. in diameter, revolving in a horizontal plane and turned by a horse. The only steam hoist in the Dubuque district was recently put in by the Dubuque Lead Mining Company. The company also has a steam pump by which the water has been so lowered that ore is taken from one of the lower openings.

One of the largest zinc mines in the State is worked in an open pit which extends entirely through the hill, with a width of 40 ft. and a depth of nearly 20 ft. The following is a list of the principal lead and zinc mining companies of the State with a brief description of some of the mines.

Dubuque Lead Mining Company, of which A. W. Hasford is president and C. T. Goldthorp superintendent, has a mine one mile west of Dubuque which has been worked for about a year and a half, and employs 75 men. The three shafts are 210 ft. deep with steam hoist on one and gins on the other two. The company has just erected an ore-dressing plant at the mine because much of the Galena occurs scattered through the rock. The ore-bearing dolomite forms a zone from two to four feet wide and contains an abundance of iron pyrite and Galena which also occurs in large masses, composed of cubes, in what is probably the fourth opening. One hundred thousand pounds of lead ore have already been raised.

The Lansing Mining and Smelting Company, J. H. Trewin, President.—The mine of this company, which was discovered in 1891, is located in Allamakee County, about five miles northwest of Lansing, in the Onota limestone. This is the only instance, so far as known, in the entire Upper Mississippi region where an extensive lead deposit occurs in this bed or any below the Trenton formation. This deposit is also remarkable in being a vertical sheet in a north and south fissure, for while crevices in this direction are not uncommon in the State they are usually of limited extent and do not contain large bodies of ore; yet this sheet of mineral has been followed 1,000 ft. horizontally and the main body has a vertical extent of 25 to 30 ft. and a width of 3 to 4 in. The output of the mine since its discovery has exceeded 500,000 lbs. of lead ore and in the last two years 250,000 lbs., though during the past year little ore was raised on account of the low price of lead.

Dubuque Zinc and Lead Mining Company.—E. T. Goldthorp, superintendent. The principal mine operated by this company is worked by an open cut, at Durango, five miles northwest of Dubuque. Several east and west crevices are exposed here and in these the zinc carbonate is most abundant, but the ore also occurs mixed all through the limestone, which has been cracked and broken into fragments of all sizes. The larger masses of the deposits are blasted and the smaller ones loosened with the picks, the ore broken from the rock, the waste material carted to the dump, while the ore, mixed with more or less sand and small rock fragments, is taken to a neighboring stream, where it is washed to free it from all sand and dirt, and hand picked. During the past season 18 men were employed at the mine producing daily from 15 to 18 tons of ore, equivalent to about 2,500 tons in six months, which is probably about the annual production of the mine for the last few years. The following companies own and operate zinc mines in the city of Dubuque: Trueb, Southwell & Co., James Hird & Son, Howe, Alexander & Sellers Mining Company and Dexter & Hird.

The mines of these companies have all been closed for nearly two years on account of the low price paid for the zinc carbonate, the average being only \$5 to \$6; about 800 tons were, however, sold at these figures. There are large quantities of ore in sight in these mines, and they are capable of yielding thousands of tons for several years to come.

In addition to the above, Royce & Company and the Key City Mining Company are operating lead mines near Dubuque.

All of the zinc carbonate from the Iowa mines is bought by Mineral Point, Wis., smelters, where it is used in the manufacture of paint. The price paid has advanced somewhat within a few months with prospects of a still further rise. Until the past year or two the "dry bone" has brought from \$12 to \$18 per ton, according to the quality.

Most of the lead ore from Dubuque district is sold to W. G. Waters, whose smelter is a short distance south of the city, but that from the Lansing mine is sent to Chicago to be smelted. The price of lead ore is also low at present, being worth only \$17 per thousand pounds, when formerly it was worth \$20 to \$22.

The output of the Iowa mines for the year 1895 can be given only approximately at about 700,000 lbs. of lead ore and from 3,000 to 3,500 tons of zinc ore. The zinc mines have, however, been closed during the greater part of the year. They are easily capable of yielding from 8,000 to 10,000 tons of ore annually.

Korean Railway.—A concession has been given to the representative of an American company for the construction of the first Korean railway—between Seoul and Chemulpo, 30 miles long.

Aluminum Cooking Utensils.—An investigation recently undertaken by the Imperial German Health Bureau to enquire into the suitability of the use of aluminum for cooking utensils, proved that aluminum is entirely free from communicating to food any poisonous salt such as is given off by copper, tin or lead. To make sure that no injurious effects need be feared if aluminum be taken into the system, two physicians, aged respectively 26 and 35, volunteered to act as subjects. To each of these was administered daily, with their lunch, about 15 grains of aluminum tartrate for the period of a month. By the end of that time neither had lost flesh or appetite, nor felt the slightest discomfort. For cooking purposes this metal seems to be peculiarly adapted, as it is a splendid conductor of heat, while it has also the advantage of being non-poisonous and non-corroding.

A BODIE GOLD STAMP MILL.

Written for the Engineering and Mining Journal by Robert Gilman Brown.

Bodie, on the eastern flank of the Sierras and in the extreme eastern edge of California, is amply excused for its resemblance to Nevada by its nearness to that State. It would be difficult to conceive anything more at variance with the pleasant mining towns of the western slope than this bleak camp of the eastern; in features of sage-brush and sand, of sterility and glare, it is at one with all but a few favored spots of Nevada.

The town lies at the summit of the eastern foot-hills, that skirt the range, a dozen miles away; and half a mile to the south the stage road from Hawthorne, Nevada, splits, the one member running down to Bridgeport meadows and touching the roots of Castle Peak, the other skirting Mono Lake and reaching Lundy, seat of the Jackson and Lake View mines. So much for geography and for tying ourselves, in surveyor's phrase, on to prominent objects.

At present there are standing in Bodie four quartz stamp mills omitting a nondescript 7-stamp affair, four miles down the canyon, but of these one only, that of the Standard Consolidated Mining Company, is operated with any pretense of regularity. In this paper the Standard Company's mill will be described and where demanded discussed.

This is an old mill of 20 stamps, first built in 1876; and even at that date much of it was purchased at second hand in the fading camp of Aurora, Nev., a 12-mile neighbor.

It was run for eight years, stood idle the following five, and was finally restarted in 1889, with but little repairing, so that to-day it can hardly be

trolled from either end. The time of a round trip is 10 minutes, made up thus: up trip, 2½ minutes; loading and dumping, 2 minutes; down trip, 2½ minutes; shifting at bottom and connecting, 2½ minutes.

The cars being 6 ft. over all and solid on their trucks, with only a hanging door at one end, a simple dumping device, with a hard winch and tail rope, is arranged. Under the conditions of a small mill and the handling of less than 50 tons a day (or 40 cars), the device is allowable, but for a materially larger tonnage some more automatic device would be preferred, would indeed be necessary, were one man to handle the whole quantity and between times feed the crusher.

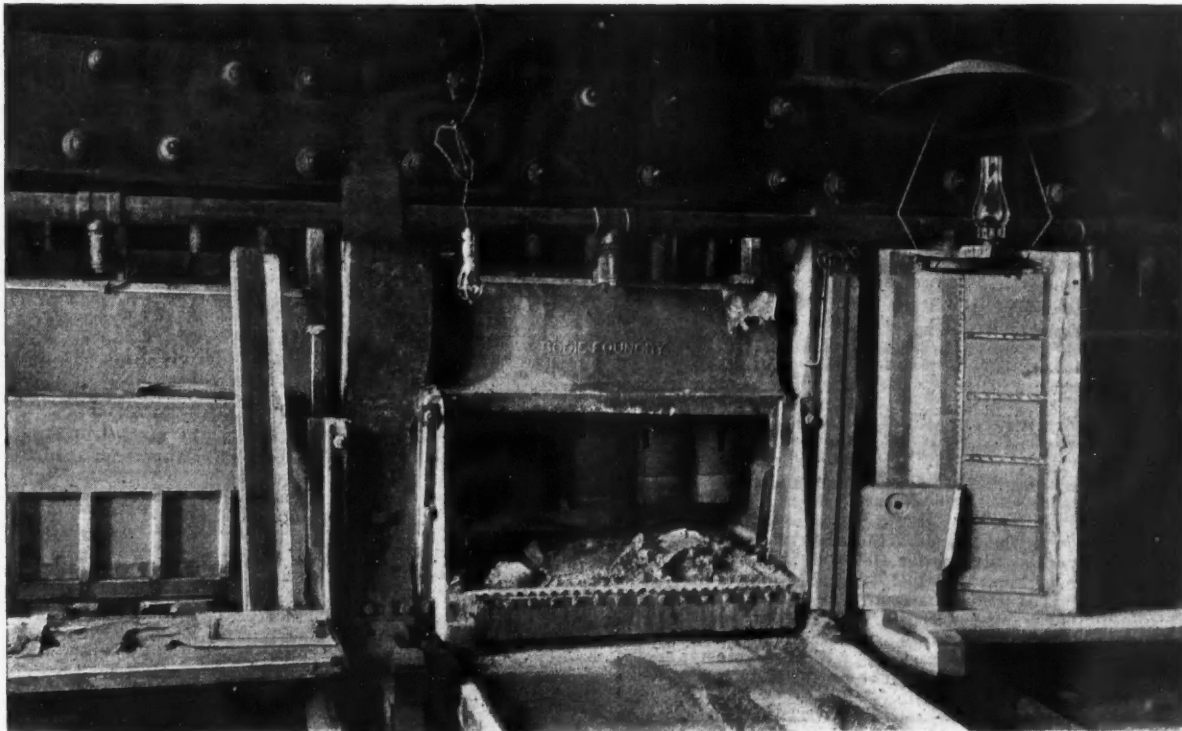
The grizzlies are in two sets, side by side, 3 ft. 10 in. wide and 8 ft. long, inclined 33° from the horizontal (hardly sufficient for damp ores, but the steepest attainable). The bars, 2½ × ¾-in. wrought iron, have the contra-theoretical rectangular section, and are spaced 2½ in.

The fine material falls into the mill chutes, and the coarse is fed to the crusher by hand, by the man that handles the cars. The rock-breaker was a very recent second thought in the mill, and the whole arrangement of grizzlies and crusher is constricted to crowding.

The crusher is of the Blake pattern, with 8 × 10 jaws, and runs at 260 Rpm. Two counter-shafts intervene between this and the line-shaft; one of them directly over the crusher, an unfortunate arrangement, requiring a very tight belt. In fact, the whole roundabout course of the power is awkward and only excused as a *sine qua non*.

It can be noted that this size of crusher is inadequate for the harder rock, and that the cost of repairs is high, amounting in 1895 to 2c. per ton, or assuming—a fair estimate—that one ton in four goes to the crusher, 8c. per ton of rock passed through it.

The chutes, under the crusher and behind the batteries, have a capacity



A BODIE GOLD STAMP MILL.

held as posing for a model, either of beauty or practice. But there is enough that is distinctive in its character and operation to give to a description of it more than a statistical value; indeed it might almost be worth study, merely as an example of what can be done with an old machine.

The Standard mine ores—and they are typical of nearly all the ores of the camp—consist of:

- a. Hard, ribboned quartz, with feldspar.
- b. Clay, with fragments of a.
- c. Soft, crumbling quartz.
- d. Crystalline, semi-vitreous quartz.
- e. Manganese oxide and quartz.

These are all oxidized and yield no sulphurets; a, b, c and e carry exceedingly fine gold and d gold in coarse colors. So strongly are these contrasted that in two or three-hundred-dollar rock, which is at times found in c, the eye cannot detect a color, while in d the whole value is visible even down to \$30 a ton.

But first and last, and barring the extreme fineness, the ore is beautifully free milling in its absence of sulphurets of any material that would foul the quicksilver or stain the plates. The concentrates are iron oxides—in great part magnetic—and make up but 1/6% of the ore.

It will be found simplest, as well as most logical, to follow the mill-stuff in its course through the mill, pausing for a moment at each machine for a closer survey.

The ore arrives at the mill in cars of 1½ tons, and is drawn up on an incline over the grizzlies. The maximum rise is 30° above the horizontal. For this a ½-in. wire rope is used, winding on a grooved worm-driven elevator drum. To this direct or reverse motion is imparted by straight and cross belts with intermediate operating pulley and outside idlers for "no motion." The slope is 100 ft. long and motion can be con-

trolled from either end. The slope of the floor is 41°, and on the whole this is satisfactory, the chutes emptying themselves without swamping.

The gates are of the standard pattern, plate iron, with rack and pinion motion. Challenge feeders of ordinary form supply the stamps.

The 20 stamps are worked by two cam shafts of 5 in. diameter, driven by horizontal belts from clutch pulleys on the line shaft. The stamps drop 102 a minute—a high rate.

The cams are of chrome steel, have a life of several years; are keyed to the shaft and weigh 225 lbs.

The tappets are of iron from the local foundry, keyed in place and life prolonged by turning off the faces. Weight, 130 lbs.

The stems are of wrought iron 3 in. in diameter and about 15 ft. long, are tapered at both ends, reversed when broken at the boss and welded and turned down smooth when broken in the middle.

The bosses are of iron and weigh 200 lbs. Chrome steel has been tried, but works loose from the stem by cutting into the soft iron.

Shoes and dies are of iron, weighing 120 and 115 lbs. respectively. The weight then of the stamp is 800 lbs.

The consumption of iron per ton of ore is: Tappets, 2 lb.; bosses, 2 lb.; shoes, 1.2 lb.; dies, .9 lb.; a total of 2.5 lbs., costing 13c.

The question of the use of iron or steel battery castings is of first moment, and has here been settled by experiment. Chrome steel has double the life of iron, but costs twice as much and is not commercially to be preferred. The exception to this is in the cams, the life of which, when of chrome steel, is fully four times that of iron. In the case of bosses, their merit becomes their condemnation, as has been explained.

The mortar liners are of iron and their wear under ½ lb. per ton. It is roughly expected that the end ones will last six months and the front and back three.

The mortars are of local pattern and deserve no praise, being at the best but makeshifts, adapted from a double discharge pattern, by putting

in wooden backs, iron-lined. This pattern was originally designed for the old Bulwer-Standard mill (recently demolished), which was run with pans and no plates, a curious fact considering the free-milling character of the ore.

Screens of round punched tin plate are used (No. 0), and with great satisfaction (*vide Engineering and Mining Journal*, June 18th, 1894, page 604). They are run until broken, with an average life of 130 hours. The exposed surface of each sheet is 8 x 12 in., or 40 x 12 for each battery.

No attempt is made to amalgamate in the battery. The advisability of doing this was considered by the late Arthur Macy when manager in 1889, but after a six weeks' trial abandoned. The height of discharge varies with the wear of the dies from nil to 5 in., no attempt having been made until very recently to regulate it.

Each stamp drops 102 a minute, in two combinations: 1, 4, 2, 5, 3 and 1, 5, 2, 4, 3. The height of drop is 6½ in.

The plates (aprons or amalgamating tables) are 9 ft. 6 in. long, of the full 4-ft. width, contracting below to the sluice width. At the head there is in addition a 10-in. separate plate directly under the drip of the battery lip. At distances of 4 and 8 ft. from this there are 2-in. drops, and the whole length of plates lies at a slope of ¼ in. in 1 ft. The plates are silvered and run soft. There are additional plates in the sluice bottoms and on the vanner feeders from which a little amalgam is collected. There are also simple quicksilver traps below the plates and a quicksilver catcher or agitator in the main sluice, where it leaves the building for the pond, which retains a few pounds a month.

The vanners stand in front of the stamps, about 8 ft. below and in a steam-heated room to obviate freezing and tearing of belts in winter. There are four of them, of the Frue type, with 6-ft. belts. The concentrates make up less than 7% of the ore, *i. e.*, 90 lbs. per vanner per day. The speed of the vanners is 200 and the advance 5 ft. per minute. They are set at a slope of 2 in. per 6 ft. The tailings from these pass directly to the agitator and the pond, but before the introduction of cyanising as a means of recovering their values, they were separated from slimes in pointed boxes, elevated and treated in continuous pans. These were adapted from the old pans of early practice by the late Arthur Macy in 1889 and used until 1895. There are eight of them. 5 ft. x 3, of ¼-in. iron, and three settlers, 8 ft. x 3, run at an Rpm. of 65 and 12 respectively. One of each of these is now used for treating battery sands, plate iron and concentrates. These concentrates are not of very high grade, the vanners not being run very "close," and yield fairly to the treatment, which is as follows: As taken from the vanners the material drains and is then mixed with 4% of salt; later it is shoveled over once or twice, put through light rolls to break the lumps, and after about six weeks treated in lots of 2,000 lbs (dry weight). The further details are given for three classes of material in following table:

TABLE OF PAN TREATMENT.

Material.	Battery sands.	Plate iron.	Concentrates.
Charge.....	1,200 lbs.	11,000 lbs.	2,000 lbs.
Salt.....	20 "	20 "	180 "
Concentrated lye.....	6 "	6 "	4 "
Bluestone.....			14 "
Grind.....	16 hours	15 hours	12-14 hours
Raise muller, then add quicksilver.....	600-700 lbs.	400-500 lbs.	225 lbs.
Amalgamate.....	4 hours	5 hours	4½-5 hours

* Screened through ¼-in. mesh and made up to weight with tailings.

† About 150 lbs. and made up to weight with tailings.

‡ In addition to 80 lbs. (4%) already added.

Discharge is then made to the settler, which is run five hours and drawn off. The quicksilver is taken from the well, the settler cleaned and the whole product washed in hot water, skimmed and squeezed.

The capacity of the mill is 54 tons in 24 hours, or duty per stamp 2.7 tons. Total consumption of water 72,000 gals. per 24 hours or 1,333 gals. per ton. The accompanying picture shows one of the mortars with false back removed. The right hand lever is shown within the mortar and a new one for the same end without. Next to it is the front lever and to the left the back lever, with broad upper lip.

The dry detail of the matter has now been rehearsed and it remains to add a few words on the daily conduct of the works, and a few more in comment or criticism.

The force consists of a foreman, crusher-man (runs ore into mill as well), battery-man and vanner-man, with the last three duplicated for night shift. In addition to this labor should be added a varying proportion of that of machinist and helper, carpenter and four motor-men (for description of electric plant *vide* Trans. A. I. M. E., Vol. XXIV., page 315), which is fairly to be distributed among the mill, mine and cyanide plant.

Height of drop is adjusted every 48 hours of run; plates are dressed with sprayed quicksilver four times a shift, or even every hour, with rich or difficult ore. The black manganese is the latter, but by suitable attention can be treated to advantage; it forms a black scum on the plates, preventing contact, and must be frequently cleaned off. In the middle of the afternoon the plates are cleaned with rubber scrapers and steel knife and redressed; the amalgam is freed from "plate iron" with abundance of quicksilver and hot water; stained, squeezed, sampled, weighed in the office, recorded and locked in the safe; the sample is retorted and assayed and the value for the day's run entered in mill book. This gives a daily record in dollars and checks with the monthly product within \$100. A simple acceptance of the weight of amalgam affords no satisfactory value basis for the day, as the value runs from \$2 to \$3 per ounce.

The vanner tailings are assayed daily, but not the ore above the batteries. All attempts at doing this have proved unsatisfactory and misleading and a complete sampling of mill products is at present relied on for figuring backward to the value of the ore; so many dollars in tailings, so many in concentrates, and so many in bullion; the sum is the value of the ore, and if "forcing a balance" does not give the highest satisfaction, it at least gives as much as the usual ante-battery samples.

Battery samples have not even proved valuable for testing the efficiency of the plates, which perhaps may be traced to the adherence of rich particles to the mortar lip and their being scraped into the sampling dipper.

The tailings, at the best (and even in the days of pan amalgamation this was true) run high.

This loss is not in concentrates or amalgam (seldom does the horn discover these), nor in occluded gold (cyanide extracts 70% of it), but, as it

appears, in fine gold that escapes the plates, insulated, it is surmised, by aluminous slime, a notable feature of the ore.

Dressing of plates, cleaning and all handling of amalgam are done by the foreman in person. He also records tons of ore received and hours lost for each battery. He charges and closes the retort and opens it, and is in short the responsible man about the mill.

The treatment of magnetic concentrates in the pan is an interesting one and successful. It resulted in 1895 in a saving of 88% of the value, with a loss of 3½ lbs. of quicksilver per ton. Naturally, in view of the charge composition, the bullion is base, and variably so. It is also very silvery, running a few points over 100 fine in gold, with a total fineness of 750-950.

The total mill saving for 1895 stood: Gold, 70%; silver, 30%.

As a general criticism upon the mill and its work, it can fairly be said that so far as business details are concerned the management is enlightened, but in so far as the settlement of milling questions and the general mill management have been left to follow the stream of usage or whimsical innovation—in so far it is benighted.

The "practical millman," on whom the business half of the mining world so relies, has his place, just as the hands have theirs, but the sphere of the hands is not the sphere of the head, nor will manual skill, ingenuity even, fill the place of the absent brain.

And yet successful milling lies in the study of and care about small details. Three inches variation in height of discharge means a changed character of pulp that makes itself felt at once in the tail sluice; experiment may show that 4 ft. more of copper plate will lower the tailings by a dollar—experiment will certainly show whether it will or not, and the mere knowledge is worth much. And so on one finds a thousand obscure details, in the very heart of the milling work, which have not been studied, have not been carried out to their logical end, and each one of them with a dollar at its back. But the manager finds himself too busy with the administration of the property by business methods, and with his study of the mine, which, after all, has the first call upon him; and the millman is a conservative and not an experimenter, or, more dangerous still, an unguided one, and so the stamps drop in irregular order, and the ore splashes out through the screen too coarse, or is pounded too fine and floats happily away with its speck of gold, and things continue—or possibly stop—in the dark. All of which would be very discouraging did we not know the darkness to be only of closed blinds and not of the night.

A NEW LUBRICANT FOR RAILWAY CAR AXLES.

Written for the Engineering and Mining Journal by A. M. Gibson.

The Prussian State railway officials, by direction of the Minister of Railways, have just completed a series of tests with a new composition of oils and fats, for lubricating the axles of railway cars. The Prussian State railways are well managed and paying concerns, giving good and cheap service. The present Minister of Railways is an army engineer of high distinction, who will shortly retire. He takes a deep interest in the tests of lubricants, which have been going on now under his direct supervision for nearly six months, because he expects to signalize his administration by effecting a very considerable economy in the operation of the State railways by the introduction of this new composition. The economy will undoubtedly be very considerable, for although the railway department will not at present state exactly what the saving is, it is admitted that it is considerably more than one-half the cost of the old methods.

The following is a summary of the results of one Harmonica (corridor) car using the new lubricant, running between Berlin and Frankfort-on-Main:

On January 27th, 1896, Harmonica car No. 562 was selected by the direction of Halle, by order of the Minister of Railways, and the new lubricant applied in the eight axle boxes. The method of application was to impregnate 16 cushions, made of a cheap shoddy material, with the new lubricant, and placing these, the one under and the other over the axles in each box. The remaining space was filled up with the composition. The total weight of lubricant thus applied was 16 kilos. The car was run in the regular passenger train service between Berlin and Frankfort-on-Main, and after running 5,000 km. a slight addition of the lubricant was made in each axle box. At the end of a run of 30,000 km. the car was held over at the Berlin station and a careful inspection made. The cushions were removed and weighed, and likewise the composition in the axle boxes carefully taken out and weighed. The cushions and grease were replaced in the boxes with some addition of fresh material, an exact record of weight being kept. This was repeated as each 30,000 km. of train services were run by the car, and now an average of the consumption after running 90,000 km. has been taken, and the result is found to be 31,400 kilos for the whole distance run, or an average of .349 g. per kilometer for eight axles.

Making the comparison of cost with oil at 20 pfennigs per kilo., and it is admitted that the State railways pay much higher for their axle oil, the saving, according to the official figures, comes out at 15.84 marks per 30,000 km. of train service, or not one-half of present cost per car.

But the saving in cost of material is not all, since no labor is required, and no time is lost in examination and in applying lubricant except at the end of each 5,000 km. run. The severest cold weather of Northern Europe does not have any effect on the composition, as its freezing point is -28° C. On the other hand the warmest weather does not cause the composition to run, its melting point being so high that it remains in a gelatinous condition in the boxes. There is consequently no dripping, no bespattering, as with all other efficient lubricants. The color of the composition remains the same after the car has run 30,000 km. as at the start. By putting in a third cushion against the end of the axle the box is hermetically sealed, and no dust or dirt of any kind can enter. The axle boxes on car 562 are the American pattern which are used on all Harmonica cars in Germany.

Reducing the foregoing metric figures of measures and weights to the English standards, the results came out approximately as follows: One application of lubricant suffices for 3,100 miles of train service, and in running 55,800 miles the consumption is about 69 lbs. which is about 1½ grains per 100 miles run for each axle box.

The Prussian government pays 1.45 marks per kilo (about 15c. per pound) for the composition.

THE GOLD MINING INDUSTRY IN GEORGIA AND ALABAMA.

Written for the Engineering and Mining Journal by Wm. M. Brewer.

The distant reader of some of the Southern newspapers may have formed the idea that we are enjoying a boom of magnificent proportions in the goldfields, but such is not the case. The published interviews with enthusiastic promoters often describe imaginary conditions which do not exist.

Cherokee and Carroll Counties, Ga., have been the scenes of most of the recent prospecting work. At the old Cherokee mine a Mr. Gilson from Utah is sinking a vertical shaft which he proposes to carry down 200 ft. before he tunnels out to crosscut the ore body. Such work as this is needed in these goldfields, because it will result in determining the actual value of the mine and demonstrating the permanency and extent of the ore body.

At the Dr. Charles mine, on the extreme northern edge of Cherokee County, a plant is being erected for the treatment of the ore.

The only regular bullion producer in Cherokee County is the old Franklin mine, owned by the Creighton Mining and Milling Company. Of the prospects in this county on which work was being done last year which promised important results, such as the Latham, and the Worley, we



STONEWALL CUT, IDAHO MINE, ALABAMA.

find such work was suspended after sinking had been carried to a depth of about 100 ft. at each location, and some 25 ft. below the line of decomposition of the mica-schist country rock before any material results had been determined, in fact before the ore bodies were crosscut, which the shafts were sunk to prospect. The work was well done, and can be continued in either shaft at any time in the future.

The expense necessary to carry on deep work in Cherokee County has been one reason for its non-performance. The volume of water encountered at a shallow depth renders heavy pumping machinery desirable, while the decomposed condition of the country rock to an average depth of about 75 ft. makes it very difficult to sink even when heavy timbers are used, and makes the expense excessive. Below the line of decomposition the unaltered country rock (a mica-schist) is very tough, and so full of seams and cracks that it breaks very badly. In consequence of these conditions one can estimate that all sinking will cost an average of \$15 per foot, and tunneling about \$10 for opening of sufficient size for working, and to permit the use of ordinary-sized tram cars and cages.

In the more mountainous districts of both Georgia and Alabama the cost of comparatively deep workings is not nearly so great, because tunneling will often drain the ore body to a depth of from 100 to 250 ft. in some places, and because the work of decomposition has not been so

complete or to so great a depth as in the country rock of the Cherokee portions of Cobb and Fulton counties.

The plant erected by the Dr. Hardy Syndicate, of Boston, to treat the ore at the Clopton mines, near Villa Rica, in Carroll County, has so far proved a failure, and I am reliably informed is to be replaced by a stamp mill at an early date.

A stamp mill, erected for an English syndicate by Captain Tamplin, on property located a short distance from Villa Rica, was started up in April last. Work of prospecting this property was commenced in the summer of 1895.

The machinery for the barrel chlorination plant being erected in Haralson County on the Royal mine, under the direction of Prof. Adolph Theiss, of the Haile mine, South Carolina, is in place and it is expected will be in operation soon. Ore from the mine has been crushed in the stamp mill and treated by amalgamation pending the completion of the chlorination plant.

The outlook in the Alabama goldfields is more encouraging than since 1893, when the suspension of work at the Lucky Joe, Hicks-Wise and Pinetucky mines were recorded. The tendency generally appears to be to perform deeper prospect work, instead of erecting plants to treat ore previous to determining whether the ore in paying quantities and grade actually occurs. The litigation over the title to the Idaho mine, in Clay County, having been settled, the superintendent received instructions to overhaul the mill and clear out the cuts, which constitute the mine workings. A Huntington mill has been shipped to add to the milling plant, which was originally 10 stamps. This mine was operated about eight years ago, and the results by amalgamation were satisfactory, but it was found that a portion of the ore was so soft and clayey that the crushing capacity of the mill was reduced to a minimum because of clogging the screens.

The accompanying illustration represents the Stonewall cut at this mine. The heading is about 50 ft. from the floor of the cut to the surface of the hill and is about 50 ft. from the entrance of the open cut, which as will be seen, crosses the formation. The material was quarried down and sent to the mill without any sorting except that the quartz filling the narrow vein exposed on the left is thrown out because it is barren. The mouth of tunnel, which shows at bottom of cut is the entrance to a further crosscut, which was being driven to expose the ore body in another occurrence about 60 yards northerly, belonging to this same property, and known as the Little Sampson vein. All the work done at this mine was by open cut, and by such the continuity of the ore body along the line of strike has been determined for a distance of about 320 ft. This is an extensive body of low-grade free-milling ore, so far as the work done has demonstrated, but water level has only been reached at one point, when a winze was sunk about 14 ft. below the floor of one of the cuts.

Mining and milling was carried on at a cost of considerably less than \$1 per ton, while the yield by amalgamation was nearly \$2 per ton. Associated with the gold-bearing ore are large quantities of garnets (both iron and alumina) as well as wad (bog manganese), which is to some extent detrimental to satisfactory amalgamation and would affect concentration, because of forming slimes, in which both gold and sulphurets could easily be carried off in suspension.

Other prospecting operations now being carried on in Alabama are in the Arbacoochee district, Cleburne County, in the Crooked Creek district, in Randolph County and in the Silver Hill district, in Tallapoosa County.

At this last-named location mining and milling have been carried on for some years at the Blue Hills and Gregory Hill mines, the ore being crushed in a 15-stamp mill and treated by an amalgamation. Owing to the presence of a large percentage of graphite in the slate country rock, and the fact that the auriferous quartzite occurs in long narrow lenses, as well as that a proportion of the slate itself is gold bearing, it would not be profitable to attempt to sort the ore from the graphite slate at the mines, consequently the workings are of the open cut variety and the entire hillside for a thickness of some 50 ft. quarried, and sent to the mill for treatment. The loss sustained during the treatment by the sickening of the quicksilver because of the presence of the graphite must be very considerable, and although experiments have been made to get rid of the graphite, this has not yet been successful. This Silver Hill district is the only section of the goldfields of Alabama which can be considered as a bullion producer during recent years, and their product has been very intermittent.

In the Arbacoochee district, in Cleburne County, a plant to hydraulic that portion of Section 7 optioned by the Chattanooga syndicate under the firm name of Heflin Gold Mining Company in 1895, was erected and operated for a short time during the spring of 1896. It was shut down after running a short time, and prospecting for the continuation of the rich vein of quartz exposed in the marble pit last summer was resumed. This work is still in progress. The original owners of the property have consolidated with the Chattanooga syndicate, and accepted stock in the company in part payment of the purchase price, and I am reliably informed the purpose of the company now is to thoroughly prospect and develop, in order to determine the actual value of the property.

In the Crooked Creek district, which has been quite idle since 1893, when the Goldberg Company attempted to bring the district into prominence, but failed because of the panic and mismanagement, there has been work going on since January last on the Mitchell and McCrayer mines, to determine the permanency and extent of the ore body in Bradford Ridge. On the Bradford property proper, on the same ridge, a syndicate from Indiana is putting in a plant furnished with Crawford mills to treat the ore, which is for the most part in arsenical pyrites. A small proportion only is free milling, and while I shall be very sorry to see failure, I cannot see how this refractory ore will be satisfactorily treated by this process. Apparently there is a large supply of ore in sight on the property. At one place the slate and quartzite, with lenses of arsenical pyrites, prospects for a thickness of 20 ft., but no well-defined walls enclose this material, which apparently graduates from auriferous partially decomposed slate into barren slate underlying it, which might be termed a footwall, and on the hanging wall side the soil at grass roots appears immediately overlying a rotten clay slate, which prospects colors. The thickness of this pay material varies from a streak to 20 ft., and sometimes there are two or three bodies of the same character of ore exposed in the open cut only separated from each other by varying thickness of barren slate.

On the Mitchell property an incline shaft 80 ft. deep has been sunk on the ore body, and a drift 100 ft. long has been run at the 40-ft. level. The headings of the shaft and drift are still in ore and the body in several places where it has been crosscut shows a thickness of 13 ft. of pay vein stone inclosed between well-defined slate walls. The structure of the ore body is lenticular, the lenses overlapping each other, and in one instance at least being 80 ft. long. The lens which overlapped this just mentioned has been drifted on 30 ft., but its maximum thickness has not been exposed in the workings. A carload of this ore has been sent to the barrel chlorination sampler at Charlotte, N. C., which is annexed to the Mecklenberg Iron Works.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

Specially Reported for the Engineering and Mining Journal.

RIGHT TO FOLLOW DIP WHEN VEIN TERMINATES WITHIN CLAIM.—When the apex of a vein crosses one end line of the claim and runs in the direction of its length, but is cut off, before reaching the other end, by a crossing, so that it terminates at that point, the right to follow the dip will be confined between the vertical lines of the one end line and a new end line parallel therewith, drawn at the point where the vein disappears. —Carson City Gold and Silver Mining Company vs. North Star Mining Company (73 Federal Reporter, 598), United States Circuit Court, California.

DRAWBACKS FROM CUSTOM DUTIES ON IMPORTED COAL.—The provision, in the tariff act of 1883, allowing, as amended by act of June 19th, 1886, a drawback of 75c. per ton on imported coal used by United States vessels, was repealed by act October 1st, 1890, merely imposing a duty of 75c. per ton on imported coal; and the drawback was not continued in force by the provision of the latter act that there should be allowed, on the exportation of articles into which imported materials entered, a drawback equal in amount to the duties paid on such materials less one per centum thereof, and that the drawback on any article "allowed under existing law" should be continued, "at the rate herein provided." Reversing the decision of the Circuit Court of Appeals (58 Federal Reporter, 547).—United States vs. Allen (16 Supreme Court Reporter, 1,071), Supreme Court of the United States.

SIZE OF SURVEY OF MINING CLAIM.—While the law prescribes a limitation as to the size of a single location, there is no limitation to the number of claims one person may hold by purchase, or that may be included in a single patent, or, it seems, in a single survey, showing only the exterior boundaries, and omitting all interior lines of the several smaller claims. The question of the right to a patent covering several vein or lode claims, before parallelism of the end lines was required, is within the jurisdiction of the land department; and after the same is determined by it, and a patent issued, the boundary lines as defined by the patent are the lines by which the rights of the parties are to be determined, and the patentee cannot be compelled to rely upon the lines of the several claims of which the patented survey is composed. —Carson City Gold and Silver Mining Company vs. North Star Mining Company. (73 Federal Reporter, 597), United States Circuit Court, California.

MINING LOCATIONS AND OPENING INDIAN RESERVATIONS.—The act of July 1, 1892, opening a part of the Colville reservation, in the State of Washington, annulled from that date the executive order creating the reservation, and restored the lands to the public domain, subject only to the rights of the Indians to make selections for allotments in severalty; but the mineral lands contained therein are not subject to such selection, it being the intent of the law to award to each Indian agricultural land for his home. For the purpose of giving the Indians the full benefit of the right to select from the whole tract, settlements upon and entries of agricultural lands must be postponed, under the act, until six months after the presidential proclamation opening the lands to settlement and entry; but prospectors and miners are not required to wait for the proclamation to open the tract to exploration for minerals; for rights to mining claims are initiated by discovery of valuable mineral deposits, and the mode of appropriating mining ground is described by the word "location," while non-mineral lands are appropriated by settlement and entry. The right to locate claims is given by the statute and needs no proclamation authorizing same, when a reservation becomes public land. —Collins vs. Bubb (73 Federal Reporter, 735), United States Circuit Court, District of Washington.

WIFE HAS NO DOWER IN LOCATION CLAIM.—The character of the right which is granted to a locator, the court finds to be: (1.) That no written instrument is necessary to create. Locating upon the land, and continuing yearly to do work as provided by statute, gives to and continues in the locator the right of possession as stated in the statute. (2.) This right, conditional in its character, may be forfeited by the failure of the locator to do the necessary amount of work; or if, being one among several locators, he neglects to pay his share of the work which has been done by his co-owners under the provisions of the statute. (3.) His interest in the claim may also be forfeited by his abandonment, with an intention to renounce his right of possession. It cannot be doubted that an actual abandonment of possession by a locator of a mining claim, such as would work an abandonment of any other easement, would terminate all the right of possession which the locator then had. Therefore, the interest in a mining claim, prior to the payment of any money for the granting of a patent for the land, is nothing more than the right to the exclusive possession of the land based upon conditions subsequent, a failure to fulfil which forfeits the locator's interest in the claim, and we do not think the locator takes such an estate in the claim that dower attaches to it. —Black vs. Elkhorn Mining Company (16 Supreme Court Reporter, 1101), Supreme Court of United States.

DUTY ON SPECIAL STEELS.—In the case of F. S. Pilditch vs. Collector Port of New York, sheet steel in strips less than 0.25 in. thick and 4 in. wide, cold rolled and intended for use in the manufacture of steel pens, was assessed at 40% *ad valorem*, under paragraph 124 of the law. Appellant claimed that it was dutiable at 24c. per lb., under paragraph 122, but the protest was overruled and the collector's decision sustained.

In the case of T. Taylor vs. Collector Port of New York, sheet steel in strips over 2½ in. and under 5 in. wide, valued at over 2½c., but below 3c.

per lb., known in the trade as corset steel, was assessed at 40% *ad valorem*, under paragraph 124. Appellant claimed, however, that it should have been assessed at 0.9c. per lb., under paragraph 122. The protest was sustained and the collector's decision set aside.—Board of United States General Appraisers.

The Corinth Canal.—This canal has proved a huge financial disappointment. The revenue collected in the second half of last year was only £6,181, while the working expenses and taxes which had to be provided for amounted to £7,111. It is needless to say that the debenture holders have to go without any return upon their investment, while the shares are practically wiped out, at any rate for the present.

Electric Lighting Safest.—Insurance companies have decided that electric lighting, when the wiring is well done—and they have formulated special rules on the subject—is the safest of all illuminants. Statistics show the following comparative risks:—Fires in one year from paraffin and kerosene, 259; from gas, 110; matches used for gas, 35; candles, 88; arc electric lights, 7; and incandescent electric lights, only 1.—*The Engineer*.

Coarse Crushing.—Some interesting experiments have lately been completed on the property of the Luipaard's Vlei Estate, in the Transvaal, where for some time past a Gates rock breaker has been at work crushing free-milling rock for treatment by cyanide. About 1,000 tons have now been dealt with, and the results have been published. The ore averaged 9 dwts. 15 grs., and was taken directly from the breaker to the vats without screening. After the solutions and washes had been drawn off, the crushed material was classified to ascertain the varying percentage of extraction. The results can be tabulated as follows:

	Percentage in bulk.	Percentage in extraction.
Not passing ¼-in. mesh.....	19.7	56.6
" " ½-in. mesh.....	17.4	65.2
" " ¾-in. mesh.....	19.8	66
" " 1-in. mesh.....	23.6	77
Remainder.....	19.5	81

The consumption of cyanide amounted to 11.2 oz. per ton and the total average extraction of gold was 68.9%. These results broadly confirm previous experiments made in crushing friable rock coarsely in a breaker and treating it direct by cyanide.

German Iron Market.—The Rhenish-Westphalian iron market reports a considerable growth of exports, a large part of which consists of rails, plates, wire and tools. Russia is a very large buyer and it is thought that most of the Russian orders go to this market. The domestic demand is also very good, and though production has grown very much, there is hardly any stock on hand. The pig-iron market is stimulated by the puddling and steel works. Orders suffice to keep the furnaces busy until the close of the year. Prices are firm. The demand for domestic ore is large. Makers of superior plate intend to start an office for the promotion of exports.

The exports of pig iron, manufactured iron, iron and steel goods, January 1st to April 31st, are stated as under:—

1896.	1895.	1894.	1893.
Tons.	Tons.	Tons.	Tons.
541,253	466,518	448,094	372,114

The increase results from the larger demand from Russia, Great Britain and the United States. The reports of pig iron during the same period are recorded thus: Exports—1896, 62,944 tons; 1895, 37,022 tons. Imports—1896, 52,223 tons; 1895, 49,391 tons. As to other iron goods the exports in the four months were:

	1896.	1895.	1896.	1895.
	Tons.	Tons.	Tons.	Tons.
Scrap iron.....	21,124	28,442	40,317	30,252
Angular.....	57,975	43,727	31,063	27,755
Sleepers.....	23,072	16,610	29,804	28,150
Rails.....	44,353	32,824	64,619	54,082
Bar iron.....	89,974	94,493	8,419	6,352
Plates.....	49,601	35,301		

PATENTS RELATING TO MINING AND METALLURGY.

United States.

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

WEEK ENDING JUNE 16TH, 1896.

562,158. **ROASTING FURNACE.** James R. Sears, Stockton, Cal.. Assignor of one-half to Don C. Matteson, same place. Filed September 15th, 1895. A horizontal cylindrical chamber extends approximately the length of the furnace, having closing-heads at its ends provided with central openings, hollow trunnions extending from the heads to and beyond the outer walls of the furnace, and journaled in bearings in the walls, said cylinder having its discharge end slightly lower than its receiving end, a driving mechanism connected with the trunnions at points exterior of the walls of the furnace whereby the cylinder is rotated from the ends, a heating-chamber within which the body of the cylinder is inclosed, and through which the trunnions project; supporting-rollers at the center of the cylinder, for supporting that portion thereof, while the opposite end portions are supported by the trunnions, and a petroleum burner delivering a hydrocarbon fuel into the furnace beneath the discharge end of the cylinder and passages through which air is admitted through the bottom and sides of the furnace-chamber adjacent to the burner.

562,068, 562,069. **ART OF AND APPARATUS FOR CONTROLLING OPERATION OF TRAY-ELING-GRATE FURNACES.** Alexander B. Cox, Drifton, Pa., and Henry B. Cox, New York, N. Y., Executors of Eckley B. Cox, deceased. Filed January 21st, 1896. The improvement consists in superimposing layers of carbonaceous and non-carbonaceous materials; subjecting said superimposed layers to an air-blast at successively different points; and burning and decarbonizing the carbonaceous layer. In a drive or sprocket chain, two duplicate links pivotally connected together at their adjacent ends with their side faces in alignment, and each link having one or more outwardly-extending lugs located approximately midway between the extreme ends of said link, and each link also having, substantially midway of its width, a flange-receiving opening.

PERSONAL.

MR. WM. H. FREELAND, of the Mountain Mines Company, of Shasta County, Cal., is at Denver, Colo., inspecting the smelters there.

MR. H. M. LANE, professor of mining and metallurgy at the College of Montana, has accepted the position of assistant engineer of the Montana Iron Works.

MESSRS. J. E. SPURR, H. B. GOODRICH and F. C. SCHRAEDER, of the United States Geological Survey, have gone to Alaska to report on the mineral resources of the Yukon Basin.

MR. WALTER McDERMOTT so well known in this country for many years as the representative of Fraser & Chalmers in New York, and who since the opening of that firm's business in England has occupied the position of secretary and manager has been elected managing director, to replace Seymour, retired.

MR. T. A. RICKARD, the well-known mining engineer and metallurgist, stopped at Boise, Idaho, on his return from a professional trip to Oregon. Mr. Rickard left Idaho on the 21st inst. for Neihart, Mont., to examine the Broadwater mine at that place. He expects to return to Denver by the end of the month.

OBITUARY.

GENERAL WILLIAM H. DIMOND, died in New York, June 18th, aged 58 years. He was at one time superintendent of the San Francisco mint.

JAMES M. DAY, mine owner, died in Galena, Ill., on June 13th, aged 77 years. He was at one time part owner of the Little Emma mine, in Utah, which was eventually sold to English capitalists for a very large sum.

GEN. GUSTAVUS WOODSON SMITH died June 24th, in New York, aged 74 years. He was born in Scott County, Ky., on January 1st, 1822. In 1842 he graduated from the West Point Military Academy, and during the Civil War held the rank of Major-General in the Confederate Army. He received many honors while in the military service, but in 1864 he resigned from the army to take up civil engineering. For a number of years he was employed in the iron works of Cooper & Hewitt, at Trenton, N. J., and from 1866 to 1869 acted as superintendent of the Southwest Iron Works, at Chattanooga, Tenn.

JOSEPH PRESTWICH, the celebrated English geologist and author, died in London, on June 23d, aged 84 years. He was born at Pensbury, Clapham, near London, March 12th, 1812. Mr. Prestwich has written several works on geological subjects, which have secured for him the Wollaston medal from the Geological Society in 1849, a royal medal from the Royal Society in 1865, and a Telford medal and premium from the Institution of Civil Engineers in 1874. He served on the Royal Coal Commission of 1866, and on the Royal Commission on Water Supply of 1867. He was president of the Geological Society in 1870-72, vice-president of the Royal Society in 1870-71, professor of geology at Oxford in 1874, a corresponding member of the Academy of Sciences, Institute of France, in 1885, and president of the Congress Geologique International in 1888. In 1888 the University of Oxford conferred upon Mr. Prestwich the honorary degree of D. C. L.

SOCIETIES AND TECHNICAL SCHOOLS.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.—The summer school is now in session in the iron regions of Michigan. The students are making a study of the geology of the country there and are having the opportunity of intimate acquaintance with the mining operations. The party received the hospitality of the ore boats of M. A. Hanna & Co., plying on the lakes. There are 10 students in the party, which is in charge of Professors Robert H. Richards and H. O. Hofman. The summer school will be in session one month, and the party will break up July 8th.

ENGINEERS' CLUB OF ST. LOUIS.—The 438th meeting of the club was held on June 17th and called to order by President Ockerson. A paper was read on "Experiments on Vitrified Paving Brick" by F. F. Harrington, of the St. Louis Testing Department. Attention was called by the author to the great variations both in the methods of testing such brick, and in the specifications for same. A discussion followed in which Messrs. Holman, Freeman, Flad, Kinealy, Wheeler, Crosby and Barth took part. Mr. Holman explained a testing machine which he had just designed for the department.

INDUSTRIAL NOTES.

The Altoona Iron Works, of Altoona, Pa., have started up again.

The Sharon Iron Company, Sharon, Pa., is contemplating the erection of an open-hearth steel plant during the summer.

The Menominee Iron Works Company, of Menominee, Mich., is about to erect a foundry, to be equipped with the latest appliances.

The big rolling-mill owned by George L. Beecher, near South Negaunee, Mich., has been purchased by Samuel Mitchell, president and manager of the Jackson & Negaunee mines.

The Edgar Boiler Company, Limited, of Warren, Pa., has just completed a shell-boiler for the New York Steam Company. The boiler is 23 ft. 6 in. high, 31½ ft. in circumference, 10 ft. in diameter, weighs 119,000 lbs., and is capable of generating over 1,000 H. P.

The Berlin Iron Bridge Company, of East Berlin, Conn., has secured a contract from the Pennsylvania Bolt and Nut Company, of Lebanon, Pa., for the construction of a steel rolling mill, 103 x 112 ft. The frame of the building will be of steel, and the roof and sides of corrugated iron.

The Clayton Air Compressor Works, of New York, report a gratifying increase in their business during the past few months, over the same period last year. The rapid extension in the field of application for compressed air was foreseen by these works several years ago, when they discontinued other lines and devoted their sole time and attention to the manufacture of air-compressing machinery.

The stockholders of the proposed steel mill at Sharon, Pa., held a meeting recently, at which the following directors were elected: John Carley, T. J. Forker and Hon. J. S. Fruit. Frank Buhl was elected president of the board; Theodore Buhl, vice-president; David Adams, treasurer, and J. M. Pressley, secretary. It was decided to build a mill at a cost of \$350,000, and it is said the company will be incorporated at once.

The Compressed Air Power Company, of New York City, has been incorporated with a capital stock of \$1,000,000, to manufacture power, plant, machinery and apparatus, and supply power to railroad and manufacturing companies. The directors are John McKinlay Wight, Alfred C. Jopling, Adolph C. Wappler, Frederick S. Woodruff, Theodore L. Cuyler, Jr., Henry F. Hawkins and Isaac Smith, of New York City; George E. P. Howard, of South Orange, N. J.; and Michael Sandford, of Hackensack, N. J.

The Iron City Firebrick Company was recently organized in Phillipsburg, Pa., with the following officers: President, George McGaffey, of Phillipsburg; secretary, O. Perry Jones, also of Phillipsburg; treasurer and general manager, George D. Blair, of Tyrone, and general superintendent, William A. Scott, of Pittsburg. The large firebrick plant at Sandy Ridge, which was purchased a short time ago by the company, will now be put in operation; also its plant near Pittsburg. The greater part of the raw material for the Western plant will be shipped from Sandy Ridge. Employment for 300 men will be given at this place.

The Bethlehem Iron Company held its annual meeting at Bethlehem, Pa., on June 23d. Hon. Chas. Broadhead presided, and Abram S. Schropp acted as secretary. The following directors were elected on a vote of 82,296 shares: Robert H. Sayre, Sr., Joseph Wharton, E. P. Wilbur, Sr., Robert P. Linderman, George H. Myers, Beauveau Borie, J. P. Lippincott. The new board of directors organized by electing the following officers: President, R. P. Linderman; vice-president and general manager, R. H. Sayre, Sr.; second vice-president, R. W. Davenport; treasurer, C. O. Brunner; secretary, A. S. Schrupp.

The New York property of the Sigua Iron Company has gone into the hands of a receiver, Mr. Logan M. Bullitt, appointed by the Supreme Court on the application of William R. Montgomery, holder of 50 shares of the company's stock. Mr. Bullitt was appointed receiver in Philadelphia, on February 9th, 1894. The principal asset in New York is a judgment for \$20,130, in favor of the company on July 17th, 1895, against Benjamin D. Greene, who has appealed the same to the Circuit Court of Appeals in this city. The Sigua Iron Company was incorporated under West Virginia laws in May, 1891, with a capital stock of \$5,000,000, of which \$920,000 was paid in to operate iron mines in Cuba.

The Colorado Iron Works Company, of Denver, Colo., have just completed arrangements with Mr. C. T. Finlayson, of that city, for the exclusive right to manufacture and sell Finlayson patent wire rope tramway. This tramway is of the double rope type, having a fixed rope over which the bucket carriers run, and a traction or tail rope which regulates the speed of buckets and to which they are attached. This tramway is built for light or heavy tonnages. Several important features characterize the "Finlayson" system. There are automatic devices for loading and dumping the bucket, attaching and detaching the same from the tail rope, and also a carriage at each terminal of the system for gradually starting the buckets which are at rest. Catalogues and other descriptive matter regarding this patent wire rope tramway can be had upon application to the above company.

MACHINERY AND SUPPLIES WANTED.

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

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

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

GENERAL MINING NEWS.

ALASKA.

ANCHOR POINT.—The Juneau Mining Record says an immense auriferous gravel deposit, carrying \$5 in gold to the yard, has been discovered here on the north side of Kachemak Bay, the ground having been taken up by a Boston syndicate.

ALASKA MEXICAN GOLD MINING COMPANY.—This company reports its clean-up for the month of May as follows: Period since last return, 31 days; bullion shipment, \$17,059; ore milled, 7,201 tons; sulphurets treated, 135 tons; bullion from sulphurets, \$5,796; working expenses, \$12,480. The average yield was \$2.37 per ton of ore milled, and the average cost, \$1.73 per ton. The profit realized on the bullion shipment for the month was \$4,579.

SILVER QUEEN.—A ledge has been discovered in this mine, on Sheep Creek, which is said to run \$400 in gold to the ton.

ARIZONA.

YUMA COUNTY.

HARQUAHALA GOLD MINING COMPANY, LIMITED.—The assistant manager of this company reports the operations of the cyanide plant for the month of April as follows: Pulp treated, 3,000 tons; average assay of pulp, \$1.43 per ton; average assay of tailings, \$1.81 per ton; extracted according to assays, 59%; bullion realized, \$6,565; miscellaneous revenue, \$20; total revenue, \$6,585; operating expenses, \$3,784; extraneous expenses, \$623; total expenses, \$4,407.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

BELLWEATHER.—This property is northeast of Jackson on the outskirts of the town. A new shaft has been started north of the old one and near the center of the claim. The mine is now operated by an Iowa company, George Adams superintendent.

WILDMAN & MAHONEY.—This mine, at Sutter Creek, is running 70 stamps night and day, crushing about 7,000 tons of ore per month. It is estimated that enough ore is in sight to keep the present plant busy for 10 years.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

FELLOWCRAFT.—This mine, at San Andreas, is now in the hands of a Cleveland, O. Company, with Prof. P. L. Hobbs, of Cleveland, as superintendent. Air compressors and other machinery will be put in at once and the development work pushed as rapidly as possible. This mine has been idle for several years.

EL DORADO COUNTY.

BIG SANDY.—Work in this mine in Kelsey District is being vigorously prosecuted. The double compartment shaft is now down 200 ft., and the three shifts sink 10 ft. a week. The Teledo owners have given the contract to sink 300 ft. deeper.

(From Our Special Correspondent.)

OHIO AND WALSH.—These mines, half a mile from Greenwood, are bonded by San Francisco parties. A shaft is down 100 ft., at which level they are crosscutting on the vein. The ore is free milling and very rich. The shaft will be sunk 300 ft. before another crosscut is made.

GUNNISON COUNTY.

GOLDEN ETTA.—A big strike has recently been made in the north crosscut at the bottom of the 100-ft. shaft in this mine. The workmen encountered a large body of gold quartz which looks rich. A mill run on a 3-ft. body, struck a short time ago, gave \$20 in gold and \$3 in silver. A contract has been given to sink another 100 ft.

KERN COUNTY.

(From Our Special Correspondent.)

A 3-ft. vein of gold-bearing quartz has been located in the town limits of Havilah. The formation is slate and granite and the pay chute is said to be 400 ft. in length, assaying from \$100 to \$200 per ton.

MARIPOSA COUNTY.

(From Our Special Correspondent.)

MARIPOSA GRANT.—This property, which comprises 44,357 acres, being 15 miles long by 5 miles in width, is found to be intersected by a network of veins, but few of which have been opened. In early days the Josephine, Pine Tree and Princeton mines were opened up and yielded over \$2,000,000 in two years. The ore from the Princeton is said to have averaged \$150 per ton of free-milling ore, the refractory and low-grade not being treated at all. This mine was only worked to a depth of 400 ft. The owners of this property are Senator John P. Jones, of Nevada; John W. Mackey, Alvinza Hayward and the Hobart Estate, who it is said are about to commence development work on a large scale and to throw open the immense tract to settlers. The old mines will be reopened and worked on modern

ines and new lines will be opened in other parts of the grant. All the mines are on the mother lode, which runs through the estate for a distance of 10 miles.

TRYO.—At this mine, on the west lode, $1\frac{1}{2}$ miles south of Coulterville, a fine chute of ore has been struck at the 700-ft. level.

NEVADA COUNTY.

(From Our Special Correspondent.)

NORTH STAR MINING COMPANY.—This company has purchased the Massachusetts Hill mine and is now cleaning out and extending the old drifts and is preparing to make developments. A new plant is being put in and a large force of men will be put at work. The mine was closed down in the sixties.

PLUMAS COUNTY.

(From Our Special Correspondent.)

QUINCY MINING AND WATER COMPANY.—This company will build a large restraining dam across Spanish Creek, at Devil's Elbow. About 300,000 yds. of material will be required for its construction. About 15,000,000 cu. yds. of debris can be held above the dam.

SHASTA COUNTY.

(From Our Special Correspondent.)

CLEAR CREEK MINING COMPANY.—This company has made arrangements for the erection of a large 200-ton smelter on Clear Creek, about four miles from Redding. It will be in operation inside of 60 days.

MOUNTAIN MINES COMPANY.—The directors of this company are now at Keswick, and extensive improvements are contemplated. A new 300 H.P. plant is on its way to the mines, and five more large smelters will be erected near Middle Creek, about three miles from Redding. The company is now working on an eleven-mile flume and ditch, which will convey water to the plants for power. There is a rumor that the mines will close down for 30 days until the directors agree as to a proper plan of procedure.

SISKIYOU COUNTY.

(From Our Special Correspondent.)

MEYERS.—This mine, in Quartz Valley, produced \$11,000 last year, and the owner reports that this year's yield has already been more than that. The ore averages about \$18 per ton. This mine was abandoned at one time.

YUBA COUNTY.

(From our Special Correspondent.)

BROWN'S VALLEY DISTRICT.—The Pennsylvania, Jefferson and Danneberg mines, once celebrated for their gold production, are now being reopened. A number of locations are being made in this district.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

BELLE UNION.—At this mine, near Jacksonville, a crosscut tunnel, about 150 ft. from the surface, is being run to tap the ledge. It is now in 130 ft. A drift is also being run north from the Shamut shaft to intersect the vein in the Belle Union ground.

NONPARIEL.—This mine, at Groveland, which has been idle for the past 20 years, is now being worked under bond by Reid & Jones.

RAWHIDE.—At this mine, $2\frac{1}{2}$ miles northwest of Jamestown, the 40-stamp mill is running regularly and the ore on the 1,000-ft. level shows as rich as ever.

COLORADO.

BOULDER COUNTY.

(From Our Special Correspondent.)

KILTON GOLD EXTRACTION COMPANY.—The untiring efforts of Mr. James A. Kilton toward securing for Boulder a process for the successful treatment of low-grade ores at a profitable margin have been successful, and the works, although in operation only since March 16th, have already succeeded in breaking the monopoly formerly controlled by other works in this city. The intention of the Kilton company was the erection of a custom sampling works for competition with rival concerns for a share of the ore output of this country, and the establishment of cyanide, chlorination and bromination processes to follow. The sampling works have been completed and are now in full operation, Mr. Byrns, general manager for the company, having closed several large contracts with mine owners at Ward and surrounding camps for their complete outfit.

The capacity is given at 50 tons daily, capable of being increased to 70 tons in case of emergency. The works are fitted with a 50-H. P. boiler and engine, one large Dodge crusher and one set rolls. In room set off for the purpose are smaller crusher and rolls, especially adapted for use on high-grade ores of the tellurium and sulphide character. The building enclosing the works is arranged with bins, forming a square around the inside and opening upon a large area way, in which are placed the rolls and crusher.

About four-fifths of the present tonnage is received from Ward, most of which is rich tellurium. The product, averaging a carload daily, is shipped to the Globe smelter at Denver. The working force consists of 10 men.

Plans have just been completed for the new chlorination works. By this process it is estimated that the low-grade ores of this section can be treated at a moderate cost. The sampling works at present are able to handle \$16 ore of the sulphide variety,

at a fair profit, and tellurium running \$22 per ton can be treated at a very good margin.

CLEAR CREEK COUNTY.

(From Our Special Correspondent.)

ÆTNA.—This tunnel, at Empire, is being retimbered preparatory to driving the work on the lode, it being claimed to be the same as the Tenth Legion.

AMY C.—In opening up lower levels of this mine on Seaton Mountain a large body of ore with some rich gray copper was cut. It is now being prospected.

BERTHA.—An adit is being driven on this lode at Empire, and a good streak of pay ore is showing at the breast.

GRANTHAM.—Lessees have taken charge of this Seaton Mountain mine, and are now making it pay through a pocket of \$65 ore being cut in the adit.

LITTLE ALBERT.—A St. Louis company has been organized to operate this Idaho Springs mine.

MAYFLOWER.—The water has now been taken from the shaft of this mine, at Idaho Springs, by W. E. Renshaw, and the lower drifts are to be driven for ore bodies. About 18 inches of high-grade smelting ore has already been cut to the west.

P. T. MINE.—A. L. Welch, of Denver, has secured a lease and bond on this property, near Idaho Springs, and is now driving an adit to open the vein at greater depth.

RISEING SUN.—The owners of this mine find that surface gophering will not pay, and consequently are now advertising for bids to sink the shaft. The property is located at Idaho Springs.

SENATOR.—In driving the lower adit on this property the management reports cutting a body of mineral showing ruby silver. Twenty-four claims comprise the group, which will be extensively worked by a Leadville company.

SPIRIT HILL.—Some excitement has recently been occasioned at Idaho Springs through the location of mineral-bearing veins by spiritualist mediums. Good ore is already showing at claims alleged to have been located through this influence.

EL PASO COUNTY.—CRIPPLE CREEK DISTRICT.

(From Our Special Correspondent.)

CRESSON MINING COMPANY.—This company owns four claims on both sides of the northfork of Arequa Gulch, which separates Raven from Bull Hill, and owned by Chicago people, Mr. Harbuckle being the principal owner, recently made a shipment which sampled 11.98 oz. in gold per ton. This is also an initial shipment. The shipment was taken from one of the claims situated on Raven Hill side of the gulch directly below the Moose mine.

ECLIPSE NO. 1.—This property on Raven Hill is at last a shipper; perhaps in the early days of the camp no prospect ever made such a legion of "rich strikes" as this; one-half of the claim was owned by a preacher, and whenever his salary was due the papers would instead of bread give him a "strike." The shipment now made is of medium grade, about \$40 per ton. The shaft has been sunk 140 ft. The vein is fairly well defined with a pay streak about 12 in.

ELECTRIC TUNNEL.—This tunnel pierces Bull Hill from the west. It is being actively worked by a small force, and is now in a distance of 416 ft., the size of the tunnel being designed for double track.

FAVORITE.—This property, on Bull Hill, recently held its annual meeting at Colorado Springs, and the report showed a balance in hand of \$2,000. The shaft has been sunk 140 ft. on the vein, which is low grade at present. Only development work is now being done.

FINDLAY.—This property, on Bull Hill, is a little west of the wagon road connecting Altman and Independence. The shaft has been sunk 136 ft., and sinking will be continued until 150 ft. is reached. The pay streak in the sinking of 50 ft. has increased both in size and value. This property will make its initial shipment the coming month.

INDEPENDENCE.—This mine has been the subject of much talk during the week, and a variety of reasons were assigned. The visit of Hamilton Smith, who came from Butte, Mont., made an inspection of the mine and a complete survey of the underground works. It is reported that the second visit of Mr. Hamilton Smith to this property is something more than curiosity, and that negotiations are pending for a sale. The control of the Portland mine is stated to be a part of the preliminary deal. Another reason given for the closing down of the mine is the inefficiency of the mill to treat the low-grade ores, but the mill has not been tested sufficiently to know whether it is a success or not. For such a plant (100 tons) 12 hours is hardly adequate to test its gold-saving qualities. Mr. Smith did not make a general tour of the camp, but was with Mr. Stratton most of the time.

RATTLE.—This property, adjoining the Eclipse, after being worked by a dozen sets of lessees, who made the surface look like agricultural land, is also a shipper, and gives employment to 16 men.

GILPIN COUNTY.

(From Our Special Correspondent.)

GETTYSBURG.—A contract is being set to sink the shaft a further 100 ft. So far, nothing of value has been found in this mine, which is owned by Chicago parties.

GREGORY-BOBTAIL.—It was understood that negotiations are on foot for the reorganization of

this group, with a sufficient working capital. This is by far the largest and most important group of mines in the county, but has been starved for want of once of capital and a definite plan of working, ever since the death of Mr. Rogers, the late manager, some years ago. The mill and the whole of the plant are in poor condition, and much important underground development will be necessary before the mines can hope to repeat their old production.

KANSAS-BURROUGHS.—This company has leased the old Climax Mill, of 15 stamps, on Clear Creek, and is now running its mill-ore there.

SPUR DAISY.—An injunction has been granted restraining the Commonwealth Mine Leasing Company from further working this claim until a suit to determine the title to the property has been heard. A number of cross-suits are pending, respecting the ownership of this mine.

WASHINGTON.—Men employed on the neighboring St. Louis Justice mine have broken through into the workings on this property. It is said that the two veins have come together, the St. Louis Justice being the older location. At any rate, the immediate result is that work on the Washington has been suspended.

HINSDALE COUNTY.

GOLDEN FLEECE MINING COMPANY.—This company's report for May shows that the shipments of first-class ore amounted to 13,158 lbs., which returned \$27,028 or better than \$2 per lb. The amount of dump ore shipped was 1,912,828 lbs., which returned \$5,485. The entire expenses for the month, including work on the Colorado City claim, were \$19,123. The profits for May were \$19,123. The surplus in the company's treasury on June 15th, after deducting dividend No. 42 of \$18,000, is \$33,228.01.

LAKE COUNTY.

(From Our Special Correspondent.)

LEADVILLE MINERS STRIKE.—On Saturday last a strike was inaugurated by the Miners' Union of this camp. Within 24 hours 1,600 men had left their places, and to-day 90% of the mines of the camp are closed down. The men ask for \$3 a day in all properties. Some of the silver-lead producers have been paying \$3 a day, but a number of the companies claimed that \$2.50 was all they could pay at the present low price of silver. These companies included the Small Hopes, the Union Leasing and Mining Company, the Bohn, the Welden, the big Smith-Moffat combination and others. Several times the men have demanded the raise, and finally they walked out. The Ixex Company, which owns the celebrated Little Johnny and other rich gold shafts, has been paying all its miners \$3 a day, but only paid \$2.50 to trammers. This latter class of men also demanded \$3, and when it was refused the men walked out. As a result, the company shut down entirely, letting out over 350 men. The engineers and pumpmen are still at their posts, but they are, in many cases, in sympathy with the strikers. Unless a settlement is reached within the week the strike will prove one of the most disastrous ever inaugurated in a mining camp, for it will mean the closing down of the pumps by the big mines; this would result in the flooding of a vast amount of developing territory, and some of the properties could never reopen. It would cause a loss of \$1,000,000, and would be a severe blow to the camp. Another serious feature of the strike is the scarcity of ore at the smelters. The Arkansas, the Bimetallic, and the Union smelters have barely enough ore to last a week. If these plants are compelled to close down it will be a heavy financial loss to them. The Turbot, The Big Four, The Alps and a number of other properties that have been paying \$3 a day have closed down of their own accord, and will await the result of the strike. Should the strike last 10 days there will not be a mine working in the camp, as the properties that are paying \$3 a day would have no place to market their ores. The men are orderly and quiet, but are determined in their demands. They argue that they cannot exist and support their families on \$2.50 a day. On the other hand the mine managers paying \$2.50 a day state that they will have to work at a loss in many cases if they pay over \$2.50.

GEORGIA.

CHEROKEE COUNTY.

BONNER.—This old mine is to be operated very soon.

CHEROKEE.—Pope Brothers & Dyer are energetically at work on this mine. They have just had a 10-stamp mill built.

IDAHO.

LEMHI COUNTY.

PRATT CREEK.—This property has been sold to Salt Lake men for \$50,000, \$5,000 cash and the remaining \$45,000 as it comes out of the mine. Under the terms of sale the company is bound to put in a mill and all necessary machinery for properly working the mine.

OWYHEE COUNTY.

TRADE DOLLAR.—A big strike was made in the No. 3 tunnel of this mine recently. In the adit tunnel, 400 ft. below, the heading has been in a rich chute of ore for 300 ft. The pay streak is fully 8 in. in width, while the vein (about $2\frac{1}{2}$ ft.) is good trade milling stock.

SHOSHONE COUNTY.

POORMAN & TIGER CONSOLIDATED.—The concentrator on this property is still being pushed as fast as possible. The ground is not yet all cleared of the debris from the fire of March 17th. The work of pumping out the mine will commence at once in order that it may be ready to work as soon as the mill is finished. The work on the mine will be resumed as soon as the water is lowered sufficiently.

ILLINOIS.

MARSHALL COUNTY.

DEVLIN COAL COMPANY.—This company, which controls the mines of Toluca and Marquette, has purchased the Sparland coal mines of A. R. Hancock and George Marsh. One hundred extra miners will be put to work at once. A new shaft will be sunk and as soon as completed and the force can work underground, 1,000 men will be employed.

INDIANA.

JAY COUNTY.

LINKHAUER LAFOLLETTE OIL COMPANY.—An oil strike was made last week three miles from Portland, in a well owned by this company. Oil rose 400 ft. in it after being shot.

KENTUCKY.

JOHNSON COUNTY.

WHITE HOUSE CANNEL COAL COMPANY.—The mines of this company, operating at Myrtle, have been closed down for the summer. The company has on hand sufficient coal to meet all orders that will come during the summer.

MICHIGAN.

COPPER.

OSCEOLA CONSOLIDATED COPPER MINING COMPANY.—This company is building a new boiler-house at the mill on Torch Lake, and will replace the present battery with 16 large new boilers.

MINNESOTA.

(From Our Special Correspondent.)

BESSEMER STEAMSHIP COMPANY.—The four purchased vessels of the new Bessemer Steamship Company have had their names changed to conform to the plan of the company in naming its vessels after men prominent in the iron and steel trades. The Bessemer, the company's first new ship will be out in two weeks. The Ericsson, its second, will be ready July 6th, and the third ten days later. The Siemens, the fourth, will be launched July 15th, and work on the eight others is going forward very rapidly at the yards of the Wheeler Shipbuilding Company at Bay City, the Chicago Shipbuilding Company, the Detroit Drydock Company and at Buffalo. Nearly all will be ready for launching at contract dates.

COAL.—Analyses of the coal found in Northern Minnesota, and about which there has been a good deal of talk in daily papers, show 65% of carbon, 23% of volatile matter and 10% ash, while the average is far poorer than that. This correspondence has heretofore given its opinion of these finds, and finds nothing to add to the belief then expressed.

IRON ORE SHIPMENTS.—The shipments from Minnesota mines are not changing, though rates are now from 85 to 90 cents. Shipments from other ports are decreasing. There are no night crews at Ashland docks, and the shipments from there have fallen off 180,000 tons from last year to this time. At Marquette shipments for the past two weeks have been but 117,000 tons, while they averaged a year ago 70,000 tons a week.

MINNESOTA IRON COMPANY.—This company has declared dividends amounting to 6% for the coming year.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

FAYAL IRON COMPANY.—This company has reduced its forces.

MAHONING ORE COMPANY.—Only about 1,000 tons of ore are being shipped from this mine daily now, the shovels being employed in stripping all but five hours a day. Work on the earth surface is being pushed very rapidly. More ore will be sent shortly.

PENOBSCOT MINING COMPANY.—This company has sunk its pump shaft 110 ft. and is some 20 ft. in ore. Drifting has begun to connect with the working shaft, and considerable ore is being hoisted. The machinery for the hoisting plant, which is to be one of the best on the range, is on the ground, and the foundations have been completed. Engine and boiler houses and two dwellings are about completed.

VEGA IRON COMPANY.—This property is supposed to have been sold to interests associated with the Franklin Mining Company. The mine has been closed down for a time, but will probably resume shortly. The Vega is a very fine property, with probably not less than 10,000,000 tons of ore measured up by development and borings, and is located on the southwest quarter of 31, 58-17, between the Adams and Fayal.

WASHINGTON IRON COMPANY.—The court has appointed F. W. Paine receiver on petition of Marshall-Wells Hardware Company. The company is supposed to have some valuable lands at the west end of the range, but its affairs are in bad condition.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

JOPLIN ORE MARKET.—The output of ore was about the same as last week, as there are quite a number of the mines flooded and the operators are pumping day and night trying to get the water out. The sales of ore were about the same as last week. The top price paid for zinc ore was \$21 per ton, while the average was less than \$18 per ton. The price paid for lead ore was \$15.50 per thousand, with the usual 50c. added for hauling. The production was as follows: Joplin zinc, 1,319,410 lbs.; lead, 334,040 lbs.; value, \$18,706. Webb City zinc, 310,820 lbs.; lead, 40,800 lbs.; value, \$3,752. Cartersville zinc, 616,910 lbs.; lead, 236,150 lbs.; value, \$10,666. Galena, Kan., zinc, 2,610,000 lbs.; lead, 420,000 lbs.; value, \$30,220. Aurora zinc, 360,000 lbs.; lead, 50,000 lbs.; value, \$3,230. Zincite zinc, 20,270 lbs.; value, \$207. Oronogo lead, 10,850 lbs.; value, \$128. Totals for the district: Zinc, 5,237,870 lbs.; lead, 1,091,840 lbs.; value, \$66,339.

COLUMBIA.—This plant, on the Granby land is running steadily on rich dirt and is producing over nine tons of high-grade zinc ore each shift, with the ore getting richer every day. With two steam drills they keep the crusher platform filled with dirt. Until the last two weeks they could make only four tons of zinc ore each shift.

KATIE LEHIGH.—This mine, near Carl Junction, has opened up a large body of galena at 100 ft. A block of solid ore weighing 625 lbs. was taken out and sent to Joplin Lead Works last Thursday. The block is off a larger mass of ore weighing about 22,000 lbs., and will have to be broken up to be taken out of the mine.

KELLAR LAND.—Conklin, Rich & Company have developed a large body of lead ore on the Kellar land, four miles south of Cartersville, and in four hours last Friday 4,000 lbs. of lead were taken out. They broke into an opening that is all lead ore except crevices of clay. One block was hoisted out Friday that weighed 700 lbs. They started to drift at 72 ft. and 7 ft. from the shaft struck the lead ore and last week they turned in 16,460 lbs. of lead ore.

VICTOR MINING COMPANY.—On the Connor land, near Webb City, this company has again got the water out, and are working in the Nellie Norton shaft at a depth of 185 ft. The shaft was sunk over 125 ft. several years ago by some Chicago parties, but abandoned on account of running into a limestone bar. The Victor Company sunk the shaft to 185 ft., and started a drift and 30 ft. from the shaft opened up a large face of zinc ore in open ground, and are making over 10 tons of zinc ore each shift.

NEWTON COUNTY.

(From Our Special Correspondent.)

LEWIS & PEARSON.—Mrs. C. P. Lewis and Thos. Pearson are operating the Sherwood & Morrow plant and mine and the Hunt mine and lot 26 on the Spring City Company's lease, six miles south of Joplin. They are drifting at the 115-ft. level, carrying two faces 14x20 ft., that are very rich in zinc ore, and they only work one drift at a time, and with two men in the ground they hoist about 125 tubs of dirt, and make six tons of high-grade zinc ore each shift and with a first-class concentrating plant could easily make 15 tons of zinc ore each shift, as the dirt is very rich and as it is soft-picking ground they could hoist twice the amount of dirt. They have only enough water to run the plant. Mrs. C. P. Lewis has been the most successful of all the ladies that have invested in mines in this district.

MONTANA.

DEER LODGE COUNTY.

(From an Occasional Correspondent.)

ONTARIO.—This mine, under its new manager, has effected some reforms that materially improve its income. The ore mostly requires concentration. It is then hauled to the railroad, 13 miles, to be shipped to the smelter. Another improvement is about to be established, consisting of a roasting furnace by which the freight on hauling the sulphur and moisture in the concentrates will be saved and an increased price obtained from the smelter for the product.

GRANITE COUNTY.

FAIRSTAKES.—This mine, says the Anaconda Standard, has been extensively developed during the past six months. The shaft is about 25 ft. deep. There are surface cuts for the entire length of the claim, 1,500 ft., which show a chute of ore 500 ft. long by 10 or 12 ft. wide, and about 400 ft. of underground work. The officers of the company are: President, John R. Lucas; vice-president, J. G. Morony, and the secretary and treasurer, W. E. Moore.

LEWIS AND CLARKE COUNTY.

(From an Occasional Correspondent.)

The prospecting fever continues unabated, and a new development company, formed in Helena, with the names of prominent reliable citizens in the management, has promptly met with success in placing enough stock to commence practical work.

NARROW GAUGE RAILROAD.—This road, which is to run from Rimini up Beaver Creek and thence southeast around Red Mountain, continuing west to the Ontario mine, was projected and located two years ago. It seems probable it will get under way in course of construction before the year is over. This will enable a large number of mining claims and suspended mines to commence work. Red Mountain ores are chiefly of a class that require

concentration. The plan is to run these ores to the Missouri River and build large concentrating plants on the bank of the river. The amount of water about Red Mountain is too limited for treating a tithe of these ores. The scheme is so rational that an immense business can be rapidly developed and Red Mountain will become a great auxiliary to the business of Helena. The conditions are such that little else than mining the ores will be done at Red Mountain.

The dam at the Missouri River, for electric power, is reported as an assured thing, the capital being secured to accomplish it. Eight thousand horse power is to be obtained and 1,000 H. P. of this is to be taken by the East Helena Smelter, which also intends to enlarge its plant.

MEAGHER COUNTY.

(From an Occasional Correspondent.)

MIDLAND RAILROAD.—This road to Castle commenced laying rails on the 18th, and, as the grading is nearly completed, it will not be long until the silver-lead ores of Castle will be going to market. Tracklaying begins at the connection with the Northern Pacific Railroad, nine miles south of Toston.

NEVADA.

STOREY COUNTY—BRUNSWICK LODGE.

BRUNSWICK EXPLORATION COMPANY.—The latest official weekly report of the Consolidated California & Virginia, Best & Belcher and Gould & Curry companies says that the joint shaft No. 2 has been sunk 13 ft. on the incline; total depth 237 ft., bottom in hard porphyry. Still repairing in the Gould & Curry tunnel; also cutting out for a blower. The joint north drift, 200 level of Shaft No. 1 of the Savage, has been advanced 246 ft. to the south boundary. A joint west line crosscut was started therefrom on June 9th. The crosscut from the lower Occidental tunnel, which is now being run to connect with the Edwards shaft, is now in 211 ft., having been extended 55 ft. during the week. The face of the crosscut is in soft porphyry; 650 level west crosscut No. 2, which was started 25 ft. south of the main winze, is in 406 ft., having been extended 37 ft. The face is in hard porphyry. 750 level—The upraise started from the north drift is up 40 ft. and shows ore on the hanging wall all way up. The north drift is in 71 ft., extended during the week 17 ft. face in fair-grade ore. The south drift from west crosscut has been extended 15 ft.; total length, 60 ft. face in fair-grade ore.

STOREY COUNTY—COMSTOCK LODGE.

BELCHER.—The weekly official report says that the yield of this mine for the past week amounted to 56 mining carloads of ore, averaging by assay \$18.50 per ton. They have shipped to the Brunswick mill 346 tons and 310 lbs. of ore.

CONSOLIDATED CALIFORNIA & VIRGINIA.—The latest official weekly report gives for the total extraction of ore for the week 54 tons, the average assay value of which, per samples taken from cars when raised to the surface, was \$47. Have shipped to the Morgan mill 346 tons of ore, assaying per railroad car samples, \$47.75 per ton. Average assay value (per battery samples) of all ore worked at that mill during the week (240 tons) was \$42.72 per ton.

CROWN POINT.—The latest weekly official report states that no work was done in west crosscut No. 4 on the 700-ft. level during the past week. In the raise from the south drift on this level they have been timbering and carrying the raise from the connection to the 10th floor of the slope through to the 60-ft. level, and are now on the 11th floor. On the 600-ft. level the west crosscut, opposite the east crosscut at the south end of the south lateral drift, has passed through a width of 4 ft. of quartz assaying from \$8 to \$12 per ton, chiefly gold, and the face is now in porphyry.

SAVAGE.—The ore produced by this mine from the 850-ft. level workings during the week, according to the weekly official letter, amounted to 200 carloads, of the average assay value of \$58.71 per ton. The amount of ore shipped to the Nevada mill was 180 tons and the amount milled was 200 tons, the average battery assay of which was \$46 per ton. Bullion valued at \$6,440 is on hand at the mill. There was shipped to the United States Mint at Carson on June 13th 284½ lbs. of bullion of the assay value of \$6,811.06 per ton, of which \$1,830.88 is gold and \$4,980.18 is silver.

SEGREGATED BELCHER.—The latest weekly report says that the yield of this mine during the past week was 19 mining carloads of ore, of the average assay value of \$19.53 per ton.

NEW MEXICO.

GRANT COUNTY.

CAMP VILINES.—A report comes from this camp a few miles from Georgetown that some rich ore has been struck there. The ore is said to run from \$1,000 to \$5,000 a ton. This camp was first struck about nine years ago, and small quantities of very high-grade ore were found there soon after the camp was discovered.

SOCORRO COUNTY.

MAUD S.—The big body of rich ore which was struck in this mine at Mogollon several months ago still holds out, and the company is making regular shipments of bullion.

NORTH CAROLINA.

CABARRUS COUNTY.

(From Our Special Correspondent.)

REED.—At this mine work is progressing in the usual manner. The company is reticent as to re-

suits since the finding of the 22-pound lump a month or so ago. It is reported that returns are good, with an occasional large nugget, the last being over one pound, found the last of May. Some little local excitement is on, resulting in prospecting on adjoining lands, where some rich ore has been found.

DAVIDSON COUNTY.

(From Our Special Correspondent.)

SAXTON.—This mine is about to be reopened by Richard Eames, Jr., of Salisbury, N. C. Here they have a 3 or 4-ft. belt of slate ore that at present shows a value of \$6 to \$8 per ton in gold. Mr. Eames proposes to develop it just as long as the ore holds out, or until it can show sufficient ore to justify the erection of a mill.

GUILFORD COUNTY.

(From Our Special Correspondent.)

Several parties from Chicago and New York have been looking into the mining interests of the county. J. G. Allyn, M. E., of Chicago, at present of High Point, N. C., is prospecting and unwatering several mines near High Point.

M'DOWELL COUNTY.

(From Our Special Correspondent.)

R. Guastavino, an architect of New York, reports the finding of rich gold ore near Black Mountain, in this county, where he is prospecting.

MONTGOMERY COUNTY.

(From Our Special Correspondent.)

BARNES CREEK PLACERS.—These placers are being worked in a small way by Robert Dimmick, of Washington, D. C. They are producing pay for every man at work is all the information obtainable.

GLEN BROOK MINES.—These properties have struck rich ore, which assays high. If it is of any importance as to quantity the 40 stamps will be put in operation.

LITTLE LEAD GOLD MINE.—This mine is being worked by H. G. Kopplemyer, of Chicago, who is well pleased with the prospect. This mine is near Glen Brook P. O.

OLD BEAVER DAM GOLD MINE.—This mine, owned by Senator Benjamin Wilson and others, of West Virginia, is reported as about to resume operations. Senator Wilson is at present on the mine. He is also owner of the Haitecock and Hearn mines, which are also reported as likely to work.

SALLIE COGGINS.—This mine is in operation with its 10-stamp mill and hydraulic plant. It is reported they will either increase the plant or close down, as it is about paying expenses. The ore is in large quantity but of low grade.

RANDOLPH COUNTY.

(From Our Special Correspondent.)

KEYSTONE.—At this mine they are erecting a 50-stamp mill purchased of the old Appalachian mine in Montgomery County. Mr. McKey, the superintendent, late of Pittsburg, Pa., made a 60-ton run on the ore, which was satisfactory.

ROWAN COUNTY.

(From Our Special Correspondent.)

REIMER.—This mine produced from 10 stamps treating sulphurets ore in one day's run 85 dwts. gold. The sulphurets concentrated and treated by cyanide gave a good return of bullion, which is being refined. The mine is unwatered to the 160-ft. level and is producing some good ore.

OREGON.

BAKER COUNTY.

EXPLORING SYNDICATE OF MINES AND MINING.—This French syndicate is developing the Flagstaff, Gertrude and Empire, three miles from Baker City.

PENNSYLVANIA.

BITUMINOUS COAL.

JEFFERSON & CLEARFIELD COAL AND IRON COMPANY.—This company has succeeded to the business of the Bell, Lewis & Yates Coal Mining Company and the Rochester & Pittsburg Coal and Iron Company. The announcement is now made that the change has been made and that the corporate name is to be as above.

DODSON COLLIERY.—A feat in mining engineering has just been successfully performed in the running of the tunnel or hoisting slope from this colliery at Plymouth into the new Red-ash vein. The slope is 278 ft. long and pitches 21°, and its successful completion will mean an addition of 20 years to the life of the mine. The work was over a year in construction.

RICHARDS COLLIERY.—This colliery, one of the four operated by the Union Coal Company and situated a short distance north of Mount Carmel, brought 1,042 mine cars to the surface one day last week and stripped and prepared 2,496 tons of coal to market as the result of one day's work.

SOUTH DAKOTA.

IRON COUNTY.

CREOLE.—This mine is owned by W. J. McBurney, J. H. McDonald and others, of Cedar City, the ore vein being about 3 ft. wide between walls, and runs high in gold. Samples of the mineral have been sent to R. H. Officer & Co., assayers, and the returns are said to show values of \$6.40 in gold and 26 oz. in silver to the ton.

LAWRENCE COUNTY.

HOMESTAKE MINING COMPANY.—The improvements to be made on this company's mines this year consist of additions to its mills that will bring the number of stamps to 800, all of which will be arranged to drop both day and night. The company is sinking a 3,000-ft. shaft, and is erecting a steel bridge across a gulch 1,500 ft. wide.

REDDY.—The ore that is being taken from this mine, near Lead, which made its first shipment to the Omaha smelter a few weeks ago, continues rich. A ton of the ore, carefully sacked and sealed, was sent last week. Work on the 7-in. seam of this rock continues.

WASP MINING COMPANY.—This company has just paid its stockholders a \$20,000 dividend, as the result of a run of 520 tons of ore mined in 28 days. The entire result of the run was \$29,000. The dividend for the month will amount to \$30,000. The company has just opened a new ore chute 3 ft. thick and 6 ft. wide. Its main chute has been stripped 130 ft. and is 12 ft. wide and 6 ft. thick, which is said to carry an average of \$90 to the ton.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

ANNIE.—Under the stimulus of \$10,000 in the bank for development, work is being actively pushed upon this promising free-gold prospect, situated in the Palmer Gulch District. Messrs. Bradford and Van Dyck, of Lima, O., have purchased a controlling interest in the property, and will change its title to the name of 'mine.'

BLUE LEAD.—The operations by Chicago parties upon this copper property have been temporarily suspended pending the settlement of questions of title arising under the bond. The prospecting shaft has reached the 100-ft. level, and a crosscut discloses a heavy body of quartz upon the foot wall. The hanging wall is still behind a mass of vein matter, near which the ledge of copper ore, so marked upon the surface, will probably be found.

DOLCODE.—A late mill test from this Palmer Gulch bonanza paid handsomely. Of the 80 tons milled fully one-half was barren slate, but the returns were over \$10 per ton. The owners, however, cannot agree, and the mine which might become a constant producer is again closed down.

GOLDEN SLIPPER.—This property is situated on Spring Creek, near the mouth of Palmer Gulch, surrounded on all sides by the cuts and pits of early placer working. A depth of 165 ft. has been attained under the development lease, and M. A. Dodge, lessee and one of the owners, has already taken from the workings sufficient ore to pay more than the expense of his contract. Twenty dollars per ton is about the average value of the Slipper ores, but the last 200 tons milled ran about \$30 per ton. Three known ledges traverse the ground and mining men begin to regard the property as one of great possibilities.

JUNIPER FRACTION.—Development work under the \$60,000 bond, on this very rich prospect, thus far shows the permanent characteristic of the ledges of the Keystone District. At 25 ft. in the shaft the vein matter has widened to 6 ft., and the rich seam to over 2 ft. A heavy gouge appeared at about 12 ft., and the ore is fully as rich as at the surface. The bonders have eight months in which to conduct their explorations and there is an excellent prospect that this prospect, bonded at so unusual a figure, will be sold.

LOCOMOTIVE.—This \$40 prospect, located in the Queen Bee country, seven miles north of Hill City, at a depth of 25 ft., preserves its surface quality.

PEACOCK.—The latest rich find is reported from Tepee Gulch, and was made by a prospector named Peacock upon property near the Wealthy mine. The majority of the ledges in this district are refractory, of unusual size, and ranging in values from \$8 to \$25 per ton. The Tepee Gulch ore bodies, which are practically undeveloped, are thought to be extensions of the Keystone belt.

TEXAS.

MILAM COUNTY.

TEXAS BRIQUETTING COMPANY.—This company has just bought 140 acres of lignite land from the Rockdale Mining and Manufacturing Company for \$12,000.

UTAH.

JUAB COUNTY.

MAMMOTH.—According to the Salt Lake Herald a rich strike of chloride ore has been made about 12 miles from the Mammoth pump works, on Cherry Creek.

SALT LAKE COUNTY.

EXTRA SESSION.—C. D. Gardanier has secured a three-fourths' interest in the Snowdrift, Baby Fraction and Jenner lodes, and a one-third interest in the Vulcan, adjoining the Extra Session, on the Keystone ledge, with which they have been consolidated. Work will be pushed in the development of this property.

(From Our Special Correspondent.)

ALTA.—This old mining camp, situated about eight miles above West Station, in this canon, the terminus of a branch of the Rio Grande Western Railroad, is connected with it by a tramway, now being put in shape for operation, deep snows having delayed its work, and the ores from its mines will then again have an outlet to the smelters in the valley. About 75 men are employed or at work

at that point, which promises to be more active when connection by rail with the valley is re-established.

Near the mouth of Little Cottonwood Creek there is considerable prospecting being done and the returns thus far obtained are quite promising.

Hamilton Smith, the well-known mining expert, is here, after having finished his work on the Anacoda properties. He expects to pay a visit to the Cripple Creek district in Colorado before returning to Europe.

COTTONWOOD WATER POWER AND ELECTRIC COMPANY, LIMITED.—Among the industrial enterprises, at present about to add to the prosperity of the country around Salt Lake City, is the erection by this company of a large double electric power transmission plant in and at the mouth of Little Cottonwood canon, where a fine water power thus far has not been used for industrial purposes. This is the rugged canon, whence all the granite for the Mormon temple has been taken, it having been cut from the enormous boulders and cliffs, which arise to a great height almost perpendicularly on both sides. Several surveyors' camps have been located and a force of about 25 men is now occupied establishing the location of the pipe lines and power-houses. The English company, which is furnishing the capital for this enterprise, expects to furnish an aggregate of 7,000 H. P. to the mining districts in the vicinity, and to the smelters in the valley below.

Park City, across the mountains, is only about 20 miles distant, and other promising camps are nearer by. The creek furnishes an abundant supply of water all the year around. The water is first taken out at an altitude of about 8,000 ft. and carried to the upper power-house, thence to the lower power-house at the mouth of the canon. The surveyors locating the line are working under great difficulties, and in many instances have to be let down with ropes along the precipitous cliffs. As soon as the line is definitely located the company expects to put on a large force of men and hopes to be ready to commence operations about October 1st.

HANAUER SMELTING WORKS.—On account of the growth of the business of these works at Murray, more and larger blast furnaces are about to be constructed, and one Ropp waiting furnace, 150 x 16 ft. is being constructed; the additional power needed will be electric if prices are made satisfactory. The reconstruction of these works is in charge of Mr. R. H. Terhune, who was formerly superintendent at these works, and who at present devotes his time to consulting engineering. His brother, W. E. Terhune, who has had large experience in smelting, is the present superintendent, and the smelter is running to its full capacity.

SEVIER.—Although there is no certainty in regard to the matter, it is probable that the Sevier mining deal will go through and that the Lammetsdorf controlling interest will pass into the hands of the British-American syndicate within the next few days. Should this be the case it is expected that extensive developments will be made on the property through the erection of the necessary machinery therefor.

There is a great deal of prospecting and development work going on in that district, toward which the Rio Grande Western is extending its track, having already reached Richfield. This system is helping the development of the new State along splendidly.

SUMMIT COUNTY.

CONSTELLATION.—The new hoisting engine for this property has been received.

TOOELE COUNTY.

HILLSIDE.—Horace W. Anderson has accepted the superintendency of these workings, at Eureka. The incline shaft started last year by Mr. Scheu is being extended. Samples across the entire face run from \$3 up, says the Salt Lake Herald, and the ore taken out in running the incline is nearly all pay ore.

OPHR HILL MINING COMPANY.—This company is running two eight-hour shifts on the mill, and producing about 50 tons a day of concentrates that are shipped to Salt Lake City.

WASHINGTON.

STEVENS COUNTY.

BADGER.—On this claim, on Iron Mountain, there is a 3-ft. vein of copper sulphide ore. A large amount of development work is being done.

OKANOGAN COUNTY.

IVANHOE.—This mine is being developed by Spokane mining men. The mine is well equipped with buildings and a 10-ton mill. Roads have been built and everything is ready for active work. Development work consists of 200 ft. of tunnel shaft and drift and 170 ft. of open cut. From these workings there are several hundred tons of ore on the dump.

WEST VIRGINIA.

TYLER COUNTY.

DEVONIAN OIL COMPANY.—After an almost continuous run of small wells and dry holes this company has drilled in its No. 4 Stealey, in the Bullman pool, near Wick, and has a gusher which is reported to flow at the rate of 100 bbls. an hour. The same company shot its No. 2 Bullman and increased the production to 45 bbls. an hour.

WYOMING.

FREMONT COUNTY.

BULLION.—This mine, near Lewistown, which has been idle for 13 years, has been re-opened by Messrs. Taylor and Boylen during the past two months, and the ore found to be rich enough to be worked. The Helen G. mill has been rented, and is crushing 30 tons of ore a day.

BURR.—This mine, owned by J. D. Woodruff, of Lander, will be re-opened this season and the stamp-mill at the mill operated.

IRON DUKE.—This mine has been leased to J. Brice, who is working the mine and has a quantity of ore on the dumps ready for treatment. Tests are being made on this ore to see if it can be reduced by the cyanide process.

LARAMIE COUNTY.

SILVER CROWN MINING COMPANY.—This company, which was incorporated recently, has acquired a group of claims in the Silver Crown Mining District, 30 miles from Cheyenne, which it will develop at once. The capital stock of the company is \$250,000. Incorporators are: United States Senator J. M. Thurston, of Omaha; A. H. Phelps, of Chicago; John M. Markler and H. M. Wright, of Boston, and James Adams, of Cheyenne.

FOREIGN MINING NEWS.

BRAZIL.

ST. JOHN DEL REY GOLD MINING COMPANY.—This company reports for the month of May a production of 3,055 oz. gold. For the five months to May 31st the total production was 16,428 oz., an average yield of 0.61 oz. gold per ton.

The Ouro Preto Gold Mines of Brazil (Limited) has sold the April gold for \$29,125.

CANADA.

BRITISH COLUMBIA.

GEORGIA.—Work is progressing on the Georgia. The No. 1 tunnel is now in on the main vein a distance of 110 ft. The No. 2 crosscut tunnel is now in 80 ft. and has 60 ft. more to run to reach the vein. On the crossvein a good showing of ore is being opened up by crosscuts and shafts near the north end of the claim and a tunnel will shortly be started to explore it thoroughly. This ore carries a high percentage of nickel, besides running well in gold.

IRON MINE.—Both drifts on the 100-ft. level in the No. 1 shaft of this mine show 6 ft. of high-grade ore. From this shaft 1,300 tons of ore were shipped which is said to have netted the smelter over \$75 per ton. The No. 2 shaft is down 25 ft. below the level of the No. 3 tunnel and shows over 3 ft. of solid ore which averages \$60 in gold and 13% in copper. The mine is in shape to ship regularly.

OHIO SYNDICATE.—The Enterprise was recently sold to this syndicate for \$25,000 in cash, says the *Rosland Miner*. The deed to the property was made direct from crown grant by St. Onge and Cabana to W. A. Ritchie, who is manager and representative of the syndicate in Spokane and Rosland. The \$25,000 from the sale was immediately applied in final payment of the bond on the Enterprise, Iron Horse and Monte Cristo from St. Onge and Cabana to Humphreys and secured for Mr. Humphrey's for about \$2,000 the Iron Horse property, on which the great part of the work was done last year. This is the fifth property near Rosland that has been purchased for cash by this syndicate within the past two months. First was the Consolation mineral claim, now incorporated under name of Consol Gold Mining Company, on which work is now being pushed by a force of 8 miners. Next was the Camp Bird mineral claim, incorporated as the Camp Bird Gold Mining Company, on which a force of men is now erecting buildings and building a trail preparatory to active development work. Next was the Tuesday-Climax, on which the cabins have been erected and a force of miners has been at work for 4 weeks. Next was the Mabel, which is incorporated as the Mabel Gold Mining Company and on which active development has commenced.

ONTARIO.

GOLDEN GATE.—The English company operating this mine states that it closed the title to its absolutely untouched property on April 20th, and that one month later it deposited in the Bank of Montreal about \$700 in gold. The mine has since then kept at work, and the result of one week's operations recently was a brick of 40 oz., all its milling being done at the Gold Hill mill, close by the mine. It will build a mill this summer.

SULTANA.—This mine is now turning out about \$3,000 in gold per week, and is sinking and developing more extensively than ever. It is to add another twenty stamps to its mill at once. Concentrates have accumulated ever since the mine was opened, and a plant for their reduction is to be added. There is supposed to be a large amount of gold in these concentrates.

WARAGOON.—This mine, in the Rat Portage District, Manitow Lake, recently deposited its first brick in the bank. It was worth \$430. The mine has just been opened and has a five-stamp mill in operation.

MEXICO.

CHIHUAHUA.

SANTA JULIANA.—A big strike is reported in this mine at Sabinal, about 120 miles south of Deming. The ore body which has been encountered is of considerable extent, and the ore is said to be worth from \$60 to \$100 a ton. The owners of the mine have been operating a smelter for some time, and the ore produced in the mine is all treated in the camp.

SOUTH AFRICA.

TRANSVAAL.

GELDENHUIS DEEP GOLD MINING COMPANY.—This company reports that in May there were 11,400 tons crushed, of which 10,123 tons came directly from the mine and 1,277 tons from the dump. The mill yield was 2,684 oz. gold. In addition 7,290 tons of tailings were treated by cyanide, yielding 1,489 oz. The total yield was therefore 4,173 oz.; the average per ton crushed was 0.366 oz., or \$6.17 at the usual valuation of Witwatersrand gold.

WITWATERSRAND GOLD PRODUCTION.—The unfortunate division which led to the accession of a number of companies from the Johannesburg Chamber of Mines, has made it a little difficult to give the statistics of production accurately, especially as one or two mines seem to be reported both by the old and the new association. Making allowance for this duplication, we find that the production for the month of May was 189,859 oz. gold, showing a gain of 13,152 oz. over April, but a decrease of 4,721 oz. as compared with May of last year. The production, however, is the largest for any month since November, and shows an encouraging increase. For the five months ending May 31st, the total reported was 855,714 oz. against 912,606 oz. for the corresponding period in 1895. Reducing the output to fine metal at the usual rate for Witwatersrand gold, we find that it was equivalent to 154,925 fine ounces gold for May and 698,263 fine oz. for the five months of this year. It will be of interest to compare the five months of this year with the last five months of 1895, and the figures, as reported, are given in the following table:

1895.	Ounces.	1896.	Ounces.
August	203,573	January	148,178
September	194,761	February	167,018
October	192,652	March	173,922
November	195,218	April	176,709
December	178,428	May	189,859
Total	954,635	Total	855,714
Total, fine gold	787,142	Total, fine gold	698,263

Some of the mines make a very good showing, and the Robinson especially reports for May the largest output ever made in a single month. The production of the four leading mines in May was: Robinson, 19,333 oz.; Ferreira, 13,115 oz.; Crown Reef, 11,339 oz.; Langlaagte Estate, 9,428 oz.

The details of the April production are as follows, under the old association being included 35 companies still adhering to the Johannesburg Chamber of Mines, while under the new association are given the nine companies which report to the Association of Mines of the South African Republic:

	Old ass'n.	New ass'n.	Total
	ounces.	ounces.	ounces.
From mill	93,251	22,844	116,095
" concentrates	5,712	2,569	8,281
" tailings	43,297	8,099	51,396
" banks	935	935
Total	143,195	33,512	176,707

The companies in the Chamber of Mines still have over three-fourths of the production. The amount reported for the month was equivalent to 144,193 fine ounces gold.

LATE NEWS.

INDIAN CREEK AND MOSSY SPRING PHOSPHATE COMPANY.—This company is now operating the mine near Centerville, in Hickman County, Tennessee, formerly owned by the Central Phosphate Company.

SWAN CREEK PHOSPHATE COMPANY.—The extension of this company's railroad to its Blue Ruck property on the east side of Swan Creek, in Hickman County, Tennessee, is now completed, and shipments from that property will soon be begun.

TEXAS COAL BRIQUETTING COMPANY.—This company has bought 140 acres of land near Rockdale, Milan County, Tex., and has begun work in mining the coal. It will also put up works for making briquettes of the coal, which is lignite and disintegrated too fast to make its shipment as mined profitable.

The death of Benjamin H. Bristow, in New York, this week, recalls to mind the excellent service he rendered the country as Secretary of the Treasury under President Grant from 1874 to 1876. He was a lawyer by training, and while he displayed no special ability as a financier, which indeed was not called for during his term of office, to him was due the detection and exposure of the fraudulent practices of the Whisky Ring, which had filled the Internal Revenue department with corruption. This work required ability and no common degree of courage, and it was successfully performed; and

though the political and social influence of the ring enabled it to force Mr. Bristow out of the Cabinet finally, his work was done and he retired with honor. Mr. Bristow was 64 years old; he was born in Kentucky, but since 1876 he had lived in New York, where he had a large law practice.

Leadville.

June 26.

(Special to the Engineering and Mining Journal.)

There is no hopeful outlook for a speedy settlement of the strike. All attempts at bringing about an agreement on the wage question in dispute have failed, and with the exception of a few leasers no work is being done. The Mabala, Resurrection, Big Four and Elkhorn companies, all of which were paying \$3, have of their own accord discharged their men till the strike is settled. Smelters are all running, and buying all the ore they can lay hands on. Manager Eben Smith announced to-day he would not for the present pull big pumps of Maid and Henrietta Consolidation. All pumps in camp are still running.

MONTANA.

SILVER BOW COUNTY.

CUMBERLAND.—The work on the crosscut tunnel on this mine is progressing, the drift being in 385 ft. from the mouth. The Cumberland vein at the discovery, on top of the hill, is from 25 to 35 ft. wide, measured on the croppings. An assay of the best streaks taken recently is reported to have given a return of 27.3% copper, \$4.65 in silver and \$3.80 in gold to the ton.

COAL TRADE REVIEW.

New York, Friday Evening, June 26.

Statement of shipments of anthracite coal (approximated) in tons of 2,240 lbs., for the week ending June 20th, 1896, compared with the corresponding period last year:

	1896.		1895.
	Week.	Year.	Year.
Pennsylvania Railroad	73,458	1,624,463	1,701,650

	1896.		1895.
	Week.	Year.	Year.
PRODUCTION OF BITUMINOUS COAL, in tons of 2,000 lbs. for week ending June 20th, and for years from January 1st, 1896 and 1895:			
Shipped East and North:			
Allegheny, Pa.	45,107	1,125,282	2,050,251
Barclay, Pa.	528	26,824
Beech Creek, Pa.	61,885	1,491,990	1,401,283
Broad Top, Pa.	6,313	201,532	213,444
Clearfield, Pa.	61,203	2,494,604	2,685,455
Cumberland, Md.
Kanawha, W. Va.	52,915	1,468,492	1,423,478
Phila. & Erie	734	32,160	26,974
Pocahontas Flat Top
Totals	228,685	6,834,874	7,800,815

	1896		1895
	Week.	Year.	Year.
Shipped West:			
Monongahela, Pa.	21,562	487,757	386,856
Pittsburg, Pa.	34,266	894,332	921,132
Westmoreland, Pa.	28,544	958,169	923,874
Totals	84,372	2,340,258	2,231,862
Grand totals	313,057	9,175,132	10,032,677

Production of coke on line of Pennsylvania Railroad for the week ending June 20th, 1896, and year from January 1st, 1896, in tons of 2,000 lbs.: Week, 70,493 tons; year, 2,134,317; to corresponding date in 1895, 2,651,790 tons.

Anthracite.

The much talked of advance in the price of anthracite coal has taken place. It amounts to 25c. a ton on the average free-burning coals, and makes an advance of \$1 per ton since January 1st, 1896. Although there is no announcement that another advance will be made in the near future, it is reported that one will probably take place in the fall, perhaps on September 1st.

The following table gives the prices of coal, with advances since January, 1896:

	Broken.	Egg.	Stove.	Chestnut.
January	\$2.75	\$3.00	\$3.25	\$3.00
February	3.10	3.35	3.60	3.35
March	3.10	3.35	3.60	3.35
April	3.10	3.35	3.60	3.35
May	3.50	3.75	4.00	3.75
June	3.50	3.75	4.00	3.75
July	3.75	4.00	4.25	4.00
Advance since Jan.	\$1.00	\$1.00	\$1.00	\$1.00

Taking the annual output at 50,000,000 long tons this \$1 advance would realize a profit of \$50,000,000 for the producers.

The new circular of prices was first issued by the Philadelphia & Reading Coal and Iron Company, as was also the previous one. The new figure is higher than the actual prices for three years past, and those for stove are about \$1.25 higher than they were in March of last year, when the operators were juggling with their treasuries and trying to outdo one another in over-production. At the present time harmony reigns supreme among the producers, both as regards prices and the restriction in output.

Although the circular of new prices sent out by the Philadelphia & Reading company is dated June 24th; it is not expected to go into effect until July 1st. In the meantime, however, all orders that may be

received by the sales agents will only be filled at the new schedule, and it is said that it would be a pretty difficult matter to place an order now at the May prices with either the sales agents of the leading producers or with the middlemen.

The restriction of production is at present causing much depletion in the stocks on hand, as most of the operators have already mined their allotment for the coming month, and to such an extent is this noticeable that even the middlemen are unable to fully supply their customers with coal. It was cited by a well-known middleman that he has been obliged to turn down several orders of from 500 to 1,000 tons because he was short on certain domestic sizes. Although the present outlook is favorable for better times in the anthracite coal trade there is nevertheless an anxious feeling prevalent in some quarters that the production will be unduly increased in the fall.

There is quite a supply of chestnut on hand which could have been disposed of had the price of this kind of coal not been advanced as was that of other domestic sizes.

The greater quantity of the coal mined at the present time is going to Western ports where prices are firm and better than those which can be realized in the East.

As regards stocks of coal in retailers' hands we would say that they are sufficient to meet the immediate demands of consumers, and we understand that some of the retailers have coal on barges at tide waiting to be stored.

Line business is good, and prices being received are said to be relatively higher than those at tide.

We quote as follows from the circular of prices issued by the Philadelphia & Reading Coal and Iron Company on June 24th:

Stove, \$4.25; egg and chestnut, \$4; broken, \$3.85. Whereas the May circular did not obtain freely until the latter part of June, the July schedule will probably go into force immediately.

NOTES OF THE WEEK.

The Philadelphia & Reading Coal and Iron Company reports its gross receipts for the month of May at \$1,952,901 and its gross expenses at \$2,010,721. One-twelfth of the current year's fixed charges (\$95,000) added to the loss from mining leaves a deficit for the month of \$152,819, an increase of \$51,500 over the deficit in May, 1895. The deficit for the current year to date is \$1,139,522, an increase of \$122,964 over the deficit for the same period last year.

Bituminous.

The soft coal market continues to show some activity. The demand is fairly steady, and some of the producers are having a little difficulty in getting their coal out in sufficient quantities to supply the vessels chartered at the tidewater shipping ports. It is said the contracts are plentiful enough to uphold the present condition of the market. There will probably be a continuation of the present demand for some time to come.

The combination figures are being held satisfactorily by its members, and we are reliably informed that one contract has been taken during the week for over 100,000 tons at the full "Association" prices. It is apparent to producers that unrest and anxiety prevail among buyers and dealers where their wants have not been covered, and it is thought they will soon come in at the regular circular rates. Some of the mining interests which are producing the better grades of coal are not particularly desirous of taking new business. This would indicate a rather healthy state of trade, but everyone knows general business is bad, and the coal trade cannot expect to be an exception.

The Sound ports are not as active as they usually are, and the trade that is supplied by barges from the New York Harbor ports are now receiving shipments from Norfolk, Newport News and Baltimore an account of the better rates for ocean freights. New York Harbor trade is fairly active; there are no changes in all-rail business, and the tonnages continue to be somewhat lower than last year, which fact is accounted for by the general condition of business.

But little can be learned concerning the association itself, but it is holding regular meetings still which are well attended.

Transportation from mines to tide is good on all the roads, notwithstanding the somewhat large output at this writing. The car supply is about up to the demands of the operators, although specialized cars are not easy to get for prompt usage.

In the coastwise market vessels have been in better supply than usual. It has been noted that the Dominion Coal Company, of Nova Scotia, has chartered some half a dozen large vessels for single trips at about the same rates to the New England ports as those from Norfolk and Baltimore.

We quote current rates of freight from Philadelphia: To Boston, Salem and Portland, 60@65c.; Providence, New Bedford and the Sound, 60c.; Portsmouth, 65c.; Wareham, 80c.; Lynn, 75@85c.; Newburyport, 75c.; Dover, \$1@1.10 and towage; Saco, 80@85c. and towage; Bath, 60@65c.; Gardiner, 65c. and towage; Bangor, 65c. Five and ten cents above these rates are asked for Norfolk, Newport News and Baltimore.

The Association prices remain as follows: F. o. b. Philadelphia, Norfolk and Newport News, \$2.35; Baltimore, \$2.28; New York Harbor shipping ports, \$2.80, alongside; New York Harbor, \$3. There is a 20c. differential in favor of Clearfield and Beech Creek coals.

Buffalo.

June 25.

(From Our Special Correspondent.)

The movement of anthracite coal has increased in volume the past few days in consequence of the anticipated advance in quotations next month. It wanted something of this character to stimulate the market and spur consumers to consider the question of next fall and winter's supplies. Stocks here are large. The movement by lake to Western ports is good at full rates quoted for several days.

Bituminous coal is a shade better in demand and prices paid nominally the same as those which have prevailed since the first half of this month. The yards are well supplied with all the various grades and quantities, but not with a superabundance, if the improvement in demand continues. Dealers are hopeful that from now to the close of the year they may make a little money in their business.

The shipments of coal from this port by lake from June 14th to 20th, both days inclusive, aggregated 77,085 net tons, distributed as follows: 22,200 tons to Chicago; 20,150 tons to Milwaukee; 8,510 tons to Duluth; 700 tons to Toledo, 12,550 tons to Superior; 2,375 tons to Racine; 4,000 tons to Green Bay; 500 tons to Gladstone; 900 tons to Bay City; 400 tons to Saginaw; 4,200 tons to Manitowoc, and 400 tons to Ontonagon. The rates of freight were 50c. to Chicago, Racine and Ontonagon; 45c. to Milwaukee, Manitowoc and Green Bay; 40c. to Sault Ste. Marie and Saginaw; 35c. to Gladstone and Portage, 30c. to Duluth, Superior, Ashland and Bay City, and 25c. to Toledo. Closing fairly active and rates steady.

Consumers of anthracite coal are beginning to believe that there will really be an advance in quotations on July 1st—based upon telegraphic reports to the press and by word of mouth to the dealers. The Buffalo Board of Supervisors have decided to buy 4,000 net tons of bituminous coal from Messrs. Gavin & Co. at \$1.74½ per ton, for the use of the Penitentiary, and at \$1.78 for the Poor House, delivered. The 1,500 net tons of anthracite coal required by these institutions will be supplied by Mr. Hanrahan at his bid of \$4.01 per ton, delivered, for all sizes required. Bids for the State Hospital coal will be opened on June 27th. Successful experiments have settled the question of the consumption of smoke in our city. R. W. Westphal has accomplished the feat successfully in breweries, hotels and other places at a very moderate cost for the automatic machinery necessary.

The Cataract Power and Conduit Company was incorporated a few days ago, with a capital of \$2,000,000. The concern is backed by Mr. Daniel Day, several New Yorkers of wealth, and by Mr. George Urban, of this city. Practically the company was organized for the purpose of acting as a distributing agent of electricity for the Niagara Falls Cataract Construction Company in Buffalo and vicinity of heat, light and power. The work of laying conduits in the main streets of our city will be commenced immediately. Mr. Huntley, one of the promoters and directors of the company, says: "The company is formed to carry out the details of the distribution in Buffalo, which the parent company, owing to the magnitude of its interests, does not care to be burdened with. The Buffalo company will lay all lines and conduits in the streets and take the power for distribution at the city line."

Chicago.

June 24.

(From Our Special Correspondent.)

Anthracite.—There is no change in the anthracite coal trade, buying still continuing of a very small nature. The cool condition of the weather during June so far has undoubtedly helped matters some, but the prevailing uncertainty keeps customers from the market. Another advance in hard coal is booked to take place July 1st, and if it be true it will doubtless cause some extra buying before that time. Orders for hard coal from out-of-town customers are yet very limited, and consequently dealers are depending chiefly on town consumption.

Anthracite coal is quoted at \$5.10 for grate and \$5.35 for egg, stove and chestnut.

Bituminous coal is yet very inactive. There are a few large municipal contracts about to be placed, but competition will be so large as to reduce to a minimum the profit to those who are awarded contracts. Manufacturing trade is yet slow, with no early promises of betterment.

Pittsburg.

June 25.

(From our Special Correspondent.)

Coal.—The situation on the Ohio River is without change. There has been no June rise so far, much to the disappointment of the river fraternity generally. Should the rise put in an appearance there is plenty of coal in the ports and in the harbor, with plenty of tow boats in port to send out one of the largest tows of the year. The only mining at present is simply for local purposes, and for mills that do not use gas. Some of the railroad mines not directly interested in the lake trade have shut down, as the miners refused to work at a reduction of the mining rate to 54c., the price paid by the New York & Cleveland Gas Coal Company and several other concerns. It is doubtful whether the 70c. mining rate can be upheld much longer in view of the increasing competition of the West Virginia and Ohio coal fields, which, beside a lower wage rate, have also the advantage of lower freight rates to the principal inland markets. P. H. Penn,

president of the United Mine Works of America, was in Pittsburg on an inspection tour. He says the miners and operators in Indiana have settled down to a finish fight over the wage question, and in Ohio the miners are working for the abolition of the company stores, which, he says, have not been so generally done away as in the Pittsburg District. The latest news is that the heavy rain to day makes a June rise certain. Coal plenty. The run will be a large one.

Connellsville Coke.—The trade showed some signs of revival, so far as demand is concerned. Nearly 200 ovens were blown out and production reduced about 10,000 tons, but the demand is now better and slightly increased shipments over the week previous are reported. The operators became a little rattled, possibly, and cut down production more than necessary, but there was plenty of stock coke in the yards to supply demand, and all orders were filled. A few ovens were added to the idle list and quite a number scheduled for blowing out this week, but it is not thought sure that so many will be put out, and all orders for blowing out may be countermanded before the time for making the change arrives. The demand last week was over 10,000 tons larger than production, and at this rate of going would soon require considerable changing from the idle to the active list. The summary of the region shows 10,762 ovens in blast, with 6,185 idle. The changes of the week show a reduction in the active list of 131 ovens. The reports received show 225 ovens blown out. The Oliver Coke Company has blown out 217 ovens at No. 1, but the same number was fired up at No. 2 plant.

In the running order of the ovens 4,761 ovens made six days, 5,070 ovens five days, and 931 ovens four days. Shipments from the region were distributed as follows: To Pittsburg, 1,936 cars; to points west of Pittsburg, 3,154 cars; to points east of Pittsburg, 1,006 cars; total, 6,096 cars; increase over last week, 2,223 cars. Prices show no change. Many coke contracts terminate July 1st.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 26, 1896.

Pig Iron Production and Furnaces in Blast.

Fuel used.	Week ending				From Jan., '95.	From Jan., '96.
	June 28, 1895.	June 26, 1896.	From Jan., '95.	From Jan., '96.		
Anthracite.	32	20,124	41	25,900	535,774	729,838
Coke.....	122	131,800	135	161,170	3,510,240	4,302,479
Charcoal....	18	3,961	19	6,130	103,562	136,280
Totals....	172	155,885	195	193,200	4,149,576	5,168,597

The market remains dull this week, and there is no apparent prospect of an early improvement, but every probability of a prolonged period of waiting. It is evident that buyers of raw iron and steel intend to hold back as long as possible and test the ability of the makers to hold out. While there is still some talk of a reduction in steel billets, the managers of the combine are said to be convinced that they can carry their point and force everyone to come to them at their own prices. The market is now pretty well cleared of the old accumulation of steel, and the old contracts are about all worked off, so that it is not easy to buy billets outside of the combination. This is in the makers' favor, but on the other hand the sales of finished products are light, and most mills can keep their customers supplied for some time out of their present stocks. Some millmen do not hesitate to say that they are quite willing under present conditions to shut down until the combination either breaks up or yields and lowers prices. The more enterprising are taking steps to make their own steel, and there are a good many inquiries about the cost of open-hearth plants.

The Premier Steel Works at Indianapolis are in the market for 60,000 tons of Bessemer pig, July to December delivery, but are not willing to take the iron unless it can be had at a low price.

The manufacturers and the officers of the Amalgamated Association met in Pittsburg this week to discuss the new wages-scale. The conference adjourned without coming to any decision.

There is no prospect now of a repetition of last year's boom, and a good many are settling down into the belief that it will be a dull year.

NOTES OF THE WEEK.

Mr. Sol. Haas, for a number of years in charge of the traffic department of the Richmond & Danville and its successor, the Southern Railway Company, has been chosen President of the Sloss Iron Company, of Birmingham, Ala., to succeed the late Thomas Seddon.

The Troy Steel and Iron Company has its new basic steel plant at Troy, N. Y., completed, but will not start it up before August or September, it is understood.

New York.

June 26.

Hardly anything has occurred worthy of note in the local market this week. Business continues

very quiet, and there is still an absence of new orders from the shops. A little more iron is moving eastward, but the quantity is less than a year ago. The structural iron market is duller than for a long time past, and there seems to be no disposition to do anything on the plans which have been in suspense on account of financial conditions. In some quarters there is beginning to be a pressure for business which may soon take the form of general concessions in prices.

Pig Iron.—Business continues light, though brokers report some inquiry from foundrymen who are willing to put in stock if they can get it cheap. We can note no material change in quoted prices, but certain brands can be had a little below the market by good buyers.

We quote for large lots, tidewater delivery, Northern brands: No. 1 foundry, \$12.25@13; No. 2 foundry, \$11.25@12; gray forge, \$11@11.50. For Southern irons, same delivery, we quote: No. 1 foundry, \$12.50@12; No. 2 foundry, \$11@11.50; No. 1 soft, \$10.75@11.25. No. 2 soft, \$10.25@10.75; forge, \$10@10.50.

Cast Iron Pipe.—Two or three small contracts are reported. In one case the prices were \$19.75@21 per ton, according to size of pipe. One of the Alabama foundries has taken a contract for 1,350 tons of pipe to go to Costa Rica, at a price not reported. No decision has been reached on the big Brooklyn contract.

Spiegeleisen and Ferro-Manganese.—Only a few small sales of ferro-manganese are reported. Prices are unchanged at \$19.50@20.50 for imported spiegeleisen and \$47@47.50 for ferro.

Steel Billets and Rods.—There is no business doing here. The pool price continues \$21.75 for New York delivery. Rods are quoted \$27. Buyers seem quite satisfied to wait for the present.

Merchant Iron and Steel.—Business continues very light, and there is no quotable change. We quote for common bars 1'10@1'20; refined bars, 1'25@1'50c.; soft steel bars, 1'25@1'35c. Other quotations are: Steel hoops, 1'50@1'60c.; steel axes, 1'65@1'80c.; links and pins, 1'65@1'75c.; tire steel, 1'80@1'95c.; spring steel, 2@2'20c. All prices are for delivery on dock, New York.

Plates.—A little business has been done in plates, but prices are about the same as for some weeks past. Universal mill plates are 1'45@1'55c. For other sorts we quote: Tank, 1'40@1'50c.; boiler shell, 1'45@1'55c.; good flange, 1'65@1'75c.; firebox, 2@2'40c. Charcoal iron plates are 2'25c. for shell, 2'75c. for flange, and 3'25c. for best firebox. Rivets are 2'15@2'25c. for steel and 3@3'25c. for iron.

Structural Iron and Steel.—Two or three small buildings have been let, but no large contracts are noted. There is some large work in sight, such as the new Erie elevated tracks in Jersey City, and the proposed extension of the Suburban Elevated to Bronx Park; but both of these may be delayed for some time yet. We quote for angles, 1'45@1'50c.; channels, 1'65@1'75c.; tees, 1'60@1'70c.; beams, 1'70@1'80c. for large orders and 2@2'20c. for small lots.

Nails.—The combination price for steel wire nails continues unchanged at \$2.55 per keg, carload lots, Pittsburg delivery. Cut nails are \$2.30 per keg, car-load lots, at Pittsburg. Very little is doing, as most buyers believe the prices must come down.

Steel Rails and Rail Fastenings.—Nothing is doing at the pool price, which continues to be \$28.75 per ton at tidewater. Girder rails are \$28@32 per ton at tidewater.

Little is doing in rail fastenings. We quote for fish and angle-plates, 1'25@1'35c.; spikes, 1'60@1'70c.

Old Rails.—There is some demand for old steel rails, and they are quoted \$11@12.50 New York harbor or Sound port delivery. For old rails suitable to relay quotations are \$19@22, New York. One lot of about 1,000 tons, 56-lb. rails is reported sold at \$22, f. o. b. New York Harbor. There is very little market for old iron rails here.

Scrap Iron.—Good foundry scrap is scarce, but demand is not heavy and prices are about the same. We quote \$10@11.50 per ton for good machinery scrap; \$9@10 for ordinary cast scrap, and \$6@7.50 for stove-plate and mixed.

Buffalo.

June 24.

(Special Report of Rogers, Brown & Co.)

We note a slight increase in demand locally and east of here, but nothing of sufficient volume to be of influence on the market. Consumption of pig iron in foundries in this field has been curtailed quite heavily during the past two months, and buyers, as a rule, have been carrying very small stocks on their yards. Under these conditions it has been rather a surprise to observe that there has been no larger accumulation of pig iron in furnace hands. The hand-to-mouth policy in buying continues, but with indications that there is disposition to cover prospective wants more freely. We quote f. o. b. cars Buffalo on a cash basis as follows: No. 1 foundry strong coke iron, Lake Superior ore, \$13.50; No. 2 foundry strong coke iron, Lake Superior ore, \$13; Ohio strong cokener No. 1, \$13.50@14; Ohio strong softener, No. 2, \$13@13.50; Jackson County silvery No. 1, \$15.25@15.50; Southern soft No. 1, \$12.40; Southern soft No. 2, \$11.90; Hanging Rock charcoal, \$18; Lake Superior charcoal, \$14@14.50.

Chicago.

June 24.

(From Our Special Correspondent.)

There has been a little more activity in the iron market at this point. There is yet, though, a tendency on the part of consumers to hold off. There is increased inquiry, but it leads to actual business slowly.

Pig Iron.—About 4,000 tons of pig iron were sold during the week, equally divided between the Northern and Southern furnaces. There is little firmness noted in prices and possibly some of the iron sold during the week was for rather less than quotations. We quote: Lake Superior charcoal, \$13.50@14; Local Coke foundry No. 1, \$11.75@12; No. 2, \$11.25@11.75; No. 3, \$11@12.25; Local Scotch foundry No. 1, \$11.75@12; No. 2, \$11.25@11.75; No. 3, \$11@11.25; Southern coke No. 1, \$12.10@12.35; No. 2, \$11.60@11.85; No. 3, \$11.10@11.60; Southern, No. 1, soft, \$11.60@11.85; No. 2, soft, \$11.35@11.60; Jackson Co. Silveries, \$14.50@16; Ohio Strong Softeners, \$15@15.50; Alabama Car Wheel, \$16.85@17.35.

Bar Iron.—Business in bars has been rather good, but no large buying is observed. Bars are quoted: Common iron, 1'30@1'35, and refined, 1'35@1'40c.

Structural Material.—There has been little activity in structural material during the week. Some few contracts for bridge material were booked. Quotations are as follows: Beams and channels, 1'75c to 1'80c.; angles, 1'45c to 1'50c.; plates, 1'50c. to 1'55c.; tees, 1'65c. to 1'70c. Small lots from stock are quoted 1/4c. to 1/2c. higher.

Billets and Rods.—A few thousand tons of billets were disposed of, sales being all in small lots. Rods are quiet. Billets are quoted \$21.25.

Steel Rails.—Nothing of any importance has yet appeared, sales being few and aggregate small. Rails are quoted \$29 and upward.

Old Rails and Wheels.—There is but little movement in these lines. Old iron rails are quoted \$13@13.50, and old wheels \$12.50.

Cleveland.

June 24.

(From our Special Correspondent.)

Iron Ore.—Although few sales of magnitude were reported during the past week, the market remains firm. It is said that the majority of the furnace-men have enough ore in their yards to supply them for several weeks, and they are waiting for a drop in the freight rates before making purchases. The indications are that they will profit by so doing. Standard Bessemer are strong at \$4, and the movement of them during the past week has been a little heavier than formerly. The price of standard non-Bessemer hematites last week was \$3; since then several sales have been reported at \$3.25, an advance of 65c. over the price of a month ago. It is said that the advance is only temporary and caused by conditions of a local nature. Mesabi non-Bessemer bring from \$2.40 to \$2.50. The other ores sell at the same figures given last week.

The ore freight rates from the head of Lake Superior are in bad shape. Monday the rate was cut 5c. a ton, and there was a rush to get cargoes at that rate. The rate has been pounded down 20c. during the past two months, and shippers say there is nothing in the outlook at present to change the downward tendency. From Lake Superior ports at the head of the lake, the rate is 80c.; from Marquette, 75c., and from Escanaba, 55c. per ton.

Pig Iron.—There has been no change in the market during the past week, although a number of sales were made. Lake Superior charcoal sells at \$13.50@14; bituminous and coke No. 1 foundry iron is quoted at \$13.25; No. 2, \$12.75; No. 1 Ohio Scotch, \$12.75; No. 2, \$12.25; Bessemer, \$12.75.

Pittsburg.

June 25.

(From Our Special Correspondent.)

Raw Iron and Steel.—Business since our last has continued quiet. Confidence in the future has been increased by the satisfactory deliverance of the St. Louis convention on the currency question. The season is not propitious for an immediate expansion of trade; the period for semi-annual inventories is close at hand, but one thing you can rest assured on, there will be no further talk of concessions as regards iron and steel. Business men generally anticipate a much larger volume of trade and a fuller employment of industrial capacity during the last half of the year.

The iron and steel trade is in somewhat better shape than it was a week ago, although the gain is of moderate proportions. At the same time the improved sentiment in financial circles has had a favorable influence and, moreover, the production of pig iron has been diminished so that danger of a break in pig iron prices seems to have been successfully passed for the present. The market is now in a very sensitive position; with every movement that indicates permanently better business conditions large orders for iron and steel are certain to come on the market. On the other hand, the large stocks of pig iron on hand will, in all probability, find an early market much to the gratification of furnacemen who have been storing stocks for some time. The billet pool continues; there is, however, a lack of confidence as to its success. The pool sales last week were the largest yet noted; the demand, however, was light and transactions limited. The scale question is not yet settled. An important point likely to be made in the workers' scale will be a provision to receive a proportionate

advance in the event of a restoration of the old tariff.

The John Dunlap Company, the oldest firm of tin workers in the city, has purchased a site at Homestead for a tin manufacturing establishment; the plant will be erected at once.

The Ohio Steel Company's plant, at Youngstown, O., employing 700 men, is shut down for seven weeks; the plant made no billets since the reported deal with the pool syndicate.

Latest.—The market showed increasing firmness, and the outlook is improving. The demand for No. 2 Foundry is steadily increasing, with liberal transactions. Bessemer pig sold in the Valley at \$11.65 @ \$11.75 spot to August and September delivery; steel billet sales are limited, and prices steady at \$19.50@20.25. Bessemer pig parties from the West are here to purchase 60,000 tons Bessemer deliverable 10,000 tons per month, first delivery July. There is increased inquiry for iron and steel products. After repairs and stock-taking are over a revival is promised.

COKE SMELTED, LAKE AND NATIVE ORE.		BLOOMS, BILLETS AND SLABS AT MILL.	
Tons.	Cash.	Tons.	Cash.
3,000 Bessemer, July, Aug., Sept., Pitts.....	\$12.70	3,000 Billets, July, Aug., Sept., at mill.....	\$20.25
2,000 Bessemer, July, Aug., Pitts.....	12.50	1,200 Billets, July, Aug., at mill.....	20.25
1,000 Bessemer, June, July, Pitts.....	12.50	1,000 Billets, July, Aug., at mill.....	20.25
1,500 No. 2 Foundry, July, Pitts.....	12.00	500 Billets, June, at mill.....	19.85
1,000 Low Phos. Bessemer, June, July, Pitts.....	15.75	500 Billets, prompt, at mill.....	19.65
1,000 Low Phos. Bessemer, June, July, Pitts.....	12.50	500 Billets, June, at mill.....	19.50
1,000 No. 2 Foundry, July, Pitts.....	12.00	500 Billets, July, at mill.....	19.60
1,000 Bessemer, June, Pitts.....	12.50	SKELP IRON.	
500 Gray Forge, July, Pitts.....	10.80	500 Narrow grooved, Pitts.....	\$1.20 4 m.
250 No. 2 Foundry, Aug., Sept., Pitts.....	12.25	300 Wide grooved, Pitts.....	1.20 4 m.
200 Southern Foundry, spot, Pitts.....	11.40	200 Sheared, Pitts.....	1.40 4 m.
200 No. 2 Foundry, spot, Pitts.....	11.75	SKELP STEEL.	
200 Gray Forge, spot, Pitts.....	10.50	400 Sheared, Pitts.....	\$1.30 4 m.
100 No. 1 Foundry, July, Pitts.....	12.75	200 Wide grooved, Pitts.....	1.10 4 m.
100 No. 1 Foundry, July, Pitts.....	12.50	200 Narrow grooved, Pitts.....	1.10 4 m.
50 No. 1 Silvery, spot, Pitts.....	14.50	MUCK BAR. Cash.	
50 No. 2 Foundry, spot, Pitts.....	13.00	500 Neutral, deliv'd, Pitts.....	\$20.50
50 No. 2 Foundry, spot, Pitts.....	11.75	BLOOMS, BILLETS, BAR ENDS.	
CHARCOAL.		600 Billet and bar ends, Pitts.....	\$13.25
200 No. 2, 3, 4 Foundry, Pitts.....	\$15.80	STEEL WIRE RODS.	
100 Cold Blast, Pitts.....	23.00	700 5-gauge, delivered, Pitts.....	\$26.00
50 No. 2 Foundry, Pitts.....	16.50	SHEET BARS.	
25 No. 2 Foundry, Pitts.....	16.25	1,000 Delivered, Pitts.....	\$22.25
25 Cold Blast, Pitts.....	23.25	FERRO-MANGANESE.	
		400 80% Pitts.....	\$49.50
		50 80% Pitts.....	50.00

Philadelphia.

June 25.

(From our Special Correspondent.)

Pig Iron.—There are no signs of an improvement unless we accept mere inquiry as such. The parties asking about prices are not large buyers. Strong producers are waiting to see how the market develops; weak concerns are working off iron that looks like a concession. Large consumers cannot be induced to buy in a large way. Foundrymen are feeling encouraged over the improving appearance, but want orders actually booked before they will buy. The average price for No. 1 is \$12.50. Plenty of No. 2 is offered at \$12, but very little sold since Monday. The mill owners feel rather discouraged, and agents who have tried to fill their yards say there will be no large sales. Average price for forge is \$11. It looks to-day as if there would be large sales of Bessemer before many days.

Steel Billets.—We have a rumor that billets will yield to the pressure and drop. Nobody is buying. The quoted price is \$21.50.

Merchant Iron.—Business is flat and mills will take a midsummer rest. Those who will want iron in July cannot be induced to consider offers at this time. Our consumers want to see their way farther. Steel bars average 1.30; iron 1.20.

Skelp.—Brokers have no certain information this week.

Sheets.—Our manufacturers are promised enough business to fill their mills as soon as there is a stronger tone in the general market.

Pipes and Tubes.—Quite a lot of material has been shipped to consumers this week. Prices have been well maintained on retail business. It is impossible to say anything more as things stand.

Plates.—A good deal of locomotive work has been placed, and the locomotive people here say several roads are about ready to place orders. Steel makers confirm this hope. The upshot is that the plate iron makers look for an improving business in July. Tank is 1'40; universals, 1'45; shells, 1.55; flange, 1'60.

Structural Material.—Sharp competition on certain orders exhibits the intense desire to get business. Local work is fair. Angles are quoted 1.40.

Steel Rails.—No news; nothing doing.

Old Rails.—Quoted at \$14; no report of sales.

Scrap.—Unusually quiet. Railroad is held at \$14; heavy steel at \$13; old car wheels at \$12. Axles sell well at \$18, and No. 1 wrought is salable occasionally at \$13.

METAL MARKET.

NEW YORK, Friday Evening, June 26, 1896. Gold and Silver.

Prices of Silver per Ounce Troy.

Table with columns for June, St. L., London, N. Y. Cts., Value of sil. in \$, and rows for 20, 22, 23.

Owing to the progress of the free-silver movement, domestic speculation in bullion has set in, and although the business has been spasmodic, about 1,000,000 oz. have been accumulated here and shipments to London have subsided for the present into very small proportions.

The United States Assay office in New York reports the total receipts of silver at 67,000 oz. for the week.

Gold and Silver Exports and Imports.

At all United States ports, April, 1896, and years from January 1st, 1896 and 1895:

Table with columns for Specie and bullion, In ores, Total excess, Exp. or Imp., and rows for GOLD, SILV., 1896, 1895.

Gold and Silver Exports and Imports, New York

For the week ending June 25th, 1896, and for years from January 1st, 1896, 1895, 1894, 1893 and 1892:

Table with columns for Gold, Silver, Total Excess, Exp. or Imp., and rows for Week, 1896, 1895, 1894, 1893, 1892.

All the gold exported during the week went to Germany, while the silver went to London. The specie imported came from Central and South America.

Average Monthly Price of Silver

in New York and London, per ounce Troy, from January 1st, 1896, and for corresponding months, 1895 and 1894.

Table with columns for Month, 1896, 1895, 1894, and rows for January, February, March, April, May.

FINANCIAL NOTES OF THE WEEK.

The revived speculation in silver and the steadily increasing price has come somewhat as a surprise to many interested in the metal who rather anticipated a dull condition of the market in consequence of the pronounced gold plank in the Republican platform, as agreed upon at St. Louis.

One result of the speculation has been to raise the price of silver certificates considerably above that of commercial bar silver, with the result that today there are nearly 800,000 oz. deposited with the Mercantile Trust Company, which institution issues the certificates dealt in on the Stock Exchange.

During the 11 months of the fiscal year—that is, up to May 31st—the Government reported total silver exports from the United States of \$5,515,178, against \$43,139,481 for the same time in the fiscal year of 1895.

Gold exports for the week have been light owing to the sale of Anaconda shares and other transactions of the same character, resulting in the transfer of large blocks of securities from this country to Europe and thereby relieving the demand for gold and enabling the financial houses carrying out the banking part of the operation to draw more freely on London and Paris.

Imports of specie at San Francisco by water in May were \$231,203; for the five months ending May 31st they were as follows: From Mexico, \$1,075,380; British Columbia, \$75,107; Central America, \$44,983; miscellaneous, \$3,141; total, \$1,198,611.

This does not include imports by rail from Mexico, which amount to a considerable sum.

The statement of the United States Treasury on Thursday, June 25th, shows balances in excess of outstanding certificates as below, comparison being made with the corresponding day of last week:

Table with columns for Gold, Silver, Total, and rows for Gold coin and bullion, Silver, Total.

Total United States Treasury notes issued under act of July 14th, 1890, in general circulation and in the Treasury, \$130,246,280. Against these are held in the Treasury 11,541,457 coined standard silver dollars, and the silver bullion purchased at a cost of \$119,001,823, making a total of \$119,001,823.

The statement of the New York banks—including the 6 banks represented in the Clearing House—for the week ending June 20th, gives the following totals, comparisons being made with the corresponding weeks in 1895 and 1894:

Table with columns for 1894, 1895, 1896, and rows for Loans and discounts, Deposits, Circulation, Specie, Legal tenders.

Changes for the week this year were increases of \$5 6,300 in loans and \$806,700 in circulation; decreases of \$1,499,600 in deposits, \$840,300 in specie, \$593,400 in legal tenders and \$758,800 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:

Table with columns for Gold, Silver, Total, and rows for Asso. Banks of New York, Bank of England, Bank of France, Imp. Bank of Germany, Austro-Hungarian Bank, Netherlands Bank, Belgian National Bank, Bank of Spain, Bank of Italy, Imp. Bank of Russia.

The return for the Associated Banks of New York is of date June 20th; all the others are of date June 25th, except the Bank of Italy, which is dated May 10th, and the Bank of Russia, whose return is dated May 16th-28th. The New York banks do not report silver separately, but the specie carried is chiefly gold coin. The Bank of England reports its gold only, not considering silver at all. The Imperial Bank of Germany and the Belgian National Bank do not report gold and silver separately.

Shipments of silver from London to the East for the year up to June 11th are reported by Messrs. Pixley & Abell's circular as below:

Table with columns for 1895, 1896, Changes, and rows for India, China, The Straits, Totals.

Arrivals for the week this year were £163,000 in bar silver from New York, and £44,000 from the West Indies, a total of £207,000. Shipments for the week were £20,384 in bar silver to China, and £2,500 to India, a total of £22,884.

Indian exchange continues firm, and all of the 60 lakhs of Council bills offered in London were taken, the average price being 14d. 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:

Table with columns for 1895, 1896, and rows for Imports, Exports, Excess, imports.

The movement of gold and silver in Great Britain for the five months is given by the returns as follows:

Table with columns for Gold, Silver, and rows for Imports, Exports, Excess.

The large increase in the silver movement, both imports and exports, this year is to be noted.

Domestic and Foreign Coins.

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

Table with columns for Bid, Ask, and rows for Mexican dollars, Peruvian soles and Chilean pesos, Victoria sovereigns, Twenty francs, Twenty marks, Spanish 25 pesetas.

Other Metals.

Copper.—While the market did not show much activity, so far as home trade is concerned, a good business is continually being done for export, and this makes producers exceedingly independent and firm. The large sales recently made by the Calumet & Hecla Company have filled up home trade buyers pretty well, and the higher prices now asked are no inducement for them to buy additional lots.

The foreign market continues to exhibit a great deal of strength, and reports are still very encouraging. The largest business, however, has been done in the speculative sorts, which have fluctuated from day to day and, although quotations are somewhat lower at the close than at the opening, a great deal of strength is shown. G. M. B.s opened at £50@£50 2s. 6d. for spot and 2s. 6d. higher for three months prompt, and the closing quotations are £49 15s. @£49 17s. 6d. for spot and £49 17s. 6d. @£50 for three months prompt.

Tin has been steadier, and prices have hardened somewhat. We have to quote spot and for delivery up to September at 13'65@13'75.

The London market exhibited great strength, with very large transactions, closing the same as last week, £61 5s. @£61 7s. 6d. for spot and £61 15s. @£61 17s. 6d. for three months prompt. The statistical position of the article remains about the same. Exports of tin from the Straits Settlements for the four months ending April 30th are reported as follows, in long tons: United States, 5,672; Great Britain, 4,516; European Continent, 4,480; China, 951; India, 1,087; total, 16,712 tons, against 17,705 tons for the corresponding period in 1895, and 16,305 tons in 1894. The exports to the United States this year, 5,672 tons, compare with 1,450 tons in 1895 and 1,920 tons in 1894.

Lead.—Reports were received from Leadville at the end of last week that a strike had broken out there, and this may seriously influence the production in the Leadville camp.

The London market opened very firm and advanced to £11 ls. 3d @ £11 2s. 6d. for Spanish, and 5s. higher for English lead.

ST. LOUIS.—The John Wahl Commission Company telegraphs us as follows: Lead is strong at 2.80, and at this price July and August can be easily sold, providing brands are satisfactory.

Spelter continues very irregular. We have still to quote 4'05@4'10c., New York, but it appears that consumers are able now and then to shade these prices somewhat.

The English market remains firm but inactive at £18@£18 5s. for good ordinaries, and £18 7s. 6d. @ £18 12s. 6d. for specials.

Antimony is dull and unchanged: Hallett's, 6% c., Cookson's, 7% c., and 6% c. for U. S. Star.

Nickel.—Demand is not active, but prices are firm at 34@35c. per lb. for ton lots and 36@38c. per lb. for smaller orders.

Platinum.—The demand is somewhat in excess of supply and quotations are higher, \$14@15 per oz., New York, being asked. London prices are 57s. @ 58s. per oz.

For chemical ware, best hammered metal, Messrs. Eimer & Amend, New York, furnish the following quotation, the prices given being respectively for orders of over 250 grams; for orders of over 100 grams and less than 250 grams, and for orders of less than 100 grams: Crucibles and dishes, 50c., 51c., and 52c. per gram.

Quicksilver.—The New York quotation continues unchanged at \$37 per flask. The London price is £6 10s. per flask, with £6 8s. 9d. named from second hands.

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

Table listing prices for various metals including Aluminum, Bismuth, Chromium, Copper, Iron, Lead, Manganese, Steel, Tin, and Zinc.

Average Monthly Prices of Metals

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

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

Imports and Exports of Metals.

Table showing imports and exports of metals for New York, categorized by metal type and quantity.

* Metal Exchange Reports. † Week ending June 25.

Table showing imports and exports of metals for Baltimore, categorized by metal type and quantity.

**From our special correspondent.

Table showing imports of metals for Philadelphia, categorized by metal type and quantity.

†† From New York Metal Exchange Reports.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, June 26.

Heavy Chemicals.—This market is still languid although there are indications of better business coming. We cannot expect much activity in the heavy chemical market until politics have been disposed of and the people settle down to business.

We quote as follows: Caustic soda, 60% \$2.22 1/2 @ \$2.42 1/2; 70% @ \$2.12 1/2 @ \$2.25; 76% \$2.20 @ \$2.25 per 100 lbs. Alkali, 58%, 80@85c. for 50-ton lots and over, and 90@95c. for smaller quantities.

Acids.—The price of brimstone continues to rise and in consequence some of the acid manufacturers have been asking relatively higher prices for their goods.

Nitric acid, 36% \$3.25@4.36; 40%, \$4@4.50; 42% \$4.50@5.50. Oxalic acid, \$7.25 ex-dock and \$7.50 ex-store. Mixed acids, according to mixture. Sulphuric acid, 66%, 75@95c.; 10@15c. higher for small quantities; chamber acid, \$6@8.50 per ton at factory. Blue vitriol, \$4@4.25, according to grade and order.

Brimstone.—We have been advised by Mr. Solon J. Vlasto, an extensive importer of Sicilian brimstone, that the proposed syndicate of mine owners and producers will in all probability be in shape for active operation very shortly.

Fertilizing Chemicals.—This market shows little change from our last report outside of a few inquiries from the South for the leading ammoniates. We quote: Sulphate of ammonia, gas liquor, \$2.30; bone, \$2.20@2.30. Dried blood, high grade, \$1.37 1/2 @ \$1.42 1/2; low grade, \$1.25@1.35 per unit f. o. b. Chicago.

Sulphate of Potash: 90-95%, New York and Boston \$1.96 1/2; Philadelphia, Baltimore and Norfolk, \$1.98; Southern ports, \$2.

Double Manure Salts: 48-53%, New York and Boston, \$1.01; Philadelphia, Baltimore and Norfolk, \$1.02; Southern ports, \$1.03 1/2.

Muriate of potash continues quiet. The new prices are 1.78c. at New York and Boston; 1.79 1/2 c. at Philadelphia, Baltimore and Norfolk, and 1.81 1/2 c. at New Orleans for 80@85% (basis of 80%), in lots of 50 tons and upward.

Kainit.—Quotations for 1896 are as follows: New York, Boston, Philadelphia and Baltimore, \$8.80 per ton; Norfolk, \$9.15, and New Orleans, \$9.30 per ton, for 25 tons and upward.

Nitrate of Soda.—There was an arrival of two cargoes, during the forepart of the week, which were quoted at 1.75@1.77 1/2 c., while 1.77 1/2 @ 1.84 c. was named for that in store.

NOTES OF THE WEEK.

The Roanoke Chemical Company has been granted a charter. The principal office of the company is at Roanoke, Va., and the capital stock is to be between \$8,000 and \$25,000.

The Caraleigh Phosphate and Fertilizer Works at a recent meeting issued \$25,000 of stock for the purpose of improving its mills. It is understood that this amount was readily subscribed.

Liverpool. June 17.

(Special Correspondence of Joseph P. Brunner & Co.) There is no improvement in the position of heavy chemicals, the demand generally being of a retail character.

Soda ash is steady, but at the same time there is little fresh business reported. The nearest spot range for tierces, according to market, we quote as follows: Leblanc ash, 48% £4@£4 5s.; 58% £4 5s. @ £4 10s.; ammonia ash, 48% £3 2s. 6d. @ £3 10s.; 58% £3 7s. 6d. @ £3 12s. 6d. per ton, net cash; bags 5s. per ton less. Soda crystals are in fair request, at £2 7s. 6d. per ton, less 5% for barrels and 7s. less for bags.

Caustic soda is languid, but there is little offering outside of combination makes, and prices are firm. We quote spot range, as to market, as follows: 60% £6 5s. @ £6 10s.; 70% £7 5s. @ £7 10s.; 74% £8 5s. @ £8 10s.; 76% £9 @ £9 5s. per ton, net cash.

Bleaching powder is slow of sale, and hardwood is offered at \$7.00-7.50 per ton, net cash, as to destination. Chlorate of potash is weaker at 4 1/2 d. and nothing doing. Bicarb. soda is selling at \$6 1/2 per ton, less 2 1/2% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages. Sulphate of ammonia is a turn easier, at \$8 65. 3d. @ \$8 10s. per ton, less 2 1/2% for good gray; 2 1/2% @ 25% in double bags f. o. b. here, as to quality.

Nitrate of soda is slow at \$8 2s. 6d. @ \$8 5s. per ton, less 2 1/2% for double bags f. o. b. here, according to quality. Carb. ammonia, lump, 3d. per pound; powdered, 3 1/4 d. per pound. net cash.

MINING STOCKS.

Complete quotations will be found on pages 630 and 631 of mining stocks listed and dealt in at:

New York.	Aspen, Colo.	St. Louis.
Boston.	Colorado Springs.	Paris, France.
Philadelphia.	Duluth, Minn.	Mexico.
Baltimore.	Helena, Mont.	Shanghai, China.
Pittsburg.	Salt Lake, Utah.	Valparaiso, Chile.
Denver, Colo.	San Francisco.	London, England.

Chicago and Cleveland, page 604.

NEW YORK, Friday Evening, June 26.

The volume of business transacted on the Consolidated Stock and Petroleum Exchange and the New York Stock Exchange amounted to 28,670 shares during the week as against 22,310 shares last week, thus showing an increase of 6,360 shares. While there was no active demand for any one stock outside of Brunswick Consolidated, a little variation occurred in the range of prices, as shown below.

The Comstocks were in some request during the week and sales were made as follows: 9,700 shares of Comstock Tunnel at \$9.00; 1,500 shares of Consolidated Imperial at 4c.; 700 shares of Chollar at \$2.80 @ \$3.25; 820 shares of Consolidated California & Virginia at \$2.00 @ \$2.30; 500 shares of Mexican at 8c. @ \$1.00; 400 shares of Union Consolidated at 70 @ 90c.; 300 shares of Best & Belcher at \$1.00 @ \$2.20; 300 shares of Hale & Norcross at \$1.65 @ \$1.70; 300 shares of Crown Point at 50c.; 300 shares of Savage at \$1.75; 200 shares of Yellow Jacket at 65c.; 200 shares of Belcher at 58c.; 250 shares of Gould & Curry at \$1.50 @ \$1.60; 100 shares of Ohhr at \$1.50, and 100 shares of Occidental at \$1.50. There were also sales of two \$250 Comstock bonds at 9%.

Of the Colorados the following stocks show sales: Victor, 50 shares at \$8.00; Portland, 600 shares at \$1.75 @ \$1.90; Isabella, 300 shares at \$4 @ 65c.; Creede & Cripple Creek, 1,300 shares at 5c.; Leadville Consolidated, 800 shares at 13c.; Mount Rosa, 2,000 shares at 12 @ 15c.; Pharmacist, 400 shares at 8c. In California stocks there were dealings of 6,300 shares of Brunswick Consolidated at 18 @ 20c.

We are officially informed that the enactment of the eight-hour law in Utah caused a strike in the mines of the Horn Silver Mining Company, which has resulted in the passing of the dividend which was to have been paid this month. It is said, however, that the greater bulk of the miners have returned to work and that everything is moving along quietly.

Boston.

June 25.

(From Our Special Correspondent.)

The dealings in copper stocks the past week have been very limited, Boston & Montana and Old Dominion being the only active stock on the list. The former in the early dealings was quite strong and sold at \$89 1/2, the highest price for the week. Owing to the weakness of the market for ingot copper the price declined to \$85 1/2 yesterday, but rallied to-day, touching \$87 and closing at \$86 1/2. Old Dominion, which closed last week at \$16, opened at \$16 1/2, declined to \$15 1/2, and at this figure seems to be well sustained. The reports regarding this company are very conflicting, but the price tells how it is regarded by the public generally. The Lake Superior stocks continue to rule extremely dull and transactions are few and far between. Calumet & Hecla is in fair request for investment, but the stock comes out only in small lots. It sold ex dividend (\$5) this week at \$303 to \$305, closing at the latter figure.

Osceola Mining Company declared \$1 dividend. The last dividend in December was \$1.50. The total dividends paid by this company to date amount to \$2,072,500. The dividend of \$1 was disappointing, as it was expected that \$1 1/2 would be paid, and the stock declined from \$29 1/2 to \$28 1/2 on small sales. Tamarack sold at \$85 to \$87 and closed at \$86. There were no sales of Quincy reported this week. The scrip sold at \$82 1/2. Franklin sold at \$10. Kearsage declined from \$13 1/2 to \$11 1/2. Tamarack, Jr., sold at \$11, and Wolverine declined from \$7 1/2 to \$7. Tecumseh declined from \$2 1/2 to \$1 1/2 and Butte & Boston from \$2 1/2 to \$2 1/4.

The gold stocks have not made much of a show this week. The excitement in regard to Pioneer has subsided and the price also, from \$6 1/2 to \$5 1/2 @ \$5 1/2 on moderate sales. Santa Ysabel declined from \$12 1/2 to \$10. Gold Coins steady at 50c. Merced advanced from \$6 1/2 to \$8, with latest sales at \$7 1/2.

The Athena Quicksilver Company made its bow at the Exchange this week with sale of 100 shares at \$4.

Chicago.

June 24.

(From Our Special Correspondent.)

The temporary subsiding of political excitement and the settlement in the public mind as to the action of the St. Louis convention has created an undertone of interest in mining matters which cannot help being noticed. Stocks are still dull, of

course, in direct sympathy with every other branch of business and the stagnation of enterprise in general, but notwithstanding all this many stocks, especially the dividend-producers, recorded very noticeable advances during the past six days. Brokers feel more encouraged over the outlook.

Delaware Chief reached the highest point of the week to-day, closing at 4 1/2 c., a gain of about 4 points for the week and 11 points for two weeks.

Chicago & Montana closed without change, although sales of these shares have been heavy and the stock is going rapidly.

Imperial preferred closed firm at 31c., a gain of about 5 points for the week and about 8 points for two weeks.

Other shares, including Medina, closed firm and fractionally higher, leaving an encouraging feeling for the coming week and the entire future.

The following table gives the highest prices with sales of the stocks recorded on the Chicago Mineral and Mining Board for the week ending June 24th:

Stocks.	June 18	June 19	June 20	June 22	June 23	June 24	Sales.
Capazone.....
C. C. & C. C.....08 3,900
C. C. Golden (Group).....
C. C., G. M. B. & L. Co.....
Chi. & G. Mt. Chi. & Mont.....
Chula Vista.....
Cosmopolitan.....
Delaware Cr.....
Finance.....
Great fissure.....
Hawkeye.....
Imperial Pfd.....
Investors' and Prospectors' Little Gem.....
Lucille.....
Medina G. M. Co.....
Peerless G. M. Co.....
Rhyolite.....
Royal Age.....
Squaw Mt.....
Sumpter.....
Sunnyside.....
Gilpin.....
Union Gold.....
Utah Mercur.....
Total shares sold, 292,700.							

Cleveland.

June 21.

(From our Special Correspondent.)

The iron ore stock market has been quite steady during the past week, but only a few sales were reported. Last week \$18 was asked for Republic Iron Company stock, with \$17.50 bid. Early this week one of the brokers of the city was offered a large block of the stock at \$20, indicating confidence in the holder, but it was not taken. No change in the quotations of the other stocks were noted since last week. Following are the quotations:

Name of Company.	Par val.	Bid.	Ask.
Aurora.....	\$25	80	88
Chandler.....	25	34	35
Cleveland-Cliffs Iron Co.....	100	45	50
Jackson Iron Co.....	25	70	75
Lake Superior Iron Co.....	25	30	31
Lake Superior Consolidated.....	100	20	21
Pittsburg & Lake Anseline.....	25	75	80
Republic Iron Co.....	25	17 50	20

Colorado Springs, Colo.

June 20.

(From Our Special Correspondent.)

The Colorado Springs Mining Stock Association has moved into its new and beautiful home, and the members are well pleased with the commodious way in which the structure has been built. They are as a unit in expressing their appreciation of the fruitful labors of Mr. D. V. Donaldson, the secretary of the association, to whom so much is due for his enterprise and business methods. He has been the mainstay of the institution, and can well be proud of his position as its secretary and of his success in placing the association on such a footing as to enable it to erect one of the most attractive and complete exchange buildings in Colorado. The first business session in the new building took place on June 18th, when the members of the association met in a body to attend the initiative call.

There has been a slight change in the position of officers. Mr. T. C. Parrish is now first vice-president, and Mr. W. P. Bonbright second vice-president. The following have also been appointed: J. A. Sill, S. G. Chauncey, D. Heron and Ward Hunt to the Governing Committee; W. P. Bonbright to the Judicial Committee; L. E. Sherman and T. H. Edsall to the Listing Committee; H. R. Wray to the Membership Committee.

The Colorado Springs Board of Trade and Mining Exchange is doing a satisfactory amount of business.

The market continues strong, and prices remain firm. There was an upward tendency prevalent in the market during the first few days of the week, but a reaction was manifest at the close. On the whole business has been of a satisfactory nature. Messrs. Gardner & Co. furnish the closing quotat-

tions of the Colorado Springs Mining Stock Exchange for the week ending June 25th, as follows.

Name of Company.	June 19	June 20	June 21	June 22	June 23	June 24	June 25
Alamo.....
Anaconda.....
Argentum-Junata.....
Blue Bell.....
Cripple Creek Con.....
Golden Fleete.....
Isabella.....
Mollie Gibson.....
Mount Rosa.....
Pharmacist.....
Portland.....
Silver State.....
Union.....
Work.....

In addition to the above quotations Messrs. A. Pick & Co., of New York, furnish the following:

Name.	June 19	June 20	June 22	June 23	June 24	June 25
Bankers.....
Des Moines.....
Gold & Globe.....
Gold Standard.....
Jefferson.....
Keystone.....

Denver, Colo.

June 20.

(From Our Special Correspondent.)

The past week has not been such as would indicate that we are on the verge of a boom; in fact, the mining stock market continues to move along in a quiet way, and prices do not show a very large range of variation.

The secretary of the Colorado Mining Stock Exchange informs me that all the stocks which are listed on the board have been carefully examined by the Listing Committee and a sworn affidavit with maps and abstracts are on file in his office. By listed I do not mean those that come under the heading of "Unlisted Stocks Active." I understand that a complete set of papers regarding each mine and prospect traded in on the Exchange is kept on file by the secretary.

Los Angeles, Cal.

June 16.

(From Our Special Correspondent.)

The Los Angeles Mining and Stock Exchange is now in full operation; the by-laws and rules have been issued and it is the intention of the members and officers to carry on business in a legitimate way. The officers are A. H. Judson, president; J. A. Fairchild, vice-president; H. M. Russell, treasurer; J. F. Cooper, secretary. The directors are A. H. Judson, H. M. Russell, Charles Wier, George W. Parsons, J. A. Fairchild, P. Y. Griffin, E. T. Loy, F. C. Garbutt and E. K. Alexander. The executive committee consists of George W. Parsons, F. W. Edelsten and Richard Garvey; the finance committee, H. M. Russell, E. Groenendyke and S. J. Parsons; listing committee on mining properties, stocks and bonds, F. C. Garbutt, H. Salazar, P. L. Griffin, H. M. Russell and J. H. Hurin; listing committee on other stocks and bonds, Charles Wier, J. H. Bryant, J. F. Bumiller, R. W. Poindexter, R. D. Wade; arbitration committee, E. T. Loy, C. White Mortimer and Calvin Egerton; membership committee, J. A. Fairchild, F. D. Lanterman and Osiias Willis; committee on rules, E. K. Alexander, G. J. Griffith, G. F. Granger, A. W. Kinne and C. A. Stilson.

Salt Lake City, Utah.

June 20.

(Special Report of James A. Pollock.)

The local stock market was only fairly active during the week just closed, and, with two or three exceptions, the attention of buyers was largely paid to the cheaper and speculative stocks. The exceptions were Mammoth, Swansea and Sunshine. These three stocks closed at strong quotations, while most of the remainder of the list remained about as during the previous week.

Considerable business was done in Ajax at about the previous week's figures, the demand being quite active, with the offerings comparatively light. Operations are to be resumed at once at the properties, all of the necessary changes having been made. An increase in ore shipments should be made by the company. Alliance, Anchor and Gas were all stationary, and without activity. Bogan's last assessment of 5c. per share is now delinquent, with only a fair-sized list of delinquents. Work is progressing favorably at the properties. The stock was slightly shaded. Bullion-Beck pays its June dividend of 15c. per share on the 20th. The properties have not looked so well for over a year. It is announced that payments of dividends will be regular at 15c. per share or better.

Although nothing definite has been heard from the people holding the option on the Centennial-Eureka, it would prove neither a surprise nor a disappointment to the heavy holders should the deal not reach a successful culmination. Shipments of ore have been discontinued for the month, but development work is being pushed in certain portions of the mines, which are looking extremely well. The stock was not offered, except in odd blocks, under \$85. Dalton & Lark paid its usual half-cent dividend on the 15th. The stock remained unchanged. Dalton did little business, while quotations remained unchanged. Daly and Daly West were strong, although comparatively little business was done in the stocks. Both properties are doing extremely well. Eagle was without special activity. Development work is reported to be progressing

favorably. Four Aces is making satisfactory shipments of fair-grade ore, but the stock made no advances, although in fair demand at the previous week's figures.

Galena and Geysers were both quiet, with the quotations of the previous week practically unchanged. Horn Silver was in considerably better demand and the quotations were even stronger than during the previous week. Operations at the properties are now nearly up to their old-time proportions. The usual quarterly dividend of \$50,000 is anticipated for the last day of the present month.

It is semi-officially announced that after an interval of five years the Mammoth will resume dividend payments on July 1st, the stock-books closing on the 25th inst. When the company resumes payments holders of stock can rest assured that the distribution will be regular during the life of the mine. It is the intention of the directors to make a precedent of 5c. per share monthly, with extra dividends should the earnings merit. A surplus fund of at least \$100,000 is to be maintained. The stock was very strong and closed up very near the \$4 mark, with good prospects of a further advance. The June dividend on Mercur will probably be delayed until toward the end of the month at least. While the company has plenty of money with which to pay the dividend, the directors have decided to await certain labor developments. The properties are being operated to full capacity and are looking extremely well.

Ontario was somewhat depressed, for no good reason. Overland has equipped its properties with a good hoist, and is pushing development work energetically, the showing of ore being very gratifying. Rover did little, with quotations slightly improved. Silver King continued very strong. Sunshine showed increased activity and closed with strong quotations. The directors are expected to order the mill increase within the next few days. Swansea did a heavy business at good quotations, and sold at the highest point in its history during the week. The mines are making a good record. Utah remained about stationary. Tetro is pushing work with vigor.

San Francisco, June 20.

(From Our Special Correspondent.)

The market opened on Monday with some show of activity, but this soon subsided and all through the week business dragged, and prices declined. There were one or two efforts to relieve the dullness, but they soon came to an end. It looks as though our sport was over and we were getting back into the old routine of small sales, lack of interest and general stagnation.

Some closing quotations are: Chollar, \$2.75@2.80; Consolidated California & Virginia, \$2.20@2.25; Savage, \$1.90; Ophir, \$1.50; Occidental, \$1.40@1.45; Potosi, \$1.35@1.40; Gould & Curry, \$1.25; Confidence, \$1.15; Best & Belcher, \$1.10; Hale & Norcross, \$2@2.15. There were sales of Bodie Consolidated at 50c., and of Mono at 6c., while Bulwer was quoted at 32@33c.

The Consolidated Golden Gate Sulphur Mining and Development Company has declared its fifth dividend at the rate of 15c. per share.

The Fogus Mining Company, of Storey County, Nevada, has levied an assessment of 10c. per share, delinquent July 11th.

The Bullion Consolidated Gold Mining Company, of Grass Valley, has levied an assessment of 15c. per share, delinquent July 20th.

THE NEW EXCHANGE.

Business on the Gold Mining Exchange was not particularly active. There was about the usual amount of dealing, but not much spirit in it, and it might be characterized as a quiet week.

Some quotations are as follows: Amalie, \$2; Sebastopol, 49@50c.; Savannah, 40@43c.; Edna, 40c.; Lockwood, 30c.; Grant, 14c.

The fact is that people are getting a little tired of the half dozen or so of stocks that are traded in, and the range will have to be extended if the call board is to continue popular. We are promised some new stocks on the list, but they are slow in coming out.

London, June 13.

(From Our Special Correspondent.)

The South African mining market has been very firm all week and prices have advanced all round. The liberation of the four chief prisoners has practically put an end to the industry-destroying friction between the Boer Government and the Uitlanders. As the leading agitators find it impossible to obtain English assistance against the Boers, they are now settling down to work harmoniously with their former opponents. The Boers on their part find that to take vengeance against the conspirators would only destroy the wealth of their country, so that they had both a sentimental and a practical reason for exercising magnanimity.

To all appearances the gold mining industry of the Transvaal has got back to its normal state, for the output for May is 189,859 oz. The Robinson mine has fairly broken its record by producing 19,323 oz. during the month, and almost every mine shows an advance. The scheme for the amalgamation of the various Barnato interests will be completed shortly, but it will not include the active gold mines: Primrose, Glencairn, Mag Consolidated, etc., as I stated last week. It deals only with the Barnato Bank, Barnato Consolidated and Johannesburg Consolidated and Johannesburg Water Works. The reason for this amalgamation is not yet evident.

The West Australian market has suffered considerably by the revival of South Africans. Many of the jobbers who forsok the South African market six months ago for the West Australian market have gone back again. Buying on the part of the public is not so brisk, so that with these two causes prices have fallen away to some extent.

The New Zealand section continues to expand and it now occupies quite a large space on the floor of the Stock Exchange. There is a considerable demand among promoters for New Zealand properties and a further expansion in the boom may be expected during the next few months.

Copper shares are advancing with the price of copper. It appears that the Exploration Company has been able to obtain only 270,000 more shares in the Anaconda company, so that they now hold 570,000 shares out of 1,200,000. Some surprise has been expressed that the quotation of Anacondas in London has not gone so high as might be expected, or so high as they are really worth. The fact is, however, believed to be that the Exploration Company purposely kept the quotation low, in order to obtain further blocks of stock at a low rate.

Paris, June 14.

(From Our Special Correspondent.)

While speculation has been active during the past week in several directions, the movement in the copper stocks has continued to be the most notable point in the market. There have been many sales, and nearly all of them show higher prices. Boleo, however, did not hold the great advance of 100 fr. which I noted in my last letter; shares were offered very freely, and the price broke, going down from 1,490 fr. to 1,400 fr. Even the last quotation shows a large advance over any previous ones, and must be considered a very good price. Notwithstanding your large shipments here the price of copper continues to rise, and the reported stocks are decreasing. Evidently the consumption is enormous, even allowing that the reports of unsold stocks of metal have been manipulated.

The zinc companies' shares have risen largely, and it is evident that the effects of the new combinations have been pretty well discounted. I am informed that the agreement has been practically concluded, and that there will be a certain limitation of production. The price, however, will be kept down by the probability of exports from your side should it go too high and present a tempting opportunity. The Silesian producers understand this very well, and will not agree to too great an advance.

The demand for the metallurgical stocks continues good, and they all show high quotations. Longwy especially has advanced on the news that the company has secured the contract to furnish the material for the new railroad which is to connect our possessions in Tonkin with Southern China. Work on this line is to begin at once.

Huanchaca (silver) shows a strong advance. The nitrate stocks are also more in demand, and their standing has improved materially since the death of Colonel North.

The market for the Transvaal stocks is much more active than it has been since October. The better news from that country and the increase in gold production in May have drawn attention to these stocks once more, and there is a prospect that they will resume, in part at least, their old position in the public estimation.

One of the measures in the budget this year provides for a duty of 12.50 fr. per ton on lead ore. This was opposed in the Chamber, as the French production is only about one-seventh of our consumption, but the usual argument of increasing production at home was advanced. Finally a deputy moved that the duty should be levied only on ore from countries where an export duty existed on such ores, and that it should be of the same amount as that duty. This was voted by the Chamber, though the Ministry did not favor it. As most of the lead ore is imported from Spain, and as that country last year removed the export tax of 10 fr. per ton on the ore, which formerly existed, the amendment practically defeats the tax. At the same time it makes it more probable that Spain will not renew her export duty.

While I am speaking of Spain, you have doubtless heard that the lease of the Almaden quicksilver mines to the Rothschilds has been renewed. In return they loan the Spanish Treasury the sum of 100,000,000 pesetas, a very welcome aid to the Finance Minister, whose chief aim now is to postpone the inevitable bankruptcy, which he must foresee, as everyone else does.

The Turkish question is again disquieting our politicians, and by consequence our financiers. As long as the Turk confined his slaughtering propensities to the Armenians, who were somewhat out of the way and remote, it could be kept quiet; but now he has begun on the Cretans, who are, as it were, our neighbors, and something will have to be done. One can close one's eyes and ears to a murder done in the cellar; but when it comes to assassination in the doorway of your salon, it is too much: one must call the gendarmes at once.

And then? That is what troubles us—the answer. AZOTE.

MISCELLANEOUS DIVIDENDS.

Westinghouse Electric and Manufacturing Company, quarterly dividend of 1% on the preferred stock, payable July 1st. Transfer books will be closed June 20th at 12 m. and opened July 2d.

MEETINGS.

Name of Co.	Location of office.	Date.	Time.
Anaconda Copper	Anaconda, Mont	July 13	11 a. m.
Arvilla Tunnel	505 Mining Exchange Building, Denver, Colo.	" 14	3 p. m
Bankers Gold	205 Ernest & Cranner Building, Denver, Colo.	" 10	10 a. m
Black Bear	Telluride, Colo.	" 3	10 "
Gurney	619 Boston Building, Denver, Colo.	" 13	11 "
Parrot, Silver & Copper	Butte City, Mont.	June 30	11 "
Prospect	117 South Mill St., Aspen, Colo.	July 14	2 p. m
Roesler & Hasselbacher Chemical	73 Pine St., New York, N. Y.	June 20	1 "
Stanley Con	11 East First south St., Salt Lake City Utah.	July 14	2 "

ASSESSMENT.

Name of Co.	Loc'n.	No.	Divq.	Sale.	Amt.
Alta	Nev.	52	June 9	June 30	.10
Bay State	Cal.	32	July 7	July 30	.03
Belle Isle	Nev.	26	" 15	Aug. 12	.10
Bokan Silver	Utah	3	" 16	July 6	.05
Camp Floyd	Utah	2	June 27	" 13	.01
Gold	Cal.	1	" 22	" 18	.03
Central Eureka	Cal.	42	July 14	Aug. 4	.25
Chollar	Nev.	6	" 6	July 27	.01
Emerald	Utah	"	" 8	Sept. 3	.10
Eureka Con.	Nev.	"	" 11	Aug. 15	.10
Fogus	Cal.	9	June 25	July 10	.01
Gibraltar Con.	Nev.	1	" 22	" 14	.50
Horseshoe Bar	Cal.	12	July 22	Aug. 12	.05
Con.	Mont.	"	" 23	" 14	.0046
Kentucky, Con.	Nev.	19	June 13	July 11	.02
Leo	Utah	"	" 1	June 29	.014
Lucky Bill	Cal.	37	July 6	July 27	.10
Mohawk Con.	Nev.	4	" 2	" 23	.05
Mono Gold	Cal.	30	June 23	" 14	.05
Mt. Diablo	Nev.	24	July 13	Aug. 10	.10
North Banner	Cal.	23	" 7	July 28	.15
Con.	Nev.	73	June 5	June 25	.10
North Belle Isle	Cal.	6	" 3	" 21	.10
Occidental Con.	Utah	"	" 22	July 8	.02
Overman	Cal.	13	July 2	" 20	.03
Peachbody	Cal.	14	" 16	July 14	.25
Peruvian Con.	Cal.	11	" 8	June 29	.01
Reward Gold	Ariz.	"	" 12	July 11	.03
Silver King	Cal.	1	May 30	" 1	.20
Siskiyou Con.	Cal.	2	June 22	" 13	.10
Skagit Cumb'd	Cal.	31	" 8	July 29	.05
Coal	Wash.	4	" 21	July 9	.15
Surprise	Cal.	"	"	"	"
Thorpe	Cal.	"	"	"	"
Wide Awake	Cal.	"	"	"	"
Ybarra Gold	Mex.	"	"	"	"

*New assessment.

DIVIDENDS.

NAME OF COMPANY	Current Dividends.		Paid since Jan. 1, 1896.	Total to date.
	Date.	Amount.		
Aetna Con.	June 10	\$10,000	\$20,000	\$30,000
Alaska-Mexican			\$4,200	\$17,031
Alaska-Treadwell			150,000	2,825,000
Anaconda			750,000	750,000
Aurora Iron			50,000	700,000
*Big Six			2,500	2,500
*Boston & Mont.			600,000	4,025,000
*Bullion Beck & Ch	June 20	15,000	95,000	2,045,000
*Calumet & Hecla			1,000,000	45,350,000
*Cariboo			16,000	79,000
*Centennial-Eureka	June	30,000	210,000	1,740,000
C. O. D.			5,000	25,000
*Dalton & Lark	June	12,500	62,500	62,500
Dominion Coal			600,000	600,000
*Elkton Con.	June 20	10,000	20,000	55,000
*Florence			54,390	89,348
*Galena			16,000	36,000
Gold Coin			45,000	60,000
*Golden Fleece			90,000	491,179
*Gold & Globe Hill	June 15	2,250	19,500	28,875
Hecla Con.			30,000	2,190,000
Highland			25,000	3,153,918
*Homestake	June 25	31,250	188,500	5,900,000
Horn Silver			50,000	7,130,000
*Iron Mountain			30,000	140,000
*Isabella	June 25	22,500	112,500	135,000
*Le Roi	" 5	25,000	100,000	175,000
Mammoth	July 1	20,000	20,000	1,080,000
*Mercur			100,000	450,000
Minnesota Iron	July 15	247,500	495,000	3,240,000
*Mont. Ore Pur. Co.	June 20	40,000	240,000	400,000
*Moon-Anchor	" 15	6,000	18,000	18,000
Moose			6,000	180,000
Napa Con.	July 1	20,000	50,000	790,000
*Ontario	June 30	15,000	90,000	13,265,000
Oscoda Con.	July 3	50,000	125,000	2,072,500
Ortaqueachy			1,000	1,000
Portland	June 15	30,000	126,000	743,000
Quincy			40,000	8,070,000
*Silver King			225,000	675,000
*Slocan Star			100,000	100,000
Small Hopes			25,000	3,275,000
Smuggler-Union	July 1	50,000	100,000	100,000
*Union	June 25	11,000	23,500	73,000
*Utah			13,000	145,000
*Victor	June 15	20,000	120,000	585,000
Victor M. & L.	" 20	3,000	12,000	42,000
War Eagle			25,000	157,500
Totals			\$671,000	\$6,671,500
				\$110,330,351

* May dividend paid.

STOCK QUOTATIONS.

BOSTON, MASS.*

Table of stock quotations for Boston, Mass. listing companies like Aloues, Arnold, Atlantic, etc., with columns for location, par value, and prices for various dates from June 19 to June 25.

* Official quotations Boston Stock Exchange. + Ex-dividend. Total sales, 33,332.

NEW YORK.*

Table of stock quotations for New York listing companies like Adams, Ajax, Alliance, etc., with columns for location, par value, and prices for various dates from June 21 to June 26.

* Official quotations N. Y. Stock and Con. Stock & Petroleum Exchanges. Total shares sold, 28,730.

INDUSTRIAL COAL AND COAL RAILROAD.*

Table of stock quotations for Industrial Coal and Coal Railroad listing companies like Balt. & Ohio, Ches. & Ohio, etc., with columns for par value and prices for various dates from June 21 to June 26.

* Official quotations N. Y. Stock Exchange. Total shares sold, 89,900.

COLORADO SPRINGS, COLO.†

Table of stock quotations for Colorado Springs, Colo. listing companies like Ajax, Alamo, Anaconda, etc., with columns for par value and prices for various dates from June 15 to June 21.

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

ST. LOUIS, MO., STOCKS. Week ending June 23.

Table of stock quotations for St. Louis, Mo. listing companies like Central Lead, Con. Coal, etc., with columns for company name, office, par value, bid, asked, and last dividend.

SAN FRANCISCO, CAL.*

Table of stock quotations for San Francisco, Cal. listing companies like Alta, Belcher, Bodie Con., etc., with columns for location, par value, and prices for various dates from June 20 to June 25.

* Official telegraphic quotations, San Francisco Stock Exchange.

BALTIMORE, MD.*

Table of stock quotations for Baltimore, Md. listing companies like Balt. M. & S. N. C., Conrad Hill, etc., with columns for location, par value, bid, asked, and last dividend.

* Official quotations Baltimore Stock Exchange.

MISCELLANEOUS SECURITIES. June 25.*

Table of miscellaneous securities listing companies like American Coal, Cateaugay Ore & Iron R. R., etc., with columns for location, par value, bid, and asked.

LONDON.

June 12.

Table with columns: NAME OF COMPANY, Country, Product, Capital stock, Par value, Last dividend, Quotations (Buyers, Sellers), and various stock prices.

DENVER, COLO.

Table with columns: NAME OF COMPANY, Par value, June 15, June 16, June 17, June 18, June 19, June 20, and Sales.

PARIS. Week ending June 12.

Table with columns: NAME OF COMPANY, Country, Product, Capital Stock, Par value, Div. last year, Prices (Op'ning, Closing), and various stock prices.

PHILADELPHIA, PA.

Table with columns: NAME OF COMPANY, Loc'n, Par value, June 18, June 19, June 20, June 21, June 22, June 23, June 24, and Sales.

MEXICO. Week ending June 18.

Table with columns: NAME OF COMPANY, State, No. of shares, Last dividend, Last assessment, Prices (Opening, Closing), and various stock prices.

SALT LAKE CITY, UTAH. Week ending June 20.

Table with columns: Name of Company, Par value, Bid, Asked, Actual selling price, Name of Company, Par value, Bid, Asked, Actual selling price.

PITTSBURG, PA. Week ending June 23.

Table with columns: NAME OF COMPANY, Loc'n, Par value, Bid, Ask, Selling price, NAME OF COMPANY, Loc'n, Par value, Bid, Ask, Selling price.

VALPARAISO, CHILE. June 11.

Table with columns: NAME OF COMPANY, Capital, Share value, Last dividend, Prices (Bid, Asked, Last sale), and various stock prices.

HELENA, MONT. Week ending June 10.

Table with columns: NAME OF COMPANY, Location, Company's office, Par value, Bid, Asked, Shares sold, Price.

SHANGHAI, CHINA. May 22.

Table with columns: NAME OF COMPANY, Country, No. of shares, Value, Last dividend, Price, and various stock prices.

DULUTH, MINN. Week ending June 20.

Table with columns: NAME OF COMPANY, Par value, Bid, Asked, NAME OF COMPANY, Par value, Bid, Asked, and various stock prices.

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

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

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

Official quotations Colorado Mining Stock Exchange. All companies are located in Colorado. Shares sold: Listed, 782,400; unlisted, 1,018,150; after sales, 147,000; total, 1,947,550.

Official quotations Philadelphia Stock Exchange. Ex-dividend. Total sales, 6,190.

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

Special Report of Samuel K. Davis. Total shares sold, 20,250.

Special Report of S. E. Smith.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns: Name and Location of Company, Capital Stock, Shares (No., Par Val), Assessments (Total Levied, Date and Amount of Last), Dividends (Total Paid, Date and Amount of Last). Rows 1-130.

G., Gold, S., Silver, L., Lead, C., Copper, B., Borax. * Non-assessable. + The Deadwood previously paid \$275,000 in eleven dividends and the Terra \$75,000. † Previous to the consolidation in August, 1884, the California had paid \$31,320,000 in dividends and the Cons. Virginia \$42,380,000. Note.—Corrections to this table are made monthly. Correspondents are requested to forward changes or additions so as to reach us before the end of each month.

THE ENGINEERING AND MINING JOURNAL

UNIV. OF MICH.
29 JUN 1896

VOL. LXI., No. 26.

NEW YORK, SATURDAY, JUNE 27, 1896.

PRICE, 15 CENTS.

**THE HARRINGTON & KING
PERFORATING CO.,
CHICAGO, ILL.**

See Page 20.

WORTHINGTON MINE PUMPS
Unequaled in Design, Workmanship and Finish.

HENRY R. WORTHINGTON, NEW YORK, 86 & 88 Liberty St.
BOSTON, 70 Kilby St. PHILADELPHIA, 724 Arch St.
CLEVELAND, 24 South Water St. ST. LOUIS, Eighth & St. Charles Sts.
CHICAGO, 185 to 189 Van Buren St. INDIANAPOLIS, 64 S. Pennsylvania St.
DETROIT, MICH., 155 Jefferson Avenue. Send for New Catalogue.



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.

THE ROPP STRAIGHT LINE FURNACE

For Roasting, Chlorinating and Desulphurizing Ores.

PARKE & LACY COMPANY, Sole Licensees. SAN FRANCISCO, California.



CARPENTER STEEL COMPANY.

Gen'l Office: 1 Broadway - New York.

Works: Reading, Pa.

Warehouses and Sales Offices:

NEW-YORK, 30 Cliff St.
Boston, 69 Purchase St.
Chicago, 25 W. Lake St.
Denver, 1950 19th St.
Detroit, 75 West
Woodbridge
St.

MINING DRILL AND PICK STEEL.
MAN'RS OP
**HIGH GRADE
TEMPERING AND AIR-HARDENING
STEEL FOR
TOOLS, DIES, CUTTERS,
MINING DRILLS, WELL-BITS, &c.**
Cold rolled Strips and shaped Wire.



Norwalk

Air Compressors. SEE PAGE 22

LINK-BELT MACHINERY CO.,
ENGINEERS, FOUNDERS
MACHINISTS.
Chicago, U.S.A.



L-B.M. Co.

Malleable Iron Buckets of approved pattern and weight. Elevators and Conveyors. Electric Coal Mining Machinery.

See Page 12.

Catalogue No. 20 on application.

ELECTRIC

ROCK DRILL. SEE PAGE 24.

Parties interested in Cyanide Treatment should read Kendall Process "ad." Page 23.

SILVER PLATED

AMALGAM PLATES FOR STAMP MILLS & PLACER-MINING

Western Plating & Mfg. Co.
DENVER, COLO.

See Page 10.

IS 30% POWER WORTH SAVING?
DOUBLE-PIPE COMPRESSORS
are Guaranteed to Run on 30 per cent. less Power than any other.



Where can I have my letters sent when visiting New York City?

Have them addressed to the headquarters of the Mining Men—Office of the Engineering and Mining Journal, 253 Broadway, New York.

BOOK CATALOGUE See Our Running Book Catalogue on Page 2.

GOLD AND SILVER SMELTING, CONCENTRATION, CYANIDE AND CHLORINATION EQUIPMENTS
Colorado Iron Works. Page 27.

ELECTRIC MINE LOCOMOTIVES Also COAL MINING MACHINES, DRILLS and COAL MINE EQUIPMENTS. See Advt. of THE JEFFREY MFG. CO. No. 2. PAGES 14 and 32.

MINING MACHINERY. FRIED. KRUPP, GRUSONWERK. See Page 26.

DIAMOND PROSPECTING DRILLS QUARRYING AND MINING MACHINERY. See Card of SULLIVAN MACHINERY CO., Page 22.

MINING, MILLING, MARINE MACHINERY OF EVERY KIND. UNION IRON WORKS, S. F. See Page 29.

THE RUSSELL PROCESS For Free and Rebellious Silver and Gold Ores and Tailings. Send for Late Publications. THE RUSSELL PROCESS CO., Park City Utah. For Spanish Publication address Richard K. Chism, City of Mexico.

MINING, MILLING & HOISTING MACHINERY SEE ADV. OF F. M. DAVIS IRON WORKS CO. Pages 22 & 33.

CLAYTON AIR COMPRESSORS
FOR ALL PURPOSES AND PRESSURES
CLAYTON AIR COMPRESSOR WORKS
26 Cortlandt St., New York



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.

WHY IT IS?

First—STEADY IMPROVEMENT.
In the Spring of 1887 the "Penberthy" made its first appearance. From that time until the present it has been improved in some particular each year, until it has reached a near absolute perfection as an automatic injector can be brought.
99% PER CENT. EFFICIENCY SHOWN BY ACTUAL TEST.

PENBERTHY INJECTOR CO.
110 Seventh Street, Detroit, Mich. Branch Office, Windsor, Can.

ELECTRIC APPARATUS

FOR ALL KINDS OF Mining Work & Direct Electric Elevators A SPECIALTY.

ELECTRICAL ENGINEERING CO.,
34 & 36 Main St., San Francisco, Cal., U.S.A.

McNEILL'S CODE.
Mining and General Telegraphic Code. By BEDFORD McNEILL, F. G. S., Mining Engineer. Contains over 40,000 phrases. Page 807, royal octave, cloth. LONDON—Whitehead, Morris & Co., Ltd.; price 31s. Capetown—E. R. Morris. Adelaide—E. S. Wigg & Son. NEW YORK—The Scientific Publishing Co.; price \$7.50

An Outline of Qualitative Analysis.

BY **JOHN A. MILLER,**
Professor of Medical Chemistry and Toxicology, and Director of the Chemical Laboratory at the Medical Department of the Niagara University of Buffalo, N. Y.

CLOTH. Price \$1.50.

SCIENTIFIC PUBLISHING CO.,
253 Broadway, New York.
CHICAGO, ILL., DENVER, COLO., LONDON, ENG.,
387 Monadnock Bldg. 206 Boston Bldg. 20 Bucklersbury

Do You Want the Best Books?

ANNOUNCEMENT.

FOR the convenience of our readers we will present on this page each week a list of works on some department of mining and metallurgy and kindred subjects. These lists will contain only the best books and will be kept always up to date. Every reader, we believe, will appreciate the advantage of a special catalogue from which he can select the books he needs, and order without further trouble from the SCIENTIFIC PUBLISHING COMPANY. Purchasers will save themselves expense by remitting with order instead of asking us to send books C. O. D.

STEAM ENGINES, BOILERS, ETC.

American Marine Engineer.

By EMORY EDWARDS.
Theoretical and Practical, with examples of the latest and most approved marine practice. Illustrated.....\$2.50

American Steam Engineer.

By EMORY EDWARDS.
Theoretical and Practical, with examples of the latest and most approved American practice in the design and construction of steam engines and boilers of every description. Illustrated.....\$2.50

Boiler Making for Boiler Makers.

By W. H. FORD.
A practical treatise on work in the shop.....\$1.00

Engine and Boiler Trials, A Hand-Book of.

Including the use of the Indicator and the Brake.
By R. H. THURSTON.....\$5.00

Engine Runner's Catechism.

By ROBERT GRIMSHAW.
Illustrates, describes and explains the peculiarities of all the well-known stationary engines used in this country.....\$2.00

Engineer's Handy Book.

By STEPHEN ROPER.
Containing a full explanation of the steam engine indicator, and its use and advantages to engineers and steam users. With formulae for estimating the power of all classes of steam engines.....\$1.50

900 Examination Questions and Answers for Engineers and Firemen.

Who desire to obtain a U.S. Government or State License.....\$1.50

Gas Engine.

History and Practical Working.
By DUGALD CLERK.
Illustrated.....\$2.00

Gas, Oil and Air Engines.

A practical text-book on internal combustion motors without boilers.
By BRYAN DONKIN, JR.....\$0.50

Hand-Book for Steam Users.

By M. POWIS BALE.
Being notes on steam engine and boiler management and steam boiler explosions.....\$0.80

High Pressure Steam Boilers, A Practical Treatise On.

By WM. M. BARR.
Including results of recent experimental tests of boiler materials, together with a description of approved safety apparatus, steam pumps, injectors and economizers in actual use.....\$1.00

High Pressure, or Non-Condensing Steam Engines, A Catechism Of.

By STEPHEN ROPER.
Including the modelling, constructing and management of steam engines and steam boilers. Illustrated.....\$2.00

Indicator and Dynamometer.

By THOS. J. MAIN AND THOS. BROWN.
With their practical application to the steam engine. Illustrated.....\$1.00

Indicator Practice and Steam Engine Economy.

By FRANK F. HEMENWAY.....\$2.00

Injector, Practice and Theory of the.

By S. L. KNEASS.....\$1.50

Instructions and Suggestions for Engineers and Firemen

Who wish to procure a license, certificate or permit to take charge of any class of steam engines or boilers, stationary, locomotive and marine.
By STEPHEN ROPER.....\$2.00

Land and Marine Engines Hand-Book of.

By STEPHEN ROPER.
Including the Modelling, Construction, Running and Management of Land and Marine Engines and Boilers. Illustrated.....\$3.50

Locomotive Engine.

By ZERAH COLBURN.
Including a description of its structure, rules for estimating its capabilities and practical observations on its construction and management. Illustrated.....\$1.00

Locomotive, Hand-Book of the.

By STEPHEN ROPER.
Including the Construction of Engines and Boilers and the Construction, Management and Running of Locomotives.....\$2.50

Marine Boiler Management and Construction.

By U. E. STROMMEYER.....\$5.00

Marine Steam Engine.

By RICHARD SENNETT.
Illustrated.....\$0.00

Marine Engines and Dredging Machinery.

By WILLIAM H. MAW.
Showing the latest and best English and American practice. Illustrated by over 150 fine steel plates of the engines of the leading screw steam-ship of England and other nations, and 1295 fine wood engravings in text. Half morocco.....\$18.00

Marine Steam Engine.

By THOS. J. MAIN AND THOS. BROWN.
Questions on subjects connected with the Marine Steam Engine.....\$1.00

Marine Steam Engine.

By THOS. J. MAIN AND THOS. BROWN.
Illustrated.....\$5.00

Mathematical Theory of the Steam Engine.

By T. BAKER.
Edited and revised by J. R. Young. With rules at length and examples worked out for the use of practical men. Illustrated.....\$0.75

Modern American Locomotive Engines, Their Design, Construction and Management.

By EMORY EDWARDS.
Illustrated.....\$2.00

Modern American Marine Engines, Boilers and Screw Propellers, Their Design and Construction.

By EMORY EDWARDS.
Illustrated by thirty large and elaborate plates of the most recent American marine engines, boilers and screw propellers.....\$5.00

Modern Steam Engines.

By JOSHUA ROSE.

Written in plain language for use in the workshop as well as in the drawing office, giving full explanations of the construction of modern steam engines, including diagrams showing their actual operation. Illustrated.....\$6.00

By N. L. C. CARNOT.
Translated by R. H. THURSTON.....\$2.00

Practical Catechism.

By ROBERT GRIMSHAW.
A Series of direct practical questions and answers on subjects connected with engineering.....\$1.25

Practical Examiner on Steam and the Steam Engine.

By WILLIAM TEMPLETON.....\$1.00

Practical Steam Engineer's Guide.

By EMORY EDWARDS.
In the Design, Construction and Management of American Stationary, Portable and Steam Fire Engines, Steam Pumps, Boilers, Injectors, Governors, Indicators, Pistons and Rings, Safety Valves and Steam Gauges. Illustrated.....\$2.50

Properties of Saturated Steam and Other Vapors, Tables of.

By CEOL H. PEABODY.....\$1.00
Illustrated.....\$1.00

Questions and Answers for Engineers.

By STEPHEN ROPER.
Contains all the questions that engineers will be asked when undergoing an examination for the purpose of procuring licenses.....\$3.00

Relative Proportions of the Steam Engine.

By WM. DENNIS MARKS.
A rational and practical discussion of the dimensions of every detail of the steam engine. Illustrated.....\$3.00

Steam Boilers, Construction and Management of

By R. ARMSTRONG.
With Appendix by Robert Mallet. Illustrated.....\$1.75

Steam Boilers; Their Defects, Management and Construction.

By R. D. MUNRO.
Illustrated.....\$1.50

Steam Boilers, A Manual of; Including their Design, Construction and Operation.

By R. H. THURSTON.
Illustrated.....\$5.00

Steam Boiler Explosions in Theory and in Practice.

By R. H. THURSTON.
Illustrated.....\$1.50

Steam Boilers, A Treatise on.

By ROBT. WILSON.
Enlarged and illustrated by J. J. Flather.....\$2.50

Steam Engine, The.

By DR. LARDNER.
For the use of beginners. Illustrated.....\$0.75

Steam Engine and the Indicator, Their Origin and Progressive Development.

By WM. B. LE VAN.
Illustrated.....\$4.00

Steam Engine, The, and Other Heat Engines.

Illustrated.....\$3.75

Steam Engine Design.

By J. M. WHITHAM.
Numerous illustrations and folding plates.....\$6.00

Steam Machinery, Elementary Lessons in.

By J. LANGMAID and H. GAINFORD.
Including the Marine Steam Engine and a short description of the Construction of a Battleship.....\$2.00

Steam Engineering, Constructive.

By J. M. WHITHAM.
Embraces Engines, Pumps and Boilers, and their accessories and appendages. Folding plates and numerous illustrations.....\$10.00

Steam-Engine Catechism.

By ROBERT GRIMSHAW.
A series of direct practical answers to direct practical questions, mainly intended for Young Engineers, and for examination questions.....\$2.00

Steam Boilers.

By JOSHUA ROSE.
Embracing in plain figures all the calculations necessary in designing and classifying steam boilers. Illustrated.....\$2.50

Steam.

By W. RIPPER.
Illustrated.....\$0.80

Steam-Engine, The.

By GEO. C. V. HOLMES.
Among the best of elementary treatises on the steam-engine. Illustrated.....\$2.00

Stationary Steam-Engines.

By R. H. THURSTON.
Especially adapted to Electric Lighting purposes. Treats of the Development of Steam Engines; the Principles of Construction and Economy, with description of Moderate-Speed and High-Speed Engines.....\$1.50

Steam-Engine, Theory of.

Translated from the fourth edition of Weisbach's Mechanics, by A. JAY DU BOIS. Containing Notes on American Practice, by R. H. BULL. Illustrated.....\$5.00

Steam Engine, Manual of the.

By ROBERT H. THURSTON.
Part I. Structure and Theory.....\$7.50
Part II. Design, Construction, Operation.....\$7.50
Two parts together.....\$12.00

Steam Boiler, The.

Its care and management, with instructions for increasing the efficiency and economy, and insuring the durability and longevity of all classes of steam boilers, stationary, locomotive, marine and portable.
By STEPHEN ROPER.....\$2.00

Twenty Years with the Indicator.

By THOMAS PRAY, JR.
A practical text-book, with no complex formulae and with many rules as to the best way to run any steam engine to get the most economic results.....\$2.50

IRON and STEEL Roofings, Etc.

ALL PATTERNS.

Terne Roofing Plates.

The Cincinnati Corrugating Co.
Box 371, PIQUA, OHIO, U. S. A.
Catalogue free on application.

The List of Books on Steam Engines and Boilers will be found in our Issue of May 30, Page 7.
" " " Mining and Metallurgy " " " " June 6, " "
" " " Chemistry " " " " " 13, " "
" " " Geology and Mineralogy " " " " " 20, " 2

The Scientific Publishing Company,
253 BROADWAY, NEW YORK.

DIRECTORY OF DEALERS IN ASSAYERS' AND CHEMISTS' SUPPLIES.

EIMER & AMEND,

205-211 Third Avenue,
New York.

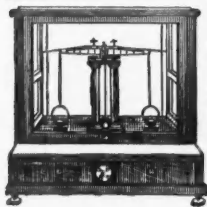


Everything necessary for the Chemist and Assayer will be furnished of best quality at reasonable prices.
Glass and metal apparatus special, made to order, according to drawings.
Glass blowing and engraving done on premises.



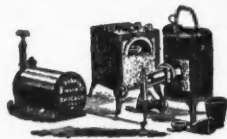
Established during the first gold discoveries in California.
JOHN TAYLOR & CO.,
INCORPORATED 1895.
63 First St., San Francisco, Cal.
Importers and Manufacturers of Assayers' Materials, Mine and Mill

Supplies, Chemicals and Chemical Glassware and Apparatus.
All articles required for a chemist, assayer and for fitting up a quartz mill. None but the best chemicals, crucibles and other appliances, such as our long experience assures us to be the best are kept in stock and all furnished at reasonable prices. Agents for the Pacific Coast of The Denver Fire Clay Co. and Morgan Crucible Co., Battersea, England.
Borax, Bone Ash, Cyanide Potass., etc., at manufacturers' prices.
Our new illustrated catalogue and assay tables sent free on application.



WM. AINSWORTH,
Manufacturer of fine Button Balances for Assayers, Repairing of all kinds of Balances, Scale Beams, Weights, Knife Edges, Agate Bearings, Riders, Pans, etc., always on hand and made to order.
2151 LAWRENCE 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.

CHEMICAL & PHYSICAL LABORATORIES

— OF —
DR. CHAS. F. MCKENNA

SUCCESSOR TO
DR. GIDEON E. MOORE
221 PEARL ST., NEW YORK.

Analyses and Assays of Ores, Metals, Waters, Fuel, Oils and Natural and Industrial Products of every description.
Tensile, Transverse and Compression Tests of Iron, Steel and other Metals and Alloys, Cements, Building Stones and Engineering Materials generally. Tests of Lubricating Value of Oils, etc., etc.

BULLOCK & CRENSHAW

528 Arch Street, Philadelphia, Pa.

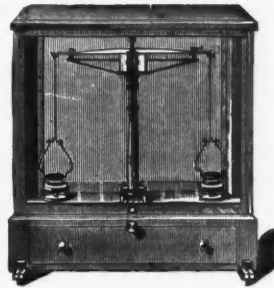


CHEMICALS and CHEMICAL APPARATUS, COMPLETE LABORATORY SUPPLIES, ASSAY OUTFITS.

Sole Agents for Dreverhoff's Filter Papers.
Agents for J. Bishop & Co.'s Platinum.
Agents for Marquart's & Schuchardt's Chemicals.

TROEMNER'S BALANCES.
Illustrated Catalogues furnished on receipt of postage, 6 cents.

HENRY HEIL CHEMICAL CO.,
ST. LOUIS, MO.



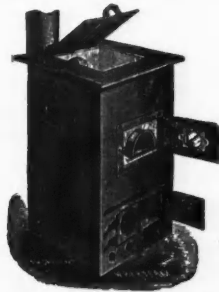
Chemical Apparatus AND Chemicals.
Agents for the United States for the celebrated Battersea Crucibles, Muffles, Etc.
Assayers' Supplies.

Oldest and Largest House in America.

E. H. SARGENT & CO.

106 and 108 Wabash Ave., Chicago.
ASSAYERS' AND CHEMISTS' SUPPLIES.

BROWN'S
ASSAY



FURNACE.

Prompt service and low prices. Satisfaction guaranteed. Publishers Brown's Manual of Assaying.

SEND FOR CATALOGUE.

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.

BAKER & ADAMSON,

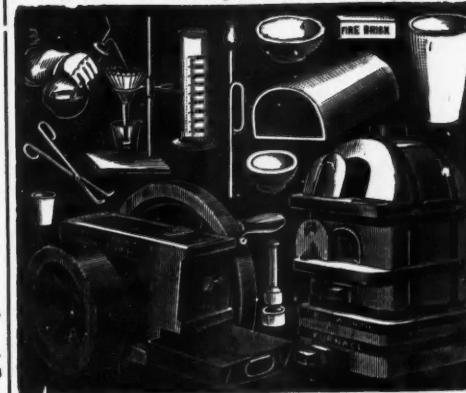
MANUFACTURERS OF
Strictly Chemical Pure Acids and Chemicals.
Washed Filter Papers for quantitative work lower in ash than any in the market.
EASTON, PENN.

FIREBRICK

Portland Cement. CRUCIBLES.

SEND FOR CATALOGUE.
Garden City Sand Co., Security Bldg., Chicago, Ill.

THE DENVER FIRE CLAY CO.
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, importers and dealers in chemicals, apparatus and assayer's supplies, fire brick and tile.
SOLE AGENTS FOR THE "AINSWORTH BALANCES."
Write for catalogues.

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. 11 MURRAY ST., NEW YORK CITY.
Illustrated Price List on Application.

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. Mints at Philadelphia, New Orleans, and U. S. Treasury Departments, Washington, etc., etc., etc.
E. H. SARGENT & CO., 106-108 Wabash Ave., Chicago, Ill., Agents.

ASSAYING.

By C. H. AARON

PART I.—Gold and Silver Ores.

2d Edition. Price \$1.00.

PARTS II. and III.—Gold and Silver Bullion, Lead, Copper, Tin, Mercury, Etc.

2d Edition. Price, \$1.75

The Scientific Publishing Co.,
253 BROADWAY, NEW YORK.

DINAS SILICA FIRE BRICKS.

TRADE MARK "ABERNANT,"
Imported and For Sale by
A. T. CHUR, Sole Agent,
No. 19 Barclay St., New York.

BRICK AND TILE MAKING MACHINERY.



E. M. FREESE & CO., GALIONO.

BAKER & CO.,

Flexible Filter Cone.



MANUFACTURERS OF

PLATINUM APPARATUS.

NEWARK, N. J.

DIRECTORY OF ENGINEERS, METALLURGISTS, CHEMISTS, ASSAYERS, ETC.

A **DAMS, W. H.,**
Mining Engineer,
18 Wall St. New York, or Mineral City Va.
Reports and Examinations on Mining Property.
Spence Furnace for Roasting, Chloridizing, etc.

A **NDERSEN, CARL,**
Mining and Metallurgical Engineer.
Expert in the Cyanide Process.
Mogollon, N. M.

A **NDERSON, ROBERT HAY,**
Mining Engineer,
13 San Juan de Letrau Mexico D. F.
Examines and Reports on Mining Properties.
Moreing & Neal's Code.

B **ALLIET, LETSON,**
Civil and Mining Engineer,
Helena, Montana
Engineering in all its branches. Consultation
and Superintendence.
Constructing Engineer in N. W. U. S. for Card
Electric Co.

B **ECKER, ARNOLD,**
Mining Engineer,
10 Annie Street, San Francisco, Cal.

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.
Apartado 809, Mexico City.
P. O. Box 71 Winston, N. C.

B **OOKS, SEND FOR THEM TO**
The Scientific Publishing Company,
Publishers and Booksellers,
Postal Telegraph Building,
253 Broadway, Main Office, Room 817, New York.
Denver, Colo., 206 Boston Building.

B **OSS, CLARENCE M.**
Mining Engineer,
Bessemer, Mich.
Inspector of mines for Gogebic County.

B **OSS, M. P.,**
Milling Engineer,
309 California Street Avenida Juarez
San Francisco, Cal. No 218 Mexico.
Improved continuous pay system.

B **RADY, SAMUEL,**
Mining Engineer,
Address P. O. Box 801 Salt Lake City Utah.
Will report on Western Mines and advise on working
of Ores. Reference: Mr. August Meyer, Pres. Con. K.
C. Smelting & R. Co., Kansas City, Mo.

B **RADLEY, FRED. W.,**
Mining Engineer,
Kellogg, Idaho.
Manager Bunker Hill & Sullivan Mining and
Concentrating Co., Wardner, Idaho; General Manager
Spanish Gold Mining Co., Washington, Nev-
ada Co., California. Cable Address: Bradley, Wardner.

B **RASCHI, VICTOR M., E. M., C. E.,**
Engineer and Contractor,
Apartado 830, City of Mexico, Mexico
Specialty: Machine Rock Drilling in all its
branches.

B **BROADWELL, EDWARD C.,**
Chemical Assayer,
2006 Champa St., Denver, Colo. Look Box 840.
No loss by fire test. Truth only. Gold, 75 cents;
gold and silver, \$1.00; gold, silver and platinum, \$1.85;
copper, lead, nickel, zinc, etc., according to difficulty of
precise determination. Tests for chlorination, cyanide or
proper method of treatment.

B **BRODIE, WALTER M.**
Mining Engineer and Metallurgist,
Care Batopilas Mining Company,
29 Broadway, New York.

B **BROWN, ROBERT GILMAN,**
Mining Engineer,
Manager Standard Cons. Mining Co.
Bodie, Mono Co., Cal.

B **BROWNE, ROSS E.,**
Consulting Engineer
in Mining and Hydraulics,
Nevada Block, San Francisco, Cal.
Special experience connected with gold-bearing
gravels, gold quartz veins, and quicksilver de-
posits; in determining values and outlining
methods of exploitation.

B **BULKLEY, FREDERICK G.,**
Mining Engineer,
Room 343, Equitable Building,
Denver, Colo.

B **BURLINGAME, E. E.**
Assay Office and Chemical Laboratory,
1736 & 1738 Lawrence Street, Denver, Colo.

C **ARPENTER, FRANKLIN R., Ph.D., E. M.**
Deadwood, South Dakota.
Specialties: Gold, including the Mining, Milling
and Smelting of its ores.
Designer and Manager of the largest pyritic
smelter ever erected.
References: {Fraser & Chalmers Co., Chicago, Ill.
Omaha & Grant Smelting Co.
Omaha, Neb.

C **ASE, WILLIAM H.,**
Mining and Civil Engineer,
Charlotte, North Carolina.
Special experience in mining large ore-bodies in
dangerous ground in the Northern and Southern
States, U. S. A.

WM. HENRY CHANDLER, WALDROW SHAPLEIGH.
C **HANDLER & SHAPLEIGH,**
Chemical Engineers and Consulting
Chemists.
Chemical Industries Investigated, New Pro-
cesses Examined, Plans and Specifications of
Works Furnished. Also Yearly Contracts for
Consultations.
Room 613 No. 44 Broadway, New York.

C **HANNING, J. PARKE,**
Engineer of Mines,
34 Bark Place, New York.
Cable Address, "Channing, New York."
Iron and Copper Mining and Exploring.

C **HASE & RANK,**
Mining Engineers and
U. S. Dep. Mining Surveyors.
Offices: {618 Mining Exchange, Denver Colo.
Central City, Colo.

C **HURCH, JOHN A.,**
Mining Engineer.
Specialist in Gold and Silver Mines.
11 William Street New York. Cable: SCOTIST.

C **LEMENT, VICTOR M.,**
Mining Engineer and Metallurgist,
Johannesburg
care Barnato Bros., Transvaal South Africa.

C **OBB & HESSELMFYER,**
Mechanical and Hydraulic Engineers,
421 Market St., Cor. First St., San Francisco, Cal.
Machinery Equipment of Mines, Development
of Water Powers, Plans, Estimates, Specifica-
tions, Supervision.

C **OLLINS, J. H., & SONS,**
Mining and Metallurgical Engineers,
Broad Street Avenue London, E. C., England.
A. L. COLLINS, Central City, Colo., U. S. A.

C **OMSTOCK, THEO. B.,**
Mining Engineer,
Prescott, Arizona.
Supt. and Consulting Engineer, Prescott Devel-
opment Syndicate, Ltd., Glasgow, Scotland.
Reports, Management, Consultation. Cable Ad-
dress: "Tibico."

C **COURTIS, WM. M., A. M.,**
Mining and Metallurgical Engineer.
449 Fourth Ave. Detroit Mich.
Open to Reports only.

C **ROZE & DENGLER,**
Consulting Mining Engineers,
711-714 Ernest-Granmer Block, Denver, Colo.
Box 1106, Cripple Creek, Colo.

D **E LA BOUGLISE, GEO.,**
Mining Engineer,
80 Rue Taitbout, Paris, France.

D **EWEE, FREDERIC P.,**
Chemist and Metallurgist,
702 Ninth Street, N. W., Washington, D. C.
Specialty: Examination, Demonstration and
Development of Patented Processes.

D **ICKERMAN, ALTON L.,**
Mining Engineer,
Colorado Springs, Colo.

E **NGELHARDT, E. C.,**
Chemist and Metallurgist,
Denver, Colo. P. O. Box 833.
Specialty: Bromination and Chlorination of Gold
Ores. Plants designed and put in operation.

E **VERETT, E.,**
Mining Engineer,
U. S. Deputy Mineral Surveyor,
Pullin Block. Cripple Creek, Colo. P. O. Box 97.

F **ARISH, WM. A.,**
Mining Engineer,
201 Mining Exchange Building, Denver, Colo.

F **OWLER, SAMUEL S.,**
Mining and Metallurgical Engineer,
Permanent Address: Room 201, 34 Clark St., Chicago, Ill.
British Columbia Investigations a Specialty.

F **REELAND, FRANCIS T.,**
Consult'g, Min'g and Mech'l Engr.
Aspen, Colo.
Gen'l Man. Isabella G. M. Co., Cripple Creek, Colo.; Aspen
Contact M. Co., Durant M. Co., etc., Aspen, Colo.

F **URMAN, H. VAN F.,**
Mining Engineer and Metallurgist,
Room 118 Boston Building, Denver, Colo.

G **IFFORD, WM. E.,**
Chemist and Metallurgist,
115 Plymouth St., Jersey City N. J.
Analyses of Ores and Investigation of Metallurgical
Processes.

H **ALSE, EDWARD,**
Mining Engineer,
Coolgardie, Western Australia.
Representing Messrs. James Bros., Mining Engineers,
Etc., Finbury House, Blomfield St., London, E. C.
Examines and Reports on Mines in Western Australia.
Cable Address: Halse, Coolgardie.
McNeill's & Moreing & Neal's Codes.

H **AMPTON, WM. HUNTLEY,**
Chemist and Mining Engineer,
Wolf Creek, Josephine County, Oregon.
Mining property examined and reported on.
Correspondence solicited.

H **ARDINGE, H. W.,**
Mining Engineer,
1752 Curtis St., P. O. Box 1446, Denver, Colo.

H **ARDMAN, JOHN E.,**
Mining Engineer,
St. George, East, Beauce Co., Quebec, Canada.
Specialty: The Mining and Milling of Gold.

H **ASTINGS, JOHN B.,**
Consulting Mining Engineer,
Boise City Idaho U. S. A.
Present Address: Rossland, British Columbia.
McNeill's Code used.

H **OGG, GEO. E.,**
Mining Engineer.
Examining Engineer for the Gold Mining Ex.,
San Francisco, Cal.
Mines Examined and Reported on.

H **UNTLEY, D. B.,**
Mining Engineer and Metallurgist,
Telluride, Colo.
Care Tom Boy Gold Mines Company.

I **HLENG, AXEL O.,**
Mining Engineer,
Carthage, Mo. (Joplin district).
Examinations and Reports on Mining Property.
Specialties: Precious Metals and Zinc and Lead.

I **HNE, DR. F. W.,**
Mining Engineer,
Consulting and Examining,
920 Medinah Building, Chicago, Ill.
Best References.

DIRECTORY OF ENGINEERS, METALLURGISTS, CHEMISTS, ASSAYERS, ETC.

L. C. PARKE, of Parke & Lacy Co., San Francisco, Cal.
 WILLIAM IRELAN, JR., Ex State Mineralogist, Ex State Engineer.
IRELAN, WILLIAM, JR.,
 Mining Engineer, Chemist, Metallurgist and Mineralogist,
 Crocker Building, San Francisco, Cal.
 Cable Address "Parlan."

JANIN, LOUIS, SR.,
 Mining Engineer,
 Pacific-Union Club, San Francisco, Cal.

JONES & JONES,
 Assayers and Chemists,
 1821 Arapahoe St., Denver Colo.
 I. M. JONES. L. J. W. JONES.

JUESSEN, EDMUND, PH.D.,
 Mining Engineer,
 Manager Idaho Co. Elk City, Idaho.
 Installation of Hydraulic Placer Mining Plants a specialty. Address:
 318 Hamden Court, Chicago, Ill.

KAUFMAN CHARLES,
 Mining and Consulting Engineer,
 St. George's Terrace, Perth, West. Australia.
 Manager West Australian Exploring and Finance Corporation, Limited.

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.

KERR, MARK B.,
 Mining Engineer (Deputy U. S. Mineral Surveyor),
 Valley Springs, Calaveras Co., Cal.
 Gold Gravel and Quartz Mines Surveyed and report made as to value.
 (S. F. address: Care Judson & Shepard, 402 Front St.)

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.
 819 Seventh Street Laramie Wyo.
 Will make examinations and report.

LANG, HERBERT,
 Mining and Smelting Engineer,
 The Albany, Oakland, California.

LAVAGNINO, G.,
 Mining Engineer,
 Cripple Creek, Colorado.

LEARNED, NEWTON, M. E.,
 Salt Lake City, Utah.
 Examination and reliable reports on Mines a specialty. References given on application.

LEGGETT, THOS. HAIGHT,
 Mining Engineer,
 P. O. Box 485,
 Johannesburg South Africa.

LIDNER, P. G.
 Mining Engineer and Metallurgist.
 69 Lexington Ave., New York.
 Specialty: Treatment of Gold Ores.

LLOYD, GEO. W.,
 Mining Engineer,
 U. S. Deputy Mineral Surveyor.
 Mines examined. Reports made.
 P. O. Box 21, Cripple Creek, Colorado.

LOWELL, S. J., & PUSHIE, J. A.,
 Mineral Experts and Consult'g Engrs.
 239 Broadway, New York.
 Examinations and Reports on Mining Properties.

J. S. LUCKRAFT. T. H. COUNTRYMAN.
LUCKRAFT & COUNTRYMAN,
 Mining Engineers and U. S. Deputy
 Mineral Surveyors,
 P. O. Box 651, Cripple Creek, Colo.

MACDONALD, BERNARD,
 Mining Engineer,
 Butte, Mont.
 Bradford McNeil's and Moreing & Neil's Codes used.

MALINS, F. A.
 Assay Office & Chemical Laboratory,
 Mines Examined and Reports Made.
 Box 212, Cripple Creek, Colo. Tel. 51.

MARINER & HOSKINS,
 Assayers and Analytical Chemists,
 81 S. Clark St., Chicago.
 Assays and analyses of ores; weighing and sampling car load lots in Chicago and vicinity.

MAYNARD, GEORGE W.,
 Consulting, Mining,
 and Metallurgical Engineer,
 Rooms 49 & 50 No. 20 Nassau Street, New York.

MERWIN & RICHARDSON,
 Experts on Southern Land Titles,
 Middlesborough, Ky.

MMILNER & BROWN,
 Assayers,
 30 North Tejon Street, Colorado Springs, Colo.
 Chemical and Mill Work.
 Mills Examined and Reported Upon.

MMIXER & DU BOIS,
 Chemists, Metallurgists and
 Economic Geologists.
 Examination of Mineral Lands and Prospects.
 Ishpeming, Mich.
 1527 No. 20th St., Philadelphia, Pa.

MMOLSON, CHARLES A.,
 Mining Engineer,
 Helena, Montana,
 Care Montana National Bank.

NNICHOLS, RALPH,
 Civil and Mining Engineer,
 De Lamar, Lincoln County, Nevada.
 Gen. Supt. De Lamar, Nev., Gold Mining Co.

NNICHOLSON, FRANK,
 Mining Engineer and Metallurgist,
 P. O. Box 615 Phenix, Arizona.
 Examines and reports on mines and mill and furnace property.

OLCOTT, FEARN & PEELE
 Mining Engineers and Metallurgists,
 18 Broadway, New York.
 Cable Address, Kramolena.

PPAGE, WM. BYRD,
 Mining Engineer,
 611 Mining Exchange Building, Denver, Colo.
 Cable Address, Page, Denver.

PPARKER, RICHARD A.,
 Consulting Mining Engineer,
 Care ENGINEERING AND MINING JOURNAL,
 253 Broadway, New York.

PPARRY, J. M. B.,
 Mining, Metallurgy,
 Aspen, Colorado.

PEARSE, ARTHUR L.,
 Consulting Mining Engineer.
 7 St. Mildred's Court, London, E.O., England.
 and 35 Wall Street, New York.
 Cable Address: "Undermined," London.
 Agents in all the principal mining centers

PPETERS, EDWARD D., JR.,
 Mining Engineer and Metallurgist.
 Percival Ave., Dorchester, Mass.
 Attends exclusively Copper Mining and Smelting.

PHILLIPS, WILLIAM B.,
 Mining Engineer and Metallurgist.
 Care Tennessee Coal, Iron and Railway Co.,
 Birmingham, Ala.
 Will report on Southern mining properties,
 technical processes and coal washing.

PPLUMMER, JOHN W.,
 Mining Engineer,
 De Lamar, Idaho.
 Manager De Lamar Mining Company, Ltd.

J. A. V. PRICE ROBERT STRAIN.
PPRICE ASSAY CO.,
 Assayers and Analytical Chemists,
 No. 20 N. Nevada Ave., P. O. Box 777,
 Colorado Springs, Colo.
 Umpire and Control Work a Specialty.

RRANDOLPH, JOHN C. F.,
 Mining Engineer and Metallurgist,
 Mills Building, 15 Broad and 35 Wall St., New York.
 Cable Address: "Rhogog," New York.

RRAYMOND, ROSSITER W.,
 Mining Engineer and Metallurgist.
 13 Burling Slip, New York. P. O. Box 223

RRICKARD, T. A.,
 Mining Engineer and Metallurgist,
 Geologist for the State of Colorado.
 608 McPhee Building, Denver, Colo.

RRIGNEY, T. P.,
 Mining Engineer,
 Cripple Creek, Colo.
 Examinations, reports and management of
 mining property.

RROBINSON, G. H.,
 Mining Engineer,
 Salt Lake City, Utah.

RROBINSON, W. S.,
 Assayer and Chemist,
 1112 Dodge Street, Omaha, Neb.

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.
 Examines and Reports on Mineral Properties.
 Advises on the Working and Management of Mines

SAVILLE, MACLYMONT & CO.,
 Mining and Consulting Engineers
 and Metallurgists,
 10 Annie Street, San Francisco, Cal.
 Examine and Report on Mines, Ore Bodies and all
 Metallurgical Processes connected therewith.

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, 253 Broadway, New York; Denver,
 Colo.: 206 Boston Building; Chicago, Ill., 737
 Monadnock Bldg.; London, 20 Bucklersbury;
 San Francisco, Cal., 12 Montgomery St.

O. F. SHATTUCK. A. L. GOETZMANN.
SSHATTUCK & GOETZMANN,
 Civil and Mining Engineers,
 U. S. Deputy Mineral Surveyors,
 336 Bennett Ave., P. O. Box 829, Cripple Creek, Colo.
 Underground Surveying a Specialty.

SSKEWES, EDWARD.
 Mining and Metallurgical Engineer,
 Cripple Creek, Colo.
 Mines Examined and Reported on.

SSPRAGUE, TIMOTHY W., S. B.,
 With CHARLES H. DAVIS,
 Consulting Engineer,
 99 Cedar St., New York, 53 State St., Boston, Mass.
 204 Walnut Pl., Philadelphia, Pa.
 Electric Power Installations for Mines,
 Reports, Specification and Supervision.

SSTOIBER, EDWARD G.,
 Mining Engineer,
 P. O. Box 129 Silverton, San Juan Co. Colo.
 Owner of Silver Lake Mines;
 Reports on San Juan County Mineral Properties.

CONTINUED ON PAGE 6.

**DIRECTORY OF ENGINEERS,
METALLURGISTS, CHEMISTS,
ASSAYERS, ETC.**
Continued from Page 6.

TATUM, L. W.
Consulting Mining Engineer and
Metallurgist,
Denver, Colo.

THIES, ADOLPH,
Mining Engineer,
Halle Gold Mine, S. C.
Specialty: Chlorination of Gold Ores.

THURSTON, E. S.,
Consulting Mining Engineer.
Care of Lounsbery & Co., 15 Broad Street, New York.

TRENT, L. C.,
Mechanical and Metallurgical
Engineer,
Salt Lake City, Utah.
Special attention given to Blast Furnace Work and
Copper Refining by the Bessemer Process. Also designs
furnished for Gold, Silver and Copper reducing ma-
chinery. Correspondence Solicited.

TUTTLE, EDGAR G., E. M.,
221 Pearl Street, New York.
Coal, Iron and Ore Mines examined, developed and
managed. References: Cambria Iron Co., and Mexican
International R. R.

TUTTLE, GEORGE R.,
Mining Engineer and Metallurgist,
320 Sansome Street, San Francisco, Cal.

UNZICKER, HERMANN,
Mechanical and Mining Engineer,
Care of Edw. P. Allis Co.,
Milwaukee, Wis.

VAN SLOOTEN, WILLIAM,
Mining Engineer and Metallurgist,
35 Wall Street, New York.

WAGONER, LUTHER,
Mining Engineer,
320 Safe Deposit Building, San Francisco, Cal.
Specialty: Gold, Silver and Coal.

WESTON, W.,
Mining Engineer,
from Royal School of Mines, London.
Cripple Creek, Colo.
20 years' experience in Colorado.
Cable Address: Souwester, Cripple Creek.

WHITELEY, ARTHUR W. B.,
Engineer of Mines,
Mine Centre, Ontario, Canada.
Address: Rainy Lake City, Minn.

WILEY, W. H.,
Mining Engineer,
Idaho Springs, Colo.

WILLS, J. LAINSON, F. C. S.,
Mining Engineer and Metallurgist,
12 Old Slip, New York.
Phosphates; Gold Ores and Reduction, Etc.

WILSON, J. HOWARD,
Assayer and Chemist,
306 Santa Fe Avenue, Pueblo, Colorado.

WOOD, HENRY E.,
Assayer,
1734 Arapahoe Street, Denver, Colo.

WOODWARD, E. C.,
Assayer and Chemist,
24 East Kiowa St., Colorado Springs, Colo.
Telephone 315.

WYATT, FRANCIS,
Consulting Analytical, and
Technical Chemist,
12 Old Slip, New York.
Advises in all branches of chemical technology.

YOUNG, J. DUNRAVEN,
Analytical Chemist and Assayer,
1760-1761 Monadnock Bld., Chicago, Ill.
Pig Iron and Steel. Gold and Silver Ores. Metal-
lurgical Products. Special Students received.

YOUNG, WM. R.,
Draughtsman,
Havemeyer Building, 26 Cortlandt Street, New York.
Mining Machinery and Mining Plants designed.
Drawings and Specifications made.

EDUCATIONAL INSTITUTIONS.

UNIVERSITY OF ARIZONA.
The Arizona School of Mines has a
well-equipped Mill and Assay Laboratory, where students
receive thoroughly practical instruction, and where ores
are tested and treated by any process in large or small
lots. Qualitative tests of minerals sent for determination
are made without charge. Special courses of instruction
are given in mineralogy, metallurgy and assaying. For
additional information address
WM. P. BLAKE, Director School of Mines, Tucson, Ariz.

**WORCESTER POLYTECHNIC IN-
STITUTE,** Worcester, Mass.
Five Courses of Study. Mechanical, Civil
and Electrical Engineering. Chemistry. General
Scientific Course. New and well-equipped labora-
tories in Mechanical and Electrical Engineering,
and in Physics and Chemistry. Large and thor-
oughly organized students' workshops. 158-page
Catalogue, showing appointments secured by
graduates, mailed free. Expenses low. 30th year
begins September 16th, 1896.
T. C. MENDENHALL, President.


CHICAGO SCHOOL OF ASSAYING.
Day and evening instruction in the assay-
ing of gold, silver, copper and lead ores, etc., to
meet the wants of miners, prospectors, and others
interested in mining. Also chemistry and chemi-
cal analysis, geology, metallurgy and blow-pipe
analysis. Special instruction for Foundrymen and
others in analysis of pig iron, steel, iron ores,
limestone and fuels.
J. DUNRAVEN YOUNG, Director,
Suite 1760-1761 Monadnock Building, Chicago, Ill.

THE LEBIGH UNIVERSITY,
South Bethlehem, Pa.
Courses in Mining Engineering and
Metallurgy; Civil, Mechanical and Electrical
Engineering; Chemistry and Architecture. Also
Classical and Literary Courses.
For further information and for Registers of the
University, address
THOMAS MESSINGER DROWN, President,
South Bethlehem, Pa.

METAL MINING

Prospecting; Coal Mining; Mechanics; Me-
chanical Drawing; Electricity; Architecture;
Architectural Drawing and Designing; Steam
Engineering—Stationary, Locomotive or Ma-
rine; Civil, Railroad, Bridge, Municipal and
Hydraulic Engineering; Plumbing; English
Branches.

A blowpiping outfit and case of
mineral specimens free to students.
Send for Free Circular and Book of
Testimonials, stating the subject you
wish to study, to
The International B. 1007
Correspondence Schools, Scranton, Pa.



ROSE POLYTECHNIC INSTITUTE,
Terre Haute, Ind.
A School of Engineering, Mechanical, Electri-
cal, Civil Engineering, Chemical courses. Well
endowed. Extensive Shops and Foundry.
Modernly equipped Laboratories in all depart-
ments. Expenses low. Address C. L. MEES, Pres.

MICHIGAN MINING SCHOOL.—A high-
grade State Technical School. Elective Sys-
tem. Gives instruction in Civil, Mechanical, Elec-
trical and Mining Engineering, Mathematics,
Physics, Chemistry, Assaying, Metallurgy, Draw-
ing, Shop Practice, Testing Materials, Designing,
Surveying, Mine Management and Accounts, Ore
Dressing, Mineralogy, Petrography and Geology.
Summer work. Instruction practical. Laborator-
ies, shops and mill well equipped. For catalogues
and information write to Dr. M. E. WADSWORTH,
Director, Houghton, Michigan.

**MASSACHUSETTS INSTITUTE OF
TECHNOLOGY,** Boston, Mass.
The regular courses in Mining Engineering and Metal-
lurgy include a thorough training in Mathematics,
Chemistry and Physics, as well as Surveying, Min-
eralogy, Lithology, Geology, Mining Engineering, Metal-
lurgy, Steam Engineering, Hydraulics and Electric
Testing with Laboratory Practice in Ore Dressing, Mill-
ing and Smelting, and with Summer Schools of Metal-
lurgy and Mining. For catalogues address Dr. HARRY
W. TYLER, Secretary.

**THE PENNSYLVANIA STATE COL-
LEGE** offers instruction in
Civil Engineering, Electrical Engineering, Me-
chanical Engineering, General Science, Agricul-
ture, Biology, Chemistry, Languages.
The School of Mines is well equipped and
located for instruction in Mine Surveying, Geol-
ogy, Mining and Metallurgy. Shops and labora-
tories for Steam Engineering, Iron Work, Elec-
tricity, Assaying, and Mills for Coal Washing and
Ore Dressing. Four-year Courses, short courses
and a twelve-week's lecture course during the
winter session. Winter session opens Jan. 8, 1896.
Tuition free, laboratory fees small, and all other
expenses light. For particulars and catalogue
address GEO. W. ATHERTON, L.L.D., President,
State College, Pa.

COLUMBIAN UNIVERSITY,
Corcoran Scientific School.
Washington, D. C.
Courses in Chemistry, Assaying, Physics, Mathe-
matics, Civil and Electrical Engineering, Archi-
tecture, Drawing, Mineralogy, Geology, Geodesy,
Astronomy, French, German, Latin and English,
leading to degrees in engineering and to bach-
elor's, master's and doctor's degrees in science
and philosophy.
Students in this school have access to the mag-
nificent collections and libraries of the United
States Government.
CHARLES E. MUNROE,
Professor Chemistry, Dean of Faculty.

The Mining Laws : Parliamentary Tactics

OF THE
Republic of Colombia.

*With a short explanation of their application
and official forms for notices, denunciations
and applications for title.*

TRANSLATED AND EDITED BY
CHAS. BULLMAN, M. E.

BOUND IN CLOTH. PRICE, \$1.50.

THE SCIENTIFIC PUBLISHING CO., 253 Broadway, New York.

Parliamentary Tactics

FOR THE USE OF THE
PRESIDING OFFICER
AND
PUBLIC SPEAKERS.

BY
HARRY W. HOOT.

PRICE, 50 CENTS.

DIRECTORY OF ENGINEERING, MINING AND SURVEYING INSTRUMENT MAKERS.

J. S. J. LALLIE, M. and M. E.
16th and Arapahoe Streets, Denver, Colo.
Engineering and Mining Instruments, Patent Reel, Long Steel Tapes, etc. Inventor and maker of Improved Current Meters, Electric and Sound Recording. Every facility for rebuilding and repairs to transits, levels, etc. Established 1888.

FAUTH & CO.,
(G. N. SAEGMULLER)
ENGINEERING AND MINING INSTRUMENTS.
WASHINGTON, D. C.
Attention is called to our newly improved Mining Transit, with best Solar Attachment. Vertical Sighting Telescope and Quick Leveling Head.

T. F. UMBACH,
61 FULTON ST., NEW YORK,
Manufacturer of Most Improved
Surveying, Engineering and
Mining Instruments.
INSTRUMENTS CAREFULLY REPAIRED.

EUGENE DIETZGEN CO., Chicago,
Importers and Manufacturers of
Surveying and Engineering
Instruments
AND
Drawing Materials.
Repairs carefully and promptly executed. Drafting Supplies of all kinds. Catalogue on application.

BUFF & BERGER,
9 Province Court, Boston, Mass.
Largest Assortment of accurate and most improved mining transits at reasonable prices.
SEND FOR CATALOGUE.

PETER HEER,
232 & 234 E. Washington St., CHICAGO, ILL.
(Formerly of HEER & SEELIG).
—Manufacturer of Highest Class—
**SURVEYING, ENGINEERING,
AND MINING INSTRUMENTS.**
Repairs carefully and promptly executed. Largest and best equipped factory in the West. Catalogue on application.

—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.

MAHN & CO.,
300-302 Oliver St., St. Louis, Mo.
MANUFACTURERS OF
Surveying, Engineering & Mining
INSTRUMENTS.
Illustrated Catalogue on application.

Transits, Levels,
Compasses, Archi-
tects', Engineers' &
Surveyors' Supplies.
Complete Catalogues on Application.
W. E. STIEREN,
544 Smithfield St., PITTSBURG, PA.

THE A. LIETZ COMPANY,
Manufacturers of Surveying, Engineering and
Mining Instruments,
422 Sacramento St., SAN FRANCISCO, CAL.
Sole Manufacturers of the New CYCLOTOMIC
Transits, Patented. Send for descriptive circular.



KEUFFEL & ESSER CO.
NEW YORK
127 Fulton & 42 Ann Sts.
BRANCHES:
111 Madison St., Chicago.
708 Locust St., St. Louis.
Drawing Materials
Surveying Instruments
The largest and best-assorted stock in this line. The most complete catalogue. All goods warranted. Catalogue on application.

A. S. ALOE COMPANY
Are Now Ready for Business with
New Fresh Goods. Largest Stock
MINING and ENGINEERING INSTRUMENTS,
DRAFTING SUPPLIES.
COMPLETE CATALOGUE. REPAIRING DONE.
ST. LOUIS, MO.

15 lines
\$73
per year.

In the Swim!

Advertisers in the
Engineering and Mining Journal.

Lead Lining for Chlorination Tubs.

Aluminum Copper, Anti-Friction Metal, Standard Babbitt Metals, Ingot Brass and Bronze.

RAYMOND LEAD COMPANY, Chicago, Ill.
Write for Prices.

SULPHURIC ACID

—MANUFACTURED BY—
The Western Chemical Co., DENVER, COLO.
For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Etc

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.



MONARCH
KING OF BICYCLES
MONARCH CYCLE MFG CO
CHICAGO
NEW YORK SAN FRANCISCO TORONTO



THE SOLVAY PROCESS COMPANY,

SYRACUSE, N. Y.,
MANUFACTURERS OF

Soda Ash Caustic Soda and Bicarbonate of Soda

By the "SOLVAY" or "AMMONIA" Process.

Soda Ash { 68 per cent....."PURE SODA."
45 "....."AMMONIA SODA."
36 "....."SODA ASH."
Caustic Soda { 80 per cent.....CAUSTIC
78 ".....CAUSTIC
74 ".....CAUSTIC
70 ".....CAUSTIC

For use in the manufacture of Glass, Paper, Soap, Soda and Crystals, Bi-carbonate and in many other industries our products are THE BEST.
Analysis of 58 Per Cent. "PURE SODA."

Iron and Alumina Oxides.....	0.025 per cent.	Carbonate of Magnesia.....	0.175 per cent
Silica.....	0.025 "	Chloride of Soda.....	0.024 "
Carbonate of Lime.....	0.404 "	CARBONATE OF SODA.....	98.467 "

Works at **GEDDES,** near Syracuse, N. Y.

Sole Agents. **WING & EVANS,** 54 William St., New York City.

MINING ENGINEERS, ASSAYERS CHEMISTS, Etc. Consult "Positions Vacant" column page 18.

Colorado Springs Mining Stock Association.

OFFICERS.—President, RICH. J. BOLLES; First Vice-President, W. P. BONRIGHT; Second Vice-President, T. C. PARRISH; Third Vice-President, CLARENCE EDSALL; Secretary and Treasurer, D. V. DONALDSON; Recording Secretary, W. Y. BRENT; Caller, J. H. HUTCHINSON; Assistant Recorder, EDWARD SMITH.

COMMITTEES

GOVERNING COMMITTEE.—W. F. Fisher, G. E. Lindley, Ward Hunt, A. E. Rope, W. A. Otis, W. S. Jackson, S. B. Dickens, J. A. Hayes, G. H. Parsons, T. C. Parrish.

LISTING COMMITTEE.—Sherwood Aldrich, J. W. Proudfit, J. H. Fitzpatrick, C. S. Sprague, J. A. Connell, W. M. Harriot, T. H. Edsall, Irving Howbert, R. J. Preston.

JUDICIAL COMMITTEE.—W. W. Williamson, T. H. Edsall, F. J. Hobbs, F. E. Brooks, E. J. Eaton.

MEMBERSHIP COMMITTEE.—C. Edsall, A. A. Carnduff, J. W. Proudfit, G. R. Buckman, H. LeB. Wills, F. H. Morley, M. Kennedy.

COMMITTEE ON ARRANGEMENTS.—D. Chisholm, G. R. Buckman, J. C. Connor, F. H. Morley, M. Kennedy.

The President is ex-officio member of all committees and Chairman of the Governing Committee.

To reach Cripple Creek, travellers should come directly to Colorado Springs (where the hotels are unexcelled), from where they can visit Cripple Creek and return the same day, or they can take a Pullman Sleeper at Colorado Springs, spend the night in the car, the day in camp, and return by Pullman. The Leading Operators in Mines and Stocks, the Leading Mining Exchange, also the offices of the Principal Mines of the Camp are located in Colorado Springs.

TIME TABLE

COLORADO MIDLAND RAILROAD (STANDARD GAUGE).

WEST BOUND, Leave—

No. 1 for Cripple Creek and Victor.....	8:00 A. M.
No. 5 for Pacific Coast and Cripple Creek.....	11:15 A. M.
No. 7 for Leadville, Cripple Creek and Aspen	11:30 P. M.

EAST BOUND, Arrive—

No. 2 from Cripple Creek.....	12:01 P. M.
No. 6 from Pacific Coast and Cripple Creek.....	6:35 P. M.
No. 8 from Aspen and Cripple Creek.....	4:15 A. M.

Nos. 7 and 8 carry Special Colorado Springs and Cripple Creek Sleepers.

Sleepers open for passengers at nine o'clock P. M.

<p>THE following firms are leading brokers, and will furnish information regarding Stocks on application :</p>	<p>SILL & SILL, Mining Stock Brokers, 28 Midland Block, Colorado Springs, Colo. Cripple Creek Stocks a specialty. Weekly market report furnished on application.</p>	<p>WILLIAM P. BONBRIGHT & CO., Bankers and Brokers, Colorado Springs, Colo. Latest information regarding Gold Mining properties furnished by wire or weekly market letter as requested.</p>	<p>RUSSELL PRENTICE, Mines and Mining Stocks, P. O. Box 420, Colorado Springs, Colo. Cripple Creek investments a specialty.</p>	<p>EDWIN ARKELL & CO. ESTABLISHED 1884.</p>
<p>ALFRED E. ROPE, JOHN J. KEY, ROPE, KEY & CO., Mining Stock Brokers, Colorado Springs. Mollie Gibson, Argentum silver stocks, Portland and Isabella gold stocks.</p>	<p>JN. W. PROUDFIT & CO., Bankers and Brokers, Mining Investments. Direct private wire to Eastern Cities. 211-213 Mining Exchange Bldg., Denver, Colo. 12 N. Tejon St., Colorado Springs, Colo.</p>	<p>W. W. WILLIAMSON, Mines & Mining Stocks. First Mortgage Loans and Investments. 24 1/2 N. Tejon St (ground floor), Colorado Springs, Colorado. Correspondence solicited. Send 10c. for Digest of United States and Colorado Mining Laws.</p>	<p>HERON BROS., Stock Brokers. References: Exchange National Bank, Colorado Springs, Colo.; First National Bank, Cripple Creek, Colo. Pamphlets, Maps and Information furnished.</p>	<p>FREYSCHLAG & CO., Mining Stock Brokers, P. O. Box 663, Colorado Springs, Colo. P. O. Box 544, Cripple Creek Colo. Information about mines and mining stocks furnished on application.</p>
<p>FRANK G. PECK, Mining Stock Broker, Colorado Springs, Colo. Reference: Either bank or business house.</p>	<p>DORSEY INVEST. CO., Colorado Springs, Colo. Capital stock, \$25,000. Correspondence solicited. H. H. Dorsey, President, Formerly Secretary Board of Trade, Colorado Springs. Thos. H. Benton, Ex-State Auditor, Nebraska. J. M. Marsh, Secretary and Treasurer. Hon. Geo. W. E. Dorsey, Vice-President, Ex-Congressman from Nebraska. W. B. Montgomery, Consulting A't'y.</p>	<p>J. W. MILLER & CO., Stock Brokers, Room 2, First National Bank Building, Colorado Springs, Colo. Mines and mining. Members Colorado Springs Mining Stock Association. P. O. Box No. 692. References: El Paso County Bank, First National Bank, Colorado Springs.</p>	<p>THE CROSBY-EHRICH INVESTMENT SYNDICATE, Gold Mines and Stocks, Colorado Springs Colo.</p>	<p>W H. MCINTYRE & CO Bankers and Brokers, Hagerman Block, Colorado Springs, Colo., Transact a general Brokerage business. Members of the Colorado Springs and Denver Mining Stock Exchanges. Cripple Creek Gold stocks a specialty. Buying and selling orders in Mining Stocks promptly executed. Highest references East and West.</p>
<p>W. J. HENDRICKSON, Mining Stock Broker, Room 25 Bank Building, Colorado Springs, Colo. Orders by mail or wire promptly executed. Cripple Creek stocks a specialty.</p>	<p>E. C. SHELDEN, Mining Stocks and Investments, 26 Midland Block, Colorado Springs, Colo. Maps, Hand Books and Weekly Stock Reports furnished at request. Reference: El Paso County Bank.</p>	<p>M. KINNEY, Broker, Rooms G and H Exchange Bank Block, Colorado Springs, Colo. P. O. Box 824. Telephone 262. Mines and mining stocks. Weekly market report sent free to any address upon application.</p>	<p>R. H. PARTRIDGE, W. B. STORER PARTRIDGE & STORER Mining Investments. Colorado Springs, Colo. Members of the Colorado Springs Mining Stock Association.</p>	<p>THE MORATH INVESTMENT CO., Mining Stock Brokers, Colorado Springs, Colo., U. S. A. Our specialty: Dividend-paying Stocks. Write for prospectus of Gold Creek Mining Co. Owns 10 claims. Ore in sight. Treasury stock, 3c. per share, ground-floor price. A sure winner: \$15 buys 500 shares, \$30 \$1,000, \$300 10,000 shares.</p>

THE COLORADO SPRINGS BOARD OF TRADE AND MINING EXCHANGE, COLORADO SPRINGS, COLORADO.

OFFICERS :

J. R. McKINNIE, President.
G. A. C. DUER, 1st Vice-Pres't.
DR. SIDNEY R. BARTLETT,
2d Vice-Pres't.
M. S. RAFIELD, Treasurer.
M. B. IRVINE, Secretary.

BOARD OF DIRECTORS :

J. R. McKINNIE, M. S. RAFIELD,
G. A. C. DUER, DR. S. R. BARTLETT,
H. E. BASSETT, WM. R. BARNES,
L. C. HALL, W. H. GOWDY,
M. B. IRVINE.

Established Rates of Commission :

Stocks selling under 1c. per share, 50 cents per thousand.
Stocks selling from 1c. to 5c., 75 cents per thousand.
Stocks selling from 5c. to 15c., one-eighth cent per share.
Stocks selling from 15c. to 35c., one-quarter cent per share.
Stocks selling from 35c. to 60c., one-half cent per share.
Stocks selling from 60c. to \$1.00, three-quarters cent per share.
Stocks selling for \$1.00 and above, one per cent. on the money.

Rule of the Board.—Any broker charging more or less than the above commissions shall be immediately expelled.

Official quotations and record of transactions furnished daily upon application. Full and accurate information regarding all Cripple Creek mines and stocks is on file with the Secretary.

“Cripple Creek up to date” and list of members furnished on application.

Do you desire to take advantage of the unprecedented opportunities presented by Cripple Creek? Put yourself in correspondence with a Broker of the Exchange. There is no safer or more attractive field to-day for the profitable employment of capital than in

The Cripple Creek Gold Stocks.

The following firms are leading Brokers, and will furnish information regarding stocks on application :

BARTLETT & CO.,
Investment Brokers,
Rooms K and L, Exchange Bank Building
Colorado Springs, Colo.
P. O. Box 267. Telephone 77.
Members Board of Trade and Mining
Stock Exchange.

G. A. C. DUER,
Mining Stock Broker,
27 Midland Block, Colorado Springs, Colo.
Telephone 261.
Member of Board of Trade and M. Exch'ge.
Latest stock quotations mailed at any
time. Best of commercial references.

EDWARD F. WELLES,
Banker and Broker,
Colorado Springs, Colo.
Ex-Pres't of the Colo. Springs Board of Trade
and Mg. Ex.; Mem. of the Denver Mg. Ex.
Highest commercial references.
Correspondence is invited and will be
promptly acknowledged.

HICKS & BENZIE,
Mining Investments,
Rooms 14, 15 and 16 Midland Block,
Colorado Springs, Colo., U. S. A.
Members Colorado Springs Board of
Trade and Mining Exchange.

L. L. JOHNSON,
Mining Stock Broker,
15 N. Tejon St. Colorado Springs, Colo.
Telephone 148.
Member Board of Trade and Mining
Exchange.
Reference: El Paso County Bank.

**THE CRIPPLE CREEK SYN-
DICATE INVESTMENT CO.,**
Incorporated.
Bankers and Brokers,
Rooms 22 and 23 First National Bank
Building, Colorado Springs, Colo.
Members Colorado Springs Board of Trade and
Mining Exchange and Chicago Mineral and
Mining Board. References: First National Bank,
El Paso County Bank, The Evening Telegraph.

C. F. KJELLANDER & CO.,
Mines and Stocks,
104 East Pike's Peak Avenue.
Cripple Creek Mining Stocks a Spe-
cialty.
Correspondence solicited.
References: Exchange Nat'l Bank.

G. W. FITTS, WM. H. FITTS, H. G. FITTS.
G. W. FITTS & SONS,
Miners and Brokers
in Mines and Cripple Creek
Gold Stocks
No. 4 S. Tejon St., Colorado Springs, Colo.
Members Board of Trade and Mining Ex-
change. Refer to First National Bank,
Colorado Springs. Telephone 256.

J. M. RILEY,
Mining Stock Broker,
104 Pike's Peak Ave., Colorado Springs,
Colo.
Write me for information and quotations.

FREDERICK B. WHITE,
Mines and Mining Stocks,
15 N. Tejon St., Colorado Springs, Colo.
Telephone: 148. Reference: El Paso
Co. Bank.
Correspondence solicited.
Cripple Creek Stocks a specialty.

JOHN S. LENTZ,
Mines and Mining Stocks,
P. O. Box 755 Colorado Springs, Colorado.
Five years' connection with Cripple
Creek district. Correspondence solic-
ited.

WEYAND BROS.,
Dealers in Mines and
Mining Stocks,
Colorado Springs, Colo.
Cripple Creek Mines and Stocks a special-
ty. Established in business in this city and
Cripple Creek since several years, and refer
to the Colorado Springs banks.
Also members of the Cripple Creek Min-
ing Stock Exchange.

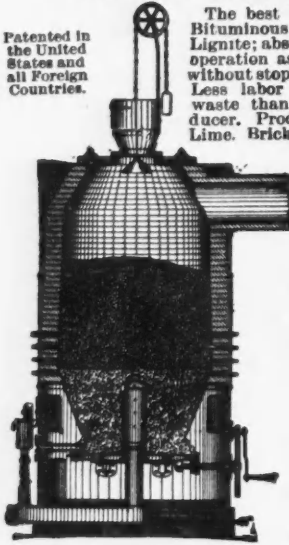
F. M. KEETH,
Mining Stock Broker,
Room 12, Midland Block,
Colorado Springs, Colo.
Cripple Creek Stocks bought and sold on
commission. Correspondence solicited. Best
of references given. Send name and address
for Book giving description of Cripple Creek
Mines and Prospects.

J. A. SPRAGUE,
116 Pike's Peak Avenue
(Ground Floor),
Colorado Springs, Colo.
Member Board of Trade. Bank refer-
ences.
If you want pointers on the best buys in
Cripple Creek stocks, whereby you
can make sure money, write to me.

RAYMOND REED & CO.,
Colorado Springs, Colo.
For latest quotations on Portland,
Summit, Union, Work, Sacramento,
Jack Pot, Dante and all Cripple Creeks,
write or wire.

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. Producer 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 Loam Castings, Special Machinery.
Water Power Pumps and Turbines.

Hydraulic, Jib and Traveling Cranes
Freight and Car Lifts Etc.,
Gas Holders and Gas Machinery.

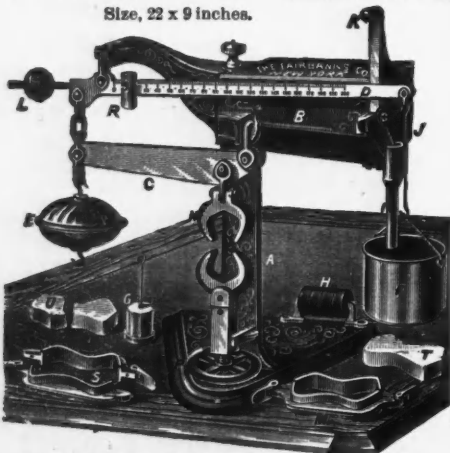
Is 30% Power Worth Saving?

The Double Pipe Air Compressor is guaranteed to save 30% in power over any other make. As a matter of fact, it saves more. It has solved the problem of cheap transmission of power. It is the best system ever devised for pumping a mine, for running an underground hoist, for running rock drills, or for distributing power from a central plant. Remember it is guaranteed to do the same work as any other make of compressor (no matter whose) on 30% less power. If your fuel costs you anything, you can't afford to run the ordinary makes of compressors, even if you can get them as a gift. The Double Pipe Compressor is cheapest to buy, cheapest to carry about and cheapest to run. It is the lightest in weight and most efficient compressor ever made. It has the same efficiency at all altitudes. It is to air compressors what the Corliss Engine was to the old slide valve. PNEUMATIC POWER COMPANY, 306 Pine street, San Francisco, Cal. It pays to save money.

Situations Wanted, 10 Cents a Line.

FAIRBANKS' Patent Automatic GEMENT TESTER.

Size, 22 x 9 inches.



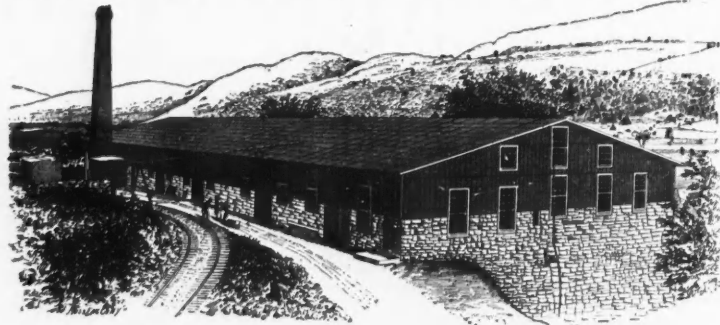
Accurate, Convenient, Compact, Automatic.
With Miller Patent Self-Adjusting Clamps.
SEND FOR CIRCULAR.

THE FAIRBANKS CO.
New York, Baltimore, New Orleans, Buffalo,
Albany Philadelphia, Pittsburg, Boston,
and London, England.

The Berlin Iron Bridge Co.

CHAS. M. JARVIS, President and Chief Engineer.
BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary.
FRANK L. WILCOX, Treasurer.
E. W. STEARNS, Chief Clerk.

Engineers, Architects and Builders of Iron and Steel Structures.



The above illustration is taken direct from a photograph, and shows the exterior of a Marble Mill, designed and built by us for The True Blue Marble Co., at Rutland, Vt. The building is built entirely of Iron and Marble, the foundations being of marble; all the supporting members of the building are made of Iron. The sides of the building are made, for a height of 10 ft., of refuse marble blocks, the balance of the covering of the sides being of corrugated iron.

Office and Works: 2 Railroad Ave., East Berlin, Conn.

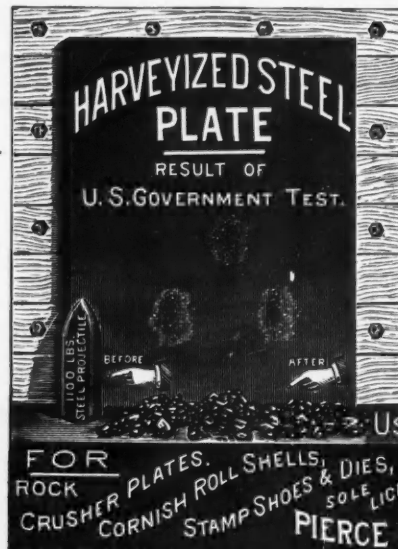
ESTABLISHED 1802.

WM. B. SCAIFE & SONS

Offices, 119 FIRST AVE., PITTSBURG, PA.
Design, Manufacture and Erect in any part of United States



IRON BUILDINGS of all descriptions.
CORRUGATED IRON. SPIRAL CONVEYORS.
WROUGHT IRON WATER PIPE.
TANK WORK A SPECIALTY.



TEST OF ARMOR PLATE
MADE UNDER
HARVEY PAT. NO. 460,262
PLATE 18 IN.
GUN, NAVY 13 IN. B.L.R.
PROJECTILE,
13 IN. ARMOR PIERCING.
WEIGHT OF PROJECTILE,
1100 LBS.
POWDER CHARGE,
489 LBS.
STRIKING VELOCITY,
1810 FT. PER SECOND.
STRIKING ENERGY,
25,000 FOOT TONS

Use HARVEY TREATED STEEL

FOR ROCK CRUSHER PLATES, CORNISH ROLL SHELLS, DIES, STAMP SHOES & DIES, SOLE LICENSED MANUFACTURERS PIERCE & MILLER ENGINEERING CO. 26 CORTLANDT ST. NEW YORK CITY

THE BETHLEHEM IRON COMPANY

SOUTH BETHLEHEM, PA.

STEEL RAILS, BILLETS and MUCK BAR, STEEL FORGINGS.

HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR
Rough, Machined or Finished Fluid Compressed Hydraulic Forged.

NEW YORK OFFICE, 100 BROADWAY
PHILADELPHIA OFFICE, 421 CHESTNUT ST
CHICAGO OFFICE, MARQUETTE BUILDING

THE PITTSBURGH BRIDGE CO., Pittsburgh, Pa.,
 Head Frames and Tipples. Steel Structural Work for Mines.

ADAMANTINE SHOES AND DIES



AND CHROME CAST STEEL
 Cams, Tappets, Bosses, Roll Shells
 and Crusher Plates.

These castings are extensively used in all the Mining States and Territories of North and South America. 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, President.
 F. E. CANDA, Vice-Pres't.
 C. J. CANDA, Secretary.
 J. G. DUNSCOMB, Treasurer.

CHROME STEEL WORKS,

Kent Ave., Keap and Hooper Sts.,
 BROOKLYN, N. Y.



SHIFFLER BRIDGE CO.,

Designers and Manufacturers of
 Steel Bridges, Viaducts, Train Sheds, Girders, Etc.
Steel Buildings a Special Department.
 Main Office and Works, 48th St. & A. V. Ry., Pittsburgh, Pa.
 Branch Offices: } 123 Betz Building, Philadelphia, Pa.
 } 48 Adams St., Chicago, Ill.
 } 225 Lumber Exchange, Minneapolis, Minn.

THE
Pratt & Whitney Co.,
 HARTFORD, CONN., U. S. A.

Manufacture Metal Working Machines and
 small Tools for repair shops of mines, railroads
 and plantations; including taps, dies, reamer
 chucks, vises, milling cutters, gauges, Renshaw's
 ratchet drills, and holders with inserted cutters,
 for use in lathes and planers for turning
 threading and forming metals.

Send for the "Miners' Catalogues."

Established
 a Century
 Ago.

JESSOP'S

THE BEST IN THE WORLD
 —FOR—

DRILLS, TOOLS, ETC.

Full Stocks Carried at all
MINING CENTRES.

Write us for your nearest point to obtain this steel.

STEEL

HIGHEST AWARD
 PARIS, 1889.
 CHICAGO 1893.

Manufactory, Sheffield, Eng. **WM. JESSOP & SONS, LTD.** Chief American Depot, 91 John St. New York.



ESTABLISHED 1865 · INCORPORATED 1889.

CRESCENT STEEL.

NEW-YORK · CHICAGO · DENVER

BEST QUALITY. / LOW PRICE.

Famous everywhere for its toughness and rock-cutting qualities.

**STEEL
 CASTINGS**

FROM 1 TO 40,000 POUNDS WEIGHT.
 Of Open Hearth, Chester or Bessemer 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.

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.



ASBESTOS PARAFFINE COMPANY,

Manufacturers of
 Asbestos Boiler and Steam Pipe Coverings, Assay, Smelting
 Furnace and Retort Cements.

(Will Stand 6,000° of heat.)

Asbestos Fire Proof and Preservative Paints, Lubricating Oils, etc.

Send for Descriptive Catalogues.

131-135 First St., San Francisco, Cal.

MANGANESE STEEL.

HARD. TOUGH. DUCTILE.

BEST MATERIAL KNOWN FOR

Wearing Parts of all kinds of Rock and Ore Crushers, Etc., Etc.

Stamp Shoes and Dies, Wheels for Mine Cars, Etc.

Outwears Chilled Iron and Steel 3 to 6 Times.

WRITE FOR PRICES AND PARTICULARS TO

TAYLOR IRON & STEEL CO., High Bridge, New Jersey

Sole Makers in America under the Hadfield System and Patents.

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, India.

PARKHURST & WILKINSON,

144 to 164 Kinzie St., CHICAGO, ILL.



Mine
 Mill and
 Smelter
 Supplies.

Wagon, Carriage and Bicycle Material.
 Tubular Barrows, Hoisting Crabs, Mining Cars, Etc.
 WRITE FOR CATALOGUE.

The American Fertilizer.

An illustrated magazine, devoted to fertilizer manu-
 facturing, phosphate mining, packing house fertilizer
 products, cotton seed meal production, fish scrap in-
 dustry, 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 per year; Foreign, \$2.50.

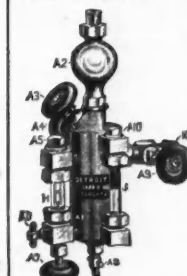
THE AMERICAN FERTILIZER,

Philadelphia, Pa.

P. O. Box 2068.

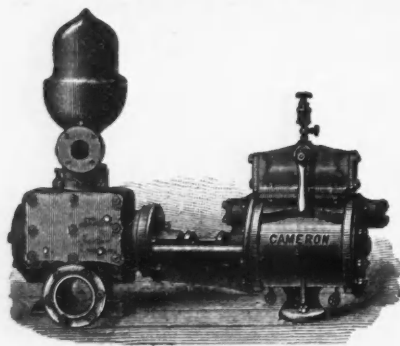
Station A.

THE DETROIT SIGHT FEED LUBRICATORS



Increase the Power,
 Prevent ruinous wear
 And Save Fuel in
 Stationary Engines,
 Hoisting Engines,
 Haulage Engines,
 Air Compressors,
 Drills and Steam Pumps.
 Send for Catalogue,
 Describing different styles.

DETROIT LUBRICATOR CO., DETROIT, MICH.

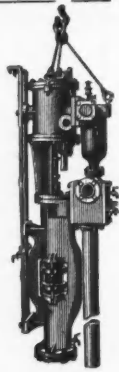


CAMERON STEAM PUMP.

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.



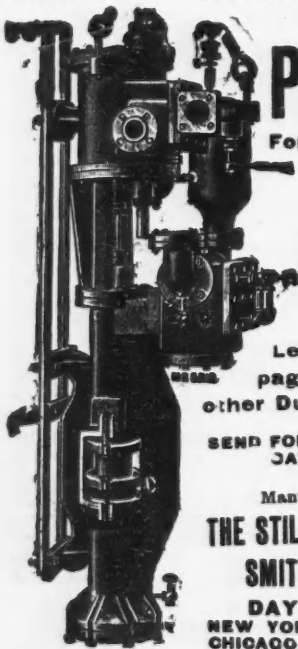
EDDY

STRAIGHT-WAY VALVES
(Brass, Iron Quick Opening)
FIRE HYDRANTS.
THE EDDY VALVE CO., Waterford, N. Y.
McMann & Taylor, 42 Cliff St., New York Agent.

WANT SITUATION?

If so, the **ENGINEERING AND MINING JOURNAL** is the recognized medium to which people turn in search for competent assistants:
Mining Engineers,
Chemists, Assayers,
Architects, Surveyors,
Draughtsmen, Etc., Etc.
Note this.

SMITH-VAILE STEAM PUMPS



For every possible duty.

The only Pumps with Patented Removable Water Cylinders and Adjustable Water Pistons.

Less Water Slippage than in any other Duplex Pump.

SEND FOR ILLUSTRATED CATALOGUE.

Manufactured by **THE STILWELL-BIERGE & SMITH-VAILE CO.**

DAYTON OHIO.
NEW YORK, 110 Liberty St.
CHICAGO, Ill., 61 Canal St.

CHAS. A. STRELINGER & CO., DETROIT, MICH., U. S. A. 123

various classes. Have sold hundreds—if not thousands—of nearly all of them, and while our line may appear limited as compared with those shown in other catalogues, they can be depended upon as being first-class in all respects.



FIG. 699. STILLSON PIPE WRENCH.

The Stillson Pipe Wrench is standard, and so well known that an extended description is unnecessary. The 24 inch and larger sizes have steel handles. The lengths as given in table below, are for Wrench with jaw extended.

Length,	6	8	10	14 in.
Takes Pipe to	2	2	1	1 1/2 "
Each,	\$1.35	1.35	1.00	2.00
Jaws,	.50	.50	.60	.75
Frames,	.20	.20	.25	.35
Nuts,	.20	.20	.35	.30

Length,	15	24	36	48 in.
Takes Pipe to	2	2 1/2	3 1/2	5 "
Each,	\$2.65	4.00	6.00	12.00
Jaws,	1.00	1.50	3.00	4.50
Frames,	.45	.50	.60	.80
Nuts,	.35	.40	.50	.65



FIG. 700. TRIM PIPE WRENCH.

The Trim Pipe Wrench was first placed on the market two or three years ago, in the form shown in No. 1, page 182, but afterwards changed as in cut shown here. It is a handsome, well-made tool, drop-forged from bar steel, all parts interchangeable, and inserted jaw is placed in handle side of wrench, which can be renewed at slight expense when dull or worn. A good many prefer it on account of the fact that it has no wooden handle.

The sizes and prices on Trim Wrenches are the same as on Stillson Wrenches shown above.

Nearly all of the Pipe Wrenches shown here, can be used on nuts, in an emer-

gency, but for obvious reasons, we do not recommend them for this class of work.



FIG. 701.

Bemis & Call Combination Wrench, Fig. 701, like the Stillson, is the pioneer of its class, and is a superior tool. It is made of the best material, and parts interchangeable. They are made with either short or long nut, but we no longer keep the short nut wrenches in stock, as the long sleeve nut is very much superior and the difference in price is comparatively small.

Length,	10	12
Takes pipe, 1/2 to 1 1/2 "		
Each,	\$1.70	1.90

Length,	15	18
Takes pipe, 3/4 to 2 1/2 "		
Each,	\$2.70	3.40

The Alligator Wrench is sold very extensively, and is particularly useful in turning pipe or round iron in narrow spaces.

No.	Each.	Length, Inches.	Holds Pipe.	Holds Rd. Iron.
1	\$0.25	5	1/2 to 1/2	1/2 to 1/2
2	.70	10	3/4 to 1	1 to 1
3	1.40	16	1 to 1 1/2	1 to 1 1/2
4	2.10	22	1 1/2 to 2	1 1/2 to 2 1/2
5	3.15	27	2 to 3	2 1/2 to 3 1/2

The Always Ready, Fig. 703 (next page), is of the Alligator Type, and the smaller sizes are very popular; is a "handy" tool, nicely finished and nickel-plated.

No.	1	2	2 1/2	3	4
Each,	\$0.45	.65	1.00	1.40	40
Length,	5	7	9 1/2	11 1/2	5

No. 4 is the same size as No. 1, but thinner.

A BOOK OF TOOLS

THE illustration given here shows a page of our "Book of Tools" reduced to one-half size. There are 550 pages and over 2,000 illustrations. Everything fully described and prices—pretty low ones, too—accompany the book.

It is altogether the most complete catalogue of Tools, Machinery and Supplies ever issued, and is indispensable to any buyer or user of these goods.

"A Book of Tools" will be sent free to any address upon receipt of 25 cents in stamps, to cover mailing expenses.

Chas. A. Strelinger & Co.

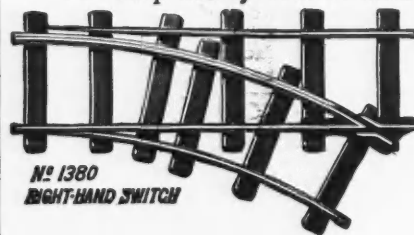
98 to 110 Bates Street,
DETROIT, MICH.

"Hunt" System of Narrow Gauge Railways.

A complete system of cars and track especially suitable for manufacturing establishments where curves of small radius are required.

A catalogue, "Industrial Railways," will be sent on receipt of address.

C. W. HUNT COMPANY,
45 BROADWAY, NEW YORK.



No. 1380
RIGHT-HAND SWITCH

WILLIAM TOD & CO.

Engineers, Founders and Machinists. Builders of Heavy Machinery for all Purposes.

THE PORTER-HAMILTON ENGINE, for Rolling Mill and Heavy Duty Work.
Reversing Engines, Blowing Engines, Water Works Pumps, Converters, Hydraulic and Other Machinery for Bessemer Plants.

WILLIAMS IMPROVED VERTICAL ENGINES

Compound and Triple Expansion, 150 Horse Power and up. For direct Electrical Work, Driving Blowers and all High Duty.

Offices and Works:
YOUNGSTOWN, O.

E. F. WILLIAMS, N. Y.,
39-41 Cortland St.

ALBERT FISHER, Chicago,
1025 Monadnock Bld'g.

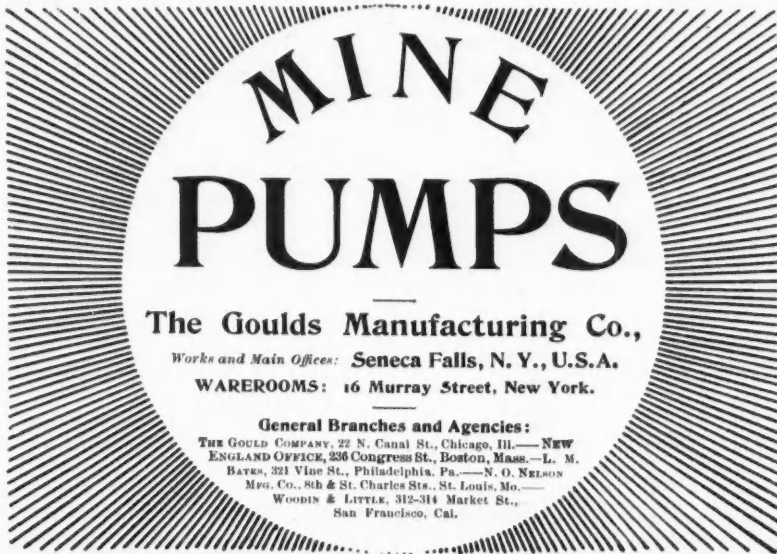
F. D. WALLAKER, Denver,
430 17th Street.

ENTERPRISE BOILER CO.,
Boilers, Tanks, Large Stacks and Plate Work. YOUNGSTOWN, OHIO

The rapidly increasing use of electricity in the mining industry makes it important

Mine Pumps.

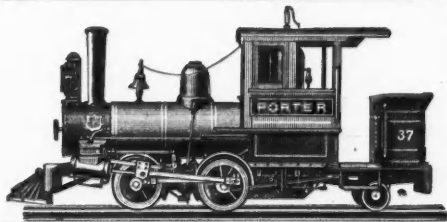
JEANESVILLE IRON WORKS, JEANESVILLE, PA.



MINE PUMPS

The Goulds Manufacturing Co.,
 Works and Main Offices: Seneca Falls, N. Y., U.S.A.
 WAREROOMS: 16 Murray Street, New York.

General Branches and Agencies:
 THE GOULD COMPANY, 22 N. Canal St., Chicago, Ill.—NEW
 ENGLAND OFFICE, 236 Congress St., Boston, Mass.—L. M.
 BATES, 321 Vine St., Philadelphia, Pa.—N. O. NELSON
 MFG. CO., 8th & St. Charles Sts., St. Louis, Mo.—
 WOODIN & LITTLE, 312-314 Market St.,
 San Francisco, Cal.



H. K. PORTER & CO. Wood Street, Pittsburg, Pa.,
 —BUILDERS OF—
**LIGHT LOCOMOTIVES,
 STEAM, COMPRESSED AIR or Electric.**
 Three to 45 tons; all gauges of track; every variety of service. Shifting and Contractors' Locomotives kept on hand. *Catalogue Mailed on Application.* Please mention this paper.

BOOKS

Those desiring to investigate any scientific or technical subject can learn which are the best books and sources of information on the same by writing to
THE SCIENTIFIC PUBLISHING CO., NEW YORK.

THE PELTON WATER WHEEL

Embracing in its variations of construction and application

THE PELTON SYSTEM OF POWER.

In simplicity of construction, absence of wearing parts, high efficiency and facility of adaptation to varying conditions of service, the **PELTON** meets more fully all requirements than any other wheel on the market. Propositions given for the development of water powers based upon direct application, or

ELECTRIC TRANSMISSION

Under any head and any requirement as to capacity.

Correspondence Invited. Catalogue Furnished upon Application. Address

PELTON WATER WHEEL CO.,

121-123 Main Street, SAN FRANCISCO, CAL., or 143 Liberty Street, NEW YORK.

TURBINE AND CASCADE WATER WHEELS

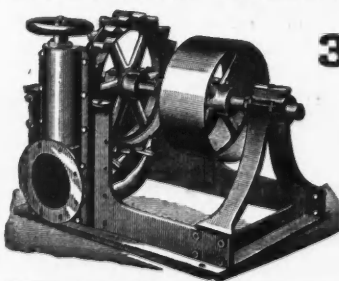
Adapted to all Heads from

3 Feet to 2000 Feet.

Our experience of 33 years building these Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for Pamphlets and write full particulars.

JAMES LEFFEL & CO.
 SPRINGFIELD OHIO, U. S. A.



EVERY VARIETY OF

PUMPING MACHINERY

CHICAGO

KNOWLES

BOSTON LONDON

STEAM PUMP WORKS

93 LIBERTY ST. NEW YORK.

AIR COMPRESSORS

OF IMPROVED DESIGNS.

"ARMS & EXPLOSIVES."

A Technical and Trade Journal. Published on the First of the Month.
 A Journal for Manufacturers of Guns, Explosives, Fuses, Etc.; for the Allied Retail Trades, and for Colliery Proprietors, Quarry Owners and Mining Engineers.
 Subscription, 7s. per annum, Post Free.
 EDITORIAL AND PUBLISHING OFFICES:
EFFINGHAM HOUSE, ARUNDEL ST., STRAND
 London, England.

'Electrical Plant & Electrical Industry.

An Illustrated Monthly Magazine and Review of Electrical Matters.
 EDITED BY H. CUTHBERT HALL.
 Published on the 1st of each month.
 Single Copies, 6d.; by Post, 8d. Annual Subscription 6s.
 Offices: 62 QUEEN VICTORIA ST., LONDON, ENGLAND

A. WYCKOFF & SON,

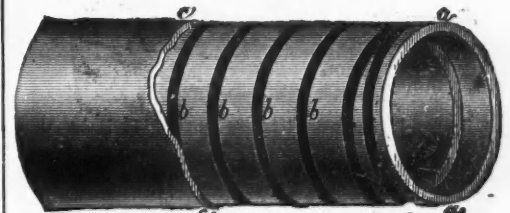
NO 110 EAST CHEMUNG PLACE,
 ELMIRA, N. Y.,

MANUFACTURERS OF
PATENT STEAM-PIPE CASING
 For Underground Steam Pipes.

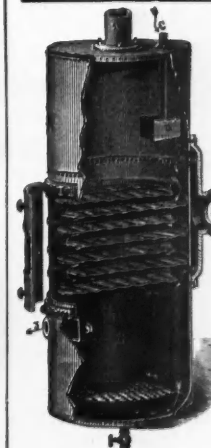


Two staves removed to show the lining between the inside and outside staves.

ALSO MANUFACTURERS OF
WOOD WATER PIPE.



FOR COAL AND IRON MINES, COKE WORKS
 AND GENERAL WATER SUPPLY.
 Send for catalogue and price lists.



STILWELL'S PATENT
 LIME-EXTRACTING
Heater and Filter
 COMBINED.

Uses Exhaust Steam. Separates the Oil from the Steam and Water. It Regulates the Feed. The Pipes Never Pound. Prevents Scale in Steam Boilers, Removing all Impurities from the Water before it enters the Boiler.

STILWELL & BIERCE
 MFG. CO.,
 DAYTON, OHIO.
 Chicago Office, 63 S. Canal St

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 St. New York.
Main Office, Atlantic Mine P. O., Houghton Co., Mich.

COPPER QUEEN CONS. MINING CO.
OF ARIZONA.
J. Douglas, President.
J. Van Vleck, Secretary and Treasurer.
Office, 99 John Street, New York City.

DETROIT COPPER MINING CO.
OF ARIZONA.
William Church, President.
Joseph Van Vleck, Secretary and Treasurer.
Office, Morenci, Arizona.

LEWISOHN BROTHERS,
P. O. Box 1247. New York City. 81 & 83 Fulton St.
SOLE SELLING AGENTS FOR
The Cherokee Lanyon Spelter Co.,
MAKERS OF THE FOLLOWING BRANDS:
C. B. S., Cherokee, Robt. Lanyon & Co.,
S. H. Lanyon & Bro., Rich Hill, Pittsburg
& St. Louis, Girard, Columbia, Scammon.

COAL PRODUCERS AND DEALERS.

STICKNEY, CONYNGHAM & CO.,
AGENTS FOR
Franklin Coal (of Lykens Valley), Susquehanna
(White and Red Ash), Kingston (White Ash),
Cameron, Shamokin, Pancoast, Wilkes-
Barre, Gaylord (White and Red
Ash), and Eureka Bituminous Coals.
1 Broadway, New York. 10 Congress St. Boston.
308 Walnut St, Philadelphia.

FREDERIC A. POTTS & CO.
WHOLESALE COAL MERCHANTS.
Old Company's Lehigh and Luzerne,
Shipped from Elizabethport, N. J.,
Wilkes-Barre and Plymouth Red Ash,
Shipped from Port Johnson, N. J.,
Jermya, from Lackawanna Region,
Shipped from Hoboken, N. J.,
Central Building, Liberty, West and
Washington Streets, New York.
OFFICES: 26 Westminister St. Providence, R. I.
116 Church St., New Haven, Conn.
26 Exchange Place, Boston, Mass.

WARD & OLYPHANT,
Delaware & Hudson Canal Co.'s Lackawanna. Also
Lehigh, Cumberland, and Clearfield.
— COAL. —
OFFICES: 21 Cortlandt Street, New York City.
30 Kilby Street, Boston, Mass.
Boston Agents, **DARROW, MANN & CO.**

J. E. KNAPP, Pres. H. B. NEDHAM, Secy. & Treas.
J. W. LOVERIDGE, Vice-President.
MARYLAND COAL CO.,
MINERS AND SHIPPERS OF
George's Creek Cumberland Coal
OF THE BEST QUALITY.
No. 1 Broadway, New York.
ROOMS 160-162, SEVENTH FLOOR.
Shipments from Baltimore, Philadelphia and
South Amboy.

CONSOLIDATION COAL COMPANY, of MARYLAND,
MINERS AND SHIPPERS OF THE SUPERIOR
"George's Creek Big-Vein Cumberland Coal,"
FOR RAILROAD, STEAMSHIP AND GENERAL USE.
Office, 44 South Street, BALTIMORE. ROUSSEL & HICKS, Sales Agents, 71 Broadway, N. Y.

CASTNER & CURRAN,

SHIPPERS OF
ECLIPSE and CAMBRIAN LEHIGH, KASKA WILLIAM Free-Burning White Ash.
General Tide-Water Agents Pocahontas Coal Co., POCAHONTAS FLAT-TOP SEMI-BITUMINOUS COAL,
of the Norfolk & Western Railroad.
322 Chestnut St. PHILADELPHIA, PA. 70 Kilby St. BOSTON, MASS.
1 Broadway. NEW YORK. 36 Main St. NORFOLK, VA.

BERWIND-WHITE COAL MINING CO.,
MINERS AND SHIPPERS OF THE
EUREKA BITUMINOUS COAL.
OFFICES: Betz Building, PHILADELPHIA. SHIPPING WHARVES:
1 Broadway, NEW YORK. PHILADELPHIA, Greenwich Point.
19 Congress St. 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.

THE WELLS LIGHT
WALLWORK & WELLS' PATENTS.



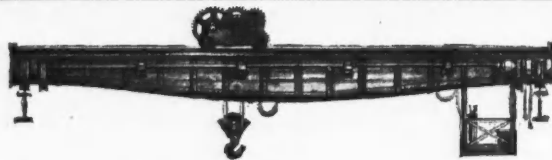
This is the **ONE** light that
will answer your needs in sud-
den emergencies, as it is

Always Ready
Portable,
Self-Contained,
Perfectly Safe,

and UNAFFECTED
by WIND or
WEATHER.

Over 10,000 in use.
800 to 4,000 Candle
Power from Oil.
400 RAILROADS and over 300 CONTRACTORS
find valuable assistance from this light.
Outdoor Night Work is its Special Feature.

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



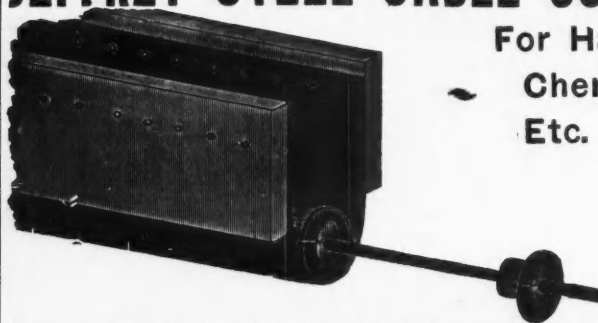
CRANES For All Purposes.

JIB OR TRAVELING, ELECTRIC, COMPRESSED AIR, HAND, Etc.
CHILLED CASTINGS, MINE CAR WHEELS, Etc.

WHITING FOUNDRY EQUIPMENT CO.,
WORKS: HARVEY, ILL. 1522 MONADNOCK BLOCK, CHICAGO

JEFFREY STEEL CABLE CONVEYORS

For Handling Coal, Ores,
Chemicals, Refuse, Etc.,
Etc.



Simple in Construction

SEND FOR CATALOGUE

THE JEFFREY MFG. CO., COLUMBUS, O.
Also, 163 WASHINGTON STREET, NEW YORK.

ALPHABETICAL INDEX TO ADVERTISERS.

(-) Indicates every other week or monthly advertisements.

Table listing advertisers alphabetically from Adams, W. H. to Zeitschrift für Praktische Geologie, with page numbers and frequency indicators.

Only 50 Cents. Lead and Zinc Mines of Missouri and Kansas. SCIENTIFIC PUB. CO. Only 50 Cents.



J. M. ALLEN, PRESIDENT.
 W. B. FRANKLIN, VICE-PRESIDENT.
 F. B. ALLEN, 2D VICE-PRESIDENT.
 J. B. PIERCE, SECRETARY AND TREASURER

For Stationary, Portable, Traction Engines, Tugboats, &c. Thoroughly Reliable - Perfectly Automatic. **JENKINS BROS.** - Selling Agents, NEW YORK, BOSTON, PHILA., CHICAGO.

"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

FOR HIGH ELEVATORS AND CRITTY MATERIAL USE LEY BUSHED CHAIN

FOR LONG CONVEYORS AND HEAVY DUTY USE "MONOBAR"

FOR LOG CAR AND LOG HAULS USE HOWE BULL CHAIN

FOR SAW DUST, SLAB AND OFFAL CONVEYORS USE NO. 550

SPROCKET WHEELS FOR ALL SIZES OF LINK-BELTING

THE ORIGINAL AND GENUINE SUPERIOR IN QUALITY AND DESIGN LARGE STOCK OF ALL SIZES

TRADE MARK

THE ONLY MANUFACTURERS HAVING COMPLETE LINE OF PLAIN AND ATTACHMENT LINKS AND SPROCKET WHEELS

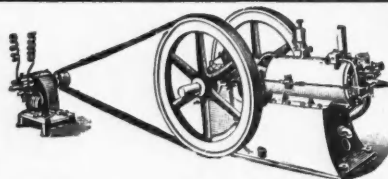
MARKET PRICES - PROMPT DELIVERY

THE LINK-BELT COMPANIES

NEW YORK. NEW ORLEANS. CHICAGO. SAN FRANCISCO. PHILADELPHIA

FROM 2 1/2 IN. TO TEN FEET IN DIAMETER

FOR ADVERTISEMENT OF **PHILADELPHIA ENGINEERING WORKS,** SEE LAST ISSUE.



CHICAGO GAS ENGINE & GASOLINE ENGINE

Used for making Electric Light or furnishing power for any purpose required. Specially adapted for electric light in private enterprises. The latest great invention of this progressive age. Built in from 2 to 50 horse power. Stationary or portable. Is the simplest power on the market. A dwarf in size; a Samson in strength. Costs but little to run it. Has no equal for even speed and durability. Send for catalogue. **J. J. NORMAN CO.** Mfrs., 49 S. Clinton St., Chicago.

W. A. CROOK & BROS.' CO. NEWARK, N. J.

MANUFACTURERS OF

HOISTING AND MINING ENGINES,

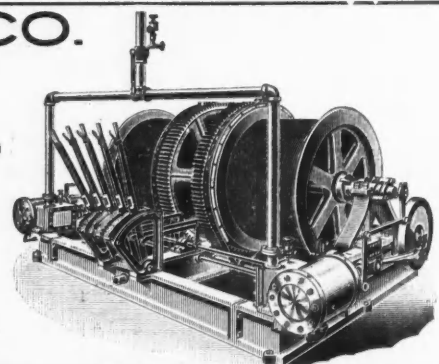
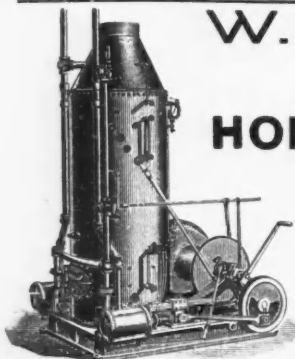
1 to 4 drums with improved patent Friction or Reversible Link motion, or both combined. Hoisting Engines specially adapted for Builders, Contractors and Engineers.

350 STYLES AND SIZES.

New York Office: 143 LIBERTY ST. Boston Office: 47 PEARL ST.

AGENTS

Pond Machine Co., Philadelphia, Pa. | L. M. Rumsey Mfg. Co., St. Louis, Mo.
 Bailey Libby Co., Charleston, S. C. | C. S. Burt Co., Ltd., New Orleans, La.
 M. C. Bullock Mfg. Co., Chicago, Ill.



HAULAGE,

HOISTING AND STATIONARY ENGINES. **ELEVATORS AND CONVEYORS** and all Mine Furnishings Complete.

Write for Catalogue. if wanted, We Send Representative | **Nelsonville Fdy. & Mach. Co** NELSONVILLE, OHIO.



THERE WAS A SCREW LOOSE SOMEWHERE. It was an advertising screw and let the

FINANCIAL.

WYOMING MINING BUREAU.
Parties wishing information concerning the geology and various mineral deposits of Wyoming can obtain the same by addressing,
E. P. SNOW, M. E.,
Laramie, Wyo.

ROSSLAND AND TRAIL CREEK MINES
COWPER, COLES & JOHNSON, Mining Brokers,
ROSSLAND, B. C.

British Columbin Mines and Mining Stocks
A. B. MACKENZIE & CO.
Offices: Rossland and New Westminster, British Col.

E. R. GRANT,
Mining Stock Broker,
57 Broadway New York.
Member Consolidated Exchange. Orders executed in New York, San Francisco, Boston, Philadelphia, Deadwood, S. D. Denver, Salt Lake City.

ANDREW MAYER,
10 WALL STREET, NEW YORK.
Investments. Street Railways.
Loans on Collateral. Electric Light Plants.
Commercial Paper. Gas and Water Stocks
Capital Procured. Constructed and Reorganized.
Correspondence Solicited.

SAMUEL WHITE,
Mining Broker,
60 Broadway, New York
Orders executed for all Mining Shares in United States and Europe.
Quotations furnished on application. Properties negotiated.

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, \$204,638,783.96.

SELDENS' PATENT PACKINGS,
with Either Rubber or Canvas Core
For Piston Rods, Plungers
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.

If you want to buy or sell a Mine, Mining Properties or Mineral Lands, it will be to your advantage to correspond with or consult

E. N. BREITUNG
Marquette, Mich., U. S. A.
Operator and Dealer in Mines, Mining Properties and Mineral Lands.
Mining Stocks, Bonds, Options, Leases, Contracts and Securities.
Money Loaned on bona-fide Mines.
Will Examine on reasonable terms all kinds of Mines, Mining Properties and Mineral Lands as to their value, method of working and the condition of their titles.
Will give Options, Leases, Bonds and Contracts on all kinds of Mines, Mining Properties and Mineral Lands.
Assay and Chemical Work done on reasonable terms.
Have best of Bank and other References. Use McNeill's or A B C Telegraphic Codes.
DO ALL OUR OWN EXPERT AND CHEMICAL WORK.

HAMERSLEY, HAMILTON & LE MAISTRE,
Solicitors, Notaries, Etc.,
At Rossland, Trail and Vancouver, British Columbia.

CRIPPLE CREEK MINING PROPERTIES and Mining Stocks. Member of Colorado Springs and Cripple Creek Exchanges. Six months spent among the mines. Before purchasing write for opinion to **L. W. HODGINS,** 116 Pike's Peak Avenue, Colorado Springs, Colo.

ALFRED E. ROPE. **JOHN J. KEY.**
ROPE, KEY & CO., Bankers and Brokers,
Colorado Springs, Colo.
Members of the Colo. Springs Mining Stock Ass'n.

Mines in Cripple Creek at Bedrock Prices. Mining Companies organized. Address,
L. E. SHERMAN
Mineral, Land and Patent Attorney.
Exchange Block, Colorado Springs, Col.

N. LEIPHEIMER,
Banker and Broker,
Member of Colorado Springs and Denver Mining Stock Exchanges,
COLORADO SPRINGS, COLO.
Cipher Code and weekly letter sent on application. First-class New York References.

C. H. SMITH & CO.,
Stock Brokers,
216 and 217 Carter Building,
7 Water Street, Boston, Mass.

THE STATE TRUST CO.,

36 WALL STREET.
Capital and Surplus, \$1,800,000.
Acts as Trustee, Registrar, Transfer and Fiscal Agent of Corporations, and as Executor, Administrator, Trustee, Guardian and Committee of Estates. Takes full charge of Real and Personal Estates. Interest allowed on deposits.
FRANCIS S. BANGS, President.
W. L. TRENHOLM, } Vice-Presidents.
W. A. NASH, }
JOHN Q. ADAMS, Secretary.
MAURICE S. DECKER, Treasurer.

TRUSTEES:
Willis S. Paine, Henry Steers.
Henry H. Cook, George W. Quintard,
Charles R. Flint, Forrest H. Parker,
W. L. Trenholm, Charles Scribner,
William B. Kendall, Charles L. Tiffany,
Walter S. Johnston, George W. White,
Joseph N. Hallock, Percival Knauth,
Edwin A. McAlpin, John Q. Adams,
Andrew Mills, Francis S. Bangs,
William A. Nash, Thomas Lynde Stetson,
George Foster Peabody, Thomas A. McIntyre,
J. D. Prubst, Edward E. Poor.

L. R. DECKER, C. E., A. M.,
Engineer and Attorney.
Investments made, mineral patents secured, examinations made.
Office: Room 24 Midland Block, Colorado Springs, Colo.

If you want Mines Leases, Bonds or Mining Stocks, write to
CHAS. N. MILLER & CO., Mining and Stock Brokers.
Members of Cripple Creek Gold Stock Exchange,
212 Bennett Ave., Cripple Creek, Colo.
We have been connected with the district for years, and can give customers the advantage of a personal knowledge of every legitimate proposition in the district.
Send for weekly market letter.
Send 10c. in stamps for booklet on Cripple Creek Stock

CLINTON S. FLETCHER & CO.,
Investment, Real Estate, Mine and Mining Brokers,
Members of the Gold Mining Stock Exchange,
Cripple Creek, Colorado, U. S. A.
WE SOLICIT YOUR CORRESPONDENCE.
References furnished on request.

BROKERS IRON & STEEL. ESTABLISHED 1885.
CRANDELL and HUFF,
MINES and MINING STOCKS.
CHOICE MINING PROPOSITIONS
now on hand, of which we will gladly furnish any desired information. Correspondence Solicited.
626 and 627 Mining Exchange,
DENVER, COLORADO, U. S. A.

GOLD

The Mine.

THE HOMESTAKE,
THE HIGHLAND,
THE DEADWOOD TERRA,
LEAD, SOUTH DAKOTA.
THE ANACONDA,
BUTTE, MONTANA.
THE INDEPENDENCE,
VICTOR, COLORADO.

SILVER

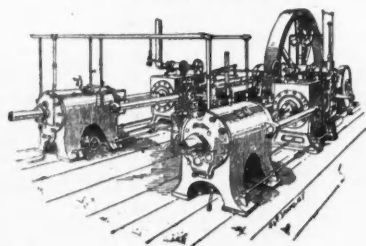
The Production and Dividends.

\$9,993,168 dividend increased from 15 per cent. to 25 per cent. per month.
110,000,000 lbs. Copper.
3,150,000 ozs. Silver.
\$2,000,000 in Gold.

COPPER.

Machinery.

INGERSOLL-SERGEANT
2 Corliss Compressors.
63 Rock Drills.
9 Air Compressors.
200 Rock Drills.
Class "A" Compressor and Rock Drills.



Prosperity and High-Grade Machinery go hand in hand.

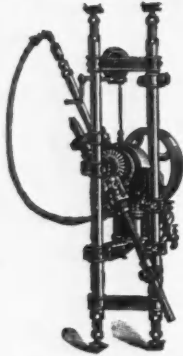


Havemeyer Bldg., 26 Cortlandt St., NEW YORK

Air Compressors, Rock Drills, Channelers, Mining Machinery.

Latest Books on Mining, Metallurey, Chemistry, Etc. Etc. can be found on Page 2.

SULLIVAN DIAMOND PROSPECTING DRILLS.



THE MOST SIMPLE. THE MOST RAPID. THE MOST ACCURATE. THE MOST ECONOMICAL INCARBON.
Adapted to HARD or SOFT ROCK, Removing a SOLID CORE.

<p>PROSPECTING MACHINERY. SULLIVAN DIAMOND DRILLS OPERATED BY Hand Power, Horse Power Steam, Compressed Air or ELECTRICITY. SEND FOR CATALOGUE.</p>	<p>MINING MACHINERY. Stanley Entry-Driving Machine For Rapid and Economical Entry Driving in Coal Mines. MITCHELL COAL TIPPLE Automatic and of High Capacity.</p>	<p>QUARRYING MACHINERY. SULLIVAN CHANNELERS & GADGERS Quarrying and Stone- Working Machinery. SEND FOR CATALOGUE.</p>
---	---	--

SULLIVAN MACHINERY CO.,

Cable Address, "Diamond, Chicago."
A. B. C. Code—4th London Edition.

54 to 60 North Clinton Street,
CHICAGO, ILL., U. S. A

"E" Drill—Capacity
400 ft.—Friction
Feed.

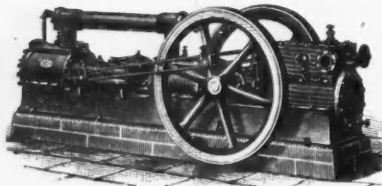
WESTERN OFFICE:
Cor. 18th and Market Sts.,
DENVER, COLO.

NEW YORK OFFICE:
18 BROADWAY.

H. P. SIMPSON, Successor to Simpson & Watkins,
Agent for Pennsylvania. SCRANTON, PA.

THE NORWALK AIR COMPRESSOR

OF STANDARD PATTERN



is built with Tandem Compound Air Cylinders Corliss Air Valves on the intake cylinders insure small clearance spaces. The Intercooler between the cylinders saves power by removing the heat of compression before the work is done, not after, and the compressing is all done by a straight pull and push on a continuous piston rod. The Compressor is self-contained; the repair bills are reduced

to a minimum, and the machine is economical and efficient. Special machines for high pressure and for liquefying gases.

A Catalogue explaining many points of superiority is sent free to business men and Engineers who apply to . . .

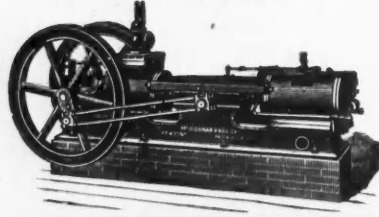
THE NORWALK IRON WORKS COMPANY,
SOUTH NORWALK, CONN.



LATEST IMPROVEMENTS IN
ROCK DRILLS and
AIR COMPRESSORS
Mining and Quarrying
Machinery.

McKiernan Drill Co.,
126 Liberty St., New York.

WORKS: PATERSON, N. J.



THE WORLD AROUND THERE IS NOTHING EQUAL TO THE

FRUE VANNER IMPROVED CONCENTRATOR

IT HAS GREATER CAPACITY THAN TWO REGULAR STYLE VANNERS CAPABLE OF TREATING THE PULP FROM FIVE STAMPS (10 TO 15 TONS) DAILY.

WITH IMPROVED FORM OF BELT.

Patented April 27th, 1880; Sept. 18th, 1883; July 24th, 1888; March 1st, 1891.
For information, pamphlets, circulars, or testimonials, address Manufacturers.

FRASER & CHALMERS,
FULTON & UNION STS., CHICAGO, ILL.
OR AGENTS AT BRANCH OFFICES:
NEW YORK: 80 BROADWAY. SALT LAKE CITY, UTAH: 109 E. THIRD SOUTH ST.
CITY OF MEXICO, MEXICO. SPOKANE, WASH. EL PASO, TEXAS. DENVER, COLO.
JOHANNESBURG, TRANSVAAL, SOUTH AFRICA. HELENA, MONT.
TOKIO, JAPAN, 18 GINZA BANGHOM.

NEW YORK DIAMOND DRILL COMPANY,
LEWIS F. BOSTELMANN, Manager,
474 West Broadway, New York.
DIAMOND CORE DRILLS

For Prospecting, Tunneling, Well Boring Sinking
Shafts, Etc.

DIAMONDS, CARBON AND BORT.

Book Buyers, Attention!

SEE ANNOUNCEMENT ON PAGE 7.

VICTOR BISHOP & CO.

ESTABLISHED 1837.

21 Maiden Lane,
New York.
CARBONS
FOR
Diamond Drills

And all other Mechanical Purposes.

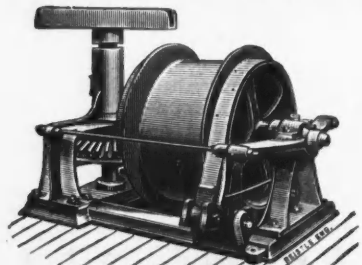
THEODOR LEXOW,
195 BROADWAY, NEW YORK.
(Western Union Building.)

—IMPORTER OF—

CARBONS

FOR
DIAMOND DRILLS
and all Mechanical Purposes.
HENRY DEMMERT.

THE DAVIS SAFETY BRAKE HORSE HOISTER



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.

SEND FOR CATALOGUE.

THE F. M. DAVIS IRON WORKS CO., Denver, Colo.

WM. B. POLLOCK & CO.,

YOUNGSTOWN, OHIO.

... OUR SPECIALTIES ARE ...
 Blast Furnaces, Copper Furnaces,
 Steel Mixers, Galvanizing Pots,
 Ladles, Converters, Tanks.

KENDALL GOLD AND SILVER EXTRACTION CO.

THE KENDALL PROCESS is the most efficient method of using cyanide for the extraction of precious metals from their ores; wherever this process has been adopted the result has been increased percentages of values recovered and saving of time; material reduction in consumption of chemical has also been demonstrated with respect to several classes of ores.

The Kendall system is covered by patents which this company will defend.

The American Cyanide Gold and Silver Recovery Co., organized in Denver more than a year ago to introduce and operate the Kendall Process in several States, have closed contracts with some ten mines for the use of this process after exhaustive comparative tests with the ordinary plain cyanide method.

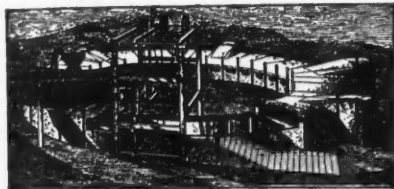
Capt. De la Mar has adopted the process at his Nevada mines, where a 250-ton plant is being completed. He writes that he is saving 95 per cent. of his gold values, and regards the Kendall Process as the cheapest and best he is aware of for the treatment of gold ores.

All ores, without exception, amenable to cyanide treatment, can be treated to better advantage by the Kendall Process; this can be accepted as an axiom.

Owners of mines and reduction works can obtain full information on application to
KENDALL GOLD AND SILVER EXTRACTION CO., 47 Broadway, New York City.

HORACE F. BROWN, CONSULTING ENGINEER, MINES

MINING and REDUCTION OF ORES



PATENTEE OF
 Brown's Complete Automatic Mill Process.
 Brown's Horseshoe Roasting Furnace.
 Brown's Chloridizing Furnace.
 Brown's Cooling and Conveying Hearth.
 Brown's Pulp Distributor for Leaching.
 Brown-Decamp Condensing Chambers.
 Will Examine Mines for Purchasers, Test Processes, Prepare Plans and Supervise Construction.
1607-08 MANHATTAN BUILDING, CHICAGO, ILL.

MECKLENBURG IRON WORKS,

CHARLOTTE, N. C.,

BUILDERS OF THE

ONLY SUCCESSFUL PLANT

FOR THE

TREATMENT OF SOUTHERN GOLD-BEARING SULPHURETS

PARTICULARS FURNISHED ON APPLICATION.

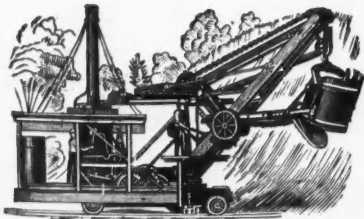
BUCYRUS STEAM SHOVEL & DREDGE CO.

JOHN S. GEORGE & HOWARD P. EELLS, Receivers.

STEAM SHOVELS. Five sizes for every purpose. Standard Railroad Shovels, Special Shovels to order.
DREDGING MACHINES. More than 20 sizes in all types. Dipper, Elevator Hydraulic, to suit any requirements.
GOLD SAVING MACHINERY. For Placer Mining. With steam shovels and appliances for disposal of tailings.
CENTRIFUGAL DREDGING PUMPS. 6 inch to 36 inch. With either Simple, Compound or Triple Engines.
WRECKING CRANES. Hand or Steam, 5 to 35 tons capacity. Also Locomotive Cranes and Pile-Drivers.
SOUTH MILWAUKEE, WIS.

JOHN SOUTHER & CO.,

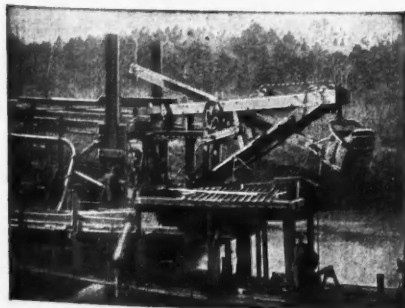
BOSTON, MASS., U. S. A.



STANDARD GRAVEL AND HARD PAN
STEAM SHOVELS

—FOR—

Open Mining Excavations and Loading Ores.



THE MARION STEAM SHOVEL COMPANY,

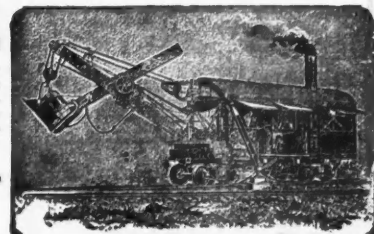
—MANUFACTURERS OF—

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.

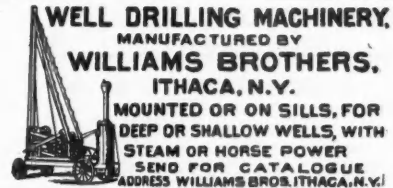


LOSSES IN GOLD AMALGAMATION.

By McDermott and Duffield.

Second Edition, \$2.00.

SPON & CHAMBERLAIN, Publishers,
 12 Cortlandt St., New York.



WELL DRILLING MACHINERY,
 MANUFACTURED BY
WILLIAMS BROTHERS,
 ITHACA, N.Y.

MOUNTED OR ON SILLS, FOR
 DEEP OR SHALLOW WELLS, WITH
 STEAM OR HORSE POWER
 SEND FOR CATALOGUE
 ADDRESS WILLIAMS BROS. ITHACA, N.Y.

THE DAVIS-COLBY ORE-ROASTERS

For Desulphurizing Iron and Copper Ores, Calcining Carbonates, Eliminating Moisture and Combined Water from Limonites, Bauxites, Etc., Burning Lime and Cement, Drying Phosphates, Clays, Etc.

Secured by U. S. and Foreign Patents.

Address

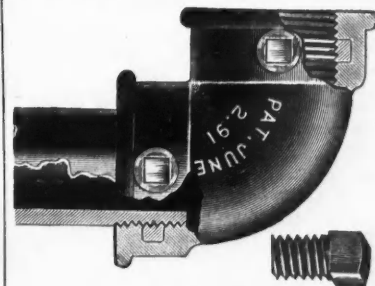
THE DAVIS-COLBY ORE-ROASTER CO.

O. W. DAVIS, Jr., President,
 MIDDLEBOROUGH, KY. U. S. A.

155-157 Bank Street, New York.

TIGHT JOINT COMPANY,

NEVER LEAK.



HIGH PRESSURE FITTINGS for
 Compressed Air and Hydraulic
 Systems.

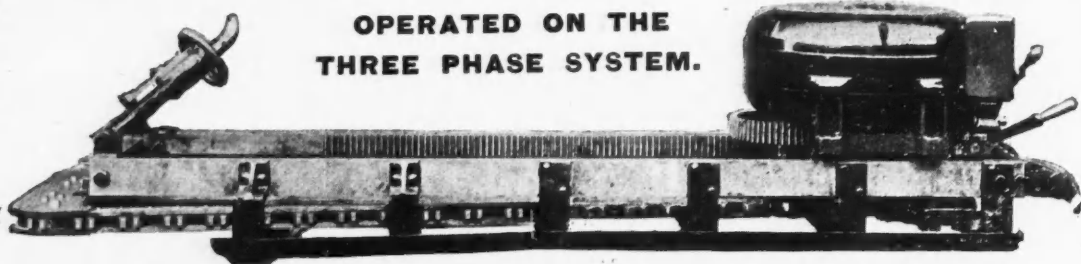
TIGHT JOINT FITTINGS

ELECTRIC COAL CUTTERS.

THE MOST
EFFICIENT
AND
DURABLE.

MOTOR
COMPLETELY
ENCLOSED.

OPERATED ON THE
THREE PHASE SYSTEM.



CANNOT
BURN
OUT.

Write for
Particulars.

NO BRUSHES—NO CUMMUTATOR—NO SPARKING.

NO TIME WASTED IN FIXING COMMUTATOR AND BRUSHES: MORE CUTTING ACCOMPLISHED PER SHIFT.

GENERAL ELECTRIC COMPANY.

MAIN OFFICE: SCHENECTADY, N. Y.

Sales Offices in all large cities in the United States.

ELECTRIC ROCK DRILLS

ELECTRIC PERCUSSION DRILLS AND DYNAMOS.

POWERFUL,
DURABLE,
ECONOMICAL.
The Simplest Machine Ever
Made for Drilling Rock.
No Expert Help Required.
Repairs Reduced.
Power Saved.

**MARVIN ELECTRIC
DRILL CO.,** CANASTOTA,
NEW YORK.

Efficiency Unimpaired by Wear.

NO CLOSE FITTING.
NO VALVES
NO LEAKING PIPE.
Save your Hose Bill.
No Freezing Up.
No Excessive Heat.
Unaffected by Altitude,
Temperature or Moisture.

THE MISSING LINK IN ELECTRICAL MINE EQUIPMENT SUPPLIED. © WRITE FOR ILLUSTRATED CATALOGUE.

"WOOD" SYSTEMS of LIGHTING and POWER

are acknowledged to lead in efficiency, workmanship and design.
Our systems are complete in every detail. Send for our new
illustrated catalogue.

FORT WAYNE ELECTRIC CORPORATION, - - Fort Wayne, Indiana.

Branch Offices in all principal cities.

NEW YORK BELTING & PACKING CO. LTD.

JOHN H. CHEEVER, PRESIDENT,

25 Park Row,
NEW YORK.



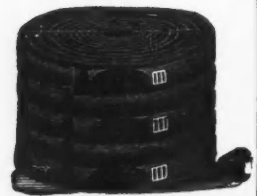
OLDEST AND LARGEST MANUFACTURERS IN THE U. S. A. OF
VULCANIZED RUBBER FABRICS FOR MECHANICAL PURPOSES.

**RUBBER (SMOOTH
FACED) BELTING,**

For Use in Gold and Silver Reduction Works, Quartz Mills and Mining Machinery
Rubber Steam and Water Hose for Mines, Mills and Smelters.

ROCK DRILL HOSE. RUBBER CEMENT.

SALESROOMS: Chicago, W. D. Allen & Co.; St. Louis, N. Y. Belting & Pack-
ing Co., Ltd.; Minneapolis, W. S. Nott & Co.; Denver, Hendrie & Bolthoff Mfg.
Co.; Butte, Tuttle Mfg. & Supply Co.; Helena, A. M. Holter Hardware Co.; San
Francisco, N. Y. Belting & Packing Co., Ltd.



THE CARD ELECTRIC COMPANY,

Office and Works: MANSFIELD, OHIO.

MANUFACTURERS OF

Multipolar Slow Speed **DYNAMOS AND MOTORS**

FOR ISOLATED LIGHTING AND POWER TRANSMISSION.

MINES, COTTON MILLS, ROLLING MILLS and FACTORIES EQUIPPED.

SPECIAL REVERSIBLE MOTORS for Operating Bending Rolls, Traveling Cranes and Bridges.

WRITE FOR ESTIMATES.

Westinghouse Electric & Manufacturing Comp'y,

PITTSBURGH, PA.

THE MOST MODERN MINING EQUIPMENT

... IS THE ...

Tesla Polyphase Alternating System of Electrical Transmission.

Current for Mining Locomotives, Incandescent Lights, Arc Lights and Power supplied from the same circuits.

NEW YORK, 120 Broadway.

BOSTON, Exchange Building.

CHICAGO, New York Life Building.

TACOMA, WASH., 102 S. 10th Street.

PITTSBURGH, Westinghouse Building.

BUFFALO, Erie County Bank Building.

PHILADELPHIA, Girard Building.

ST. LOUIS, American Central Building.

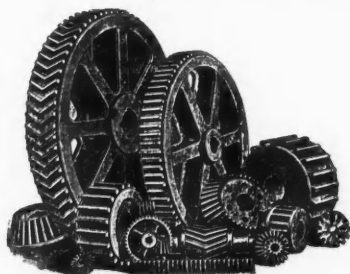
CHARLOTTE, N. C., 36-38 College St.

SYRACUSE, N. Y., Bastable Building.

SAN FRANCISCO, Mills Building.

WASHINGTON, D. C., 1333 F. St., N.

For Canada Address: AHEARN & SOPER, Ottawa, Canada.



WALKER COMPANY,

CLEVELAND, OHIO.

High-Grade Electric Machinery, Mining, Railway and Lighting,
Long-Distance Power Transmission.

Estimates Cheerfully Furnished.

ESTIMATES GIVEN ON ALL KINDS OF HEAVY MACHINERY and Castings.

The Best Equipped Foundry and Machine Shop in America for Heavy Work.

THE CONNERSVILLE BLOWER COMPANY,

CONNERSVILLE, IND.,

MANUFACTURERS OF THE

"Cycloidal" Positive Pressure Blower.

ESPECIALLY ADAPTED TO SMELTING WORK.

CORRESPONDENCE INVITED.

LIDGERWOOD CABLEWAYS

HOIST AND CONVEY LOADS UP TO 20 TONS
— SPANS UP TO 2,000 FEET. —

FOR OPEN PIT MINING, QUARRYING, ETC.



LIDGERWOOD CABLEWAY, AUSTIN DAM—1,350 feet span.

SEND FOR BOOK,
"CABLEWAY SKETCHES."

LIDGERWOOD MFC. CO., 96 Liberty St., New York.

WEBSTER, CAMP & LANE MACHINE CO..

MANUFACTURERS OF

MINING MACHINERY.

Improved Band Friction Hoisting Machinery, Geared or Direct Acting
FOR ROUND OR FLAT ROPE.

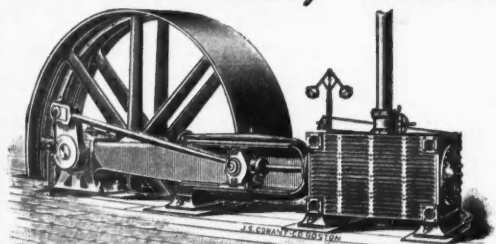
WIRE ROPE HAULAGE MACHINERY

(ENDLESS OR TAIL ROPE SYSTEMS).

AKRON CORLISS ENGINES.

Boilers, Cages, Sheaves, Buckets, etc.

AKRON, OHIO, U. S. A.

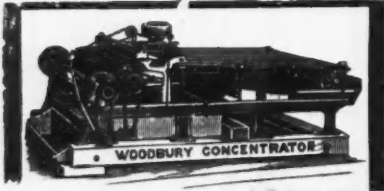


CABLE ADDRESS: WEBCAMPCO, AKRON—A. B. C. Code, 4th Edition.

HENDRIE & BOLTHOFF MFG. CO.,

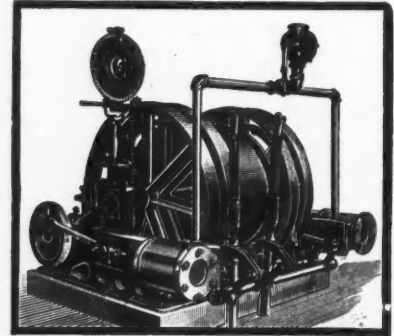
DENVER, COLORADO.

Woodbury Concentrator, First Prize Chicago and San Francisco Fairs.
 Bolthoff's Patent Gold Stamp Mills, Portable and Stationary.
 Bolthoff's Patent Friction Hoisting Engines, with Bolthoff's
 Patent Automatic Signal Alarm Indicator.
 Gilpin County Gilt Edge Concentrators.
 Sample Grinding Mills. Automatic Ore Cars.



Keeps Largest Stock of Mining and Milling
 Machinery and Supplies in the West.

ESTABLISHED IN COLORADO 1862



Manufacturing and Consulting Engineers.

CONTRACT TO DESIGN, ERECT AND OPERATE THE MOST MODERN
 SMELTING, MINING, MILLING, CONCENTRATING and ELECTRICAL
 PLANTS.



DENVER ENGINEERING WORKS COMPANY,

THIRTIETH and BLAKE STREETS, DENVER, COLO.

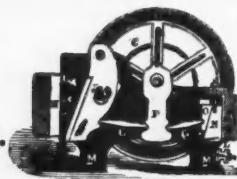
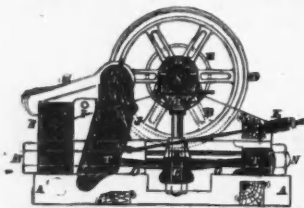
BLAKE PATENT STONE BREAKERS.

ALL STYLES AND SIZES.

MULTIPLE JAW CRUSHERS
 FOR FINE CRUSHING.

PIG IRON BREAKERS.

THEO. A. BLAKE, New Haven, Conn.



THE DENVER
 MINING MACHINERY COMPANY,
 1723 WAZEE STREET, DENVER, COLO.
 Dealers in New and Second-Hand Mining and Milling
 Machinery. Branches: Warren Ave.,
 Cripple Creek; East 2d St., Leadville.

The Denver Boiler and Sheet Iron Works Co.
 DENVER, COLORADO.

Manufacturers of Steam Boilers, Steel Water Jackets, Ore Cars,
 Buckets and Sheet Iron Work of all kinds. C. H. SHAW, Presk.

Samuel L. Moore & Son's Co.

Established 1854. Incorporated 1886.

Machine Shop & Foundry,

Elizabethport and Centreville,
 NEW JERSEY.

RAILROAD CASTINGS

A SPECIALTY.

Full Line of Patterns for
 COPPER and ZINC SMELTING FURNACES
 CHEMICAL WORKS, SULPHURIC, NITRIC
 and MURIATIC ACID PLANTS.

PYRITES BURNERS: either Large
 Ore or Fines.

Improved Regulus Metal
 Valve for Acid.

Steam Engines, Shafting, Pulleys, Mill
 Gearing and Crushers, Dick's Punches
 and Shears, and all kinds of Machinery
 built at short notice.

Samuel L. Moore, Pres.
 Douglass G. Moore, Vice-Pres.
 M. F. Moore, Treas. and Sec'y.

Front. Marshall and Franklin Sts.
 ELIZABETH, N. J.

FRIED. KRUPP GRUSONWERK,

MAGDEBURG-BUCKAU (GERMANY).

Engineering Works, Iron and Steel Foundry.

MINING & MILLING MACHINERY.

Gruson Rock and Ore
 Crushers of specially
 strong construction.
 Roller Mills, Stamp
 Batteries.
 Chrome Steel Shoes and
 Dies.

Ball Mills, with a con-
 tinuous feed and dis-
 charge improved system
 for reducing ores to any
 degree of fineness.
 More than 1,000 at work.

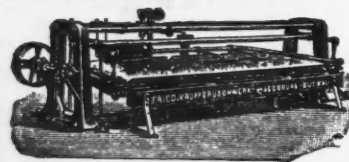
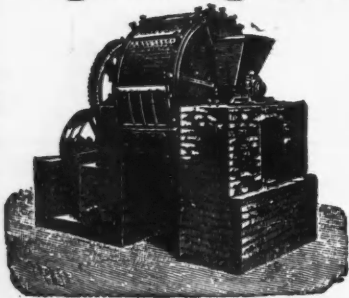
Amalgamating Appa-
 ratus, Hydraulic Clas-
 sifiers, Jig Machines,
 Harz and Bilharz Pat-
 terns, Round Buddies,
 Improved Rotary
 Tables, Improved Percu-
 ssion Tables, Salzburg
 Tables, Sweeping
 Tables, Amalgam
 Cleaners, Amalgam-
 Distilling and Gold
 Smelting Furnaces, etc.

Complete Concentration Plants.
 Cyanide Plant.

Sixteen awards at the Columbian Exposition.

AGENTS:

For the United States: FROES, PROSSER & SON,
 15 Gold Street, NEW YORK.
 For Canada: JAS. W. PYKE & CO., 35 St. Francois
 Xavier Street, Montreal.
 For Mexico: Oficina Tecnica de las Fabricas, de Fried.
 Krupp, Essen y Fried. Krupp Grusonwerk, Magde-
 burg-Buckau, Apartado 549, Mexico.
 For South Africa: Fried. Krupp Grusonwerk, South
 African Agency, P. O. Box 999, Johannesburg, S. A. R.



Electrolytic Copper Refining—Peters' Modern Copper Smelting. SCIENTIFIC PUB. CO.

ESTABLISHED 1860.

1876—INCORPORATED—1896.

THE COLORADO IRON WORKS COMPANY,

CONTRACTING ENGINEERS,

DENVER, - - - COLORADO.

Manufacturers and Builders of

CONCENTRATION AND AMALGAMATION

GOLD AND SILVER MILLS

—ALSO—

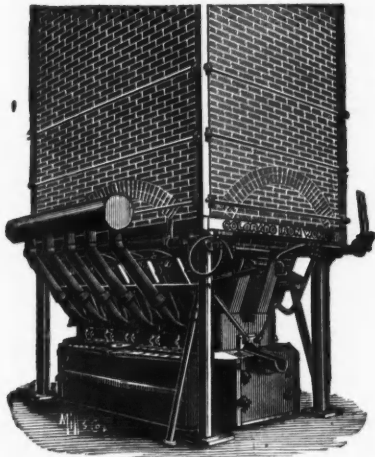
CRUSHING PLANTS WITH GUARANTEED CAPACITY
For CYANIDE, BROMINE and CHLORINATION
PROCESSES.

OUR GOLD, SILVER, LEAD, COPPER AND PYRITIC
SMELTING • FURNACES

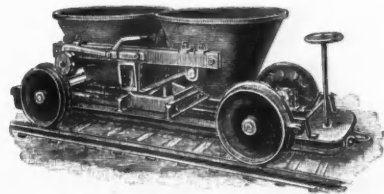
ARE IN SUCCESSFUL OPERATION FROM

Montana to Old Mexico.

Our Patent Hot Blast Apparatus for all Smelting
Furnaces is a success. A great economizer of fuel,
and enlarges capacity of furnace.

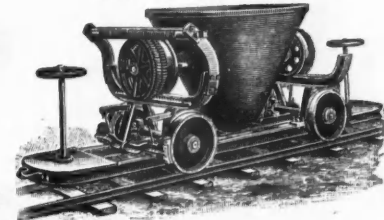


Silver-Lead Smelting Furnace.



Double Pot Slag Truck,
Upright.
CAPACITY BOTH, 15.6 CUBIC FEET.

These Slag Trucks are in use at
nearly all the prominent
Smelting Plants.



Single Pot Slag Truck, Upright.
CAPACITY, 35.16 CUBIC FEET.

BRUNTON'S PATENT POCKET

MINE TRANSIT.



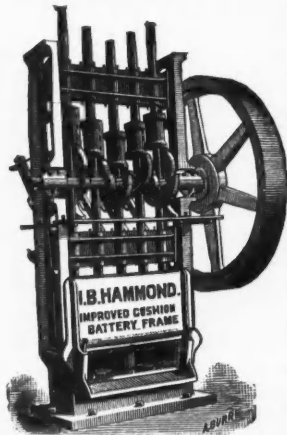
Send for Circular and
Price List to

W. AINSWORTH,

Sole Manufacturer,
2151 Lawrence St., Denver, Colo.

HAMMOND MAN'F'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.

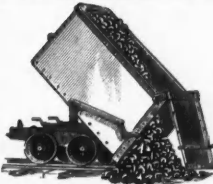
THOUSANDS

NOW IN USE OVER THE WORLD.

TRUAX PATENT IMPROVED AUTOMATIC ORE CARS

They are the Best and Cheapest.

TRUAX MFG. CO., Denver, Colo. | Send for Catalogue.
Agents Wanted Among Dealers in Mining Machinery.



Patented in U. S. and Other Countries.

CAPITAL, £100,000

The General Gold Extracting Co., Ltd.,

PELATAN-CLERICI PROCESS.

London Head Office:

8 DRAPERS GARDENS.

Laboratory and Ore Treating Plant:

1530 WYNKOOP ST., DENVER, COLO.

This process has a well-demonstrated merit in treatment of low-grade Gold and Silver Ores, especially those of a complex character, talcose and clayey combinations or slimes, which class of ore, as is well known, cannot be treated by leaching or lixiviation.

Gold and Silver values, both fine and coarse particles, are by the PELATAN-CLERICI PROCESS recovered direct from ore without roasting as pure amalgam, and the precious metals are saved in the form of fine bullion without any refining costs.

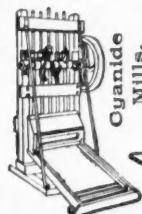
F. CLERICI, Manager for the United States.

THE CHEAPEST PLACE ON EARTH TO OUTFIT A MINE IS AT

THE J. H. MONTGOMERY MACHINERY CO., 1220-22 Curtis St., Denver, Colo., U. S. A.

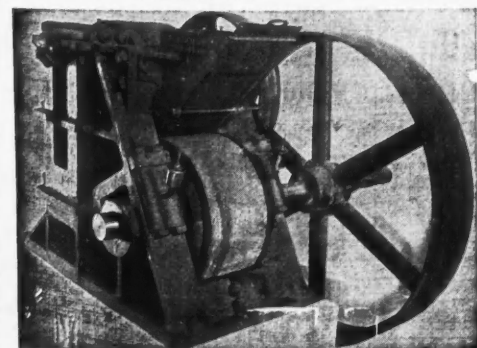
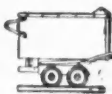
Just Listen—Reliable Common Sense Steel Whim, price reduced to \$100. Steam Hoisters, \$300 and up; hand hoisters \$30; steel ore buckets all prices; prospectors' stamp mills \$300. A 10-stamp mill, new, 850 lb. stamps, high mortars, latest improved, only \$800. Ores tested and amalgamation and concentration mills built to fit the ore and guaranteed to save what we say. Coal Mine Equipments, Screens, Jigs.

Catalogue Free.



Tramways, Arastors, Chilian Mills, Ore Sacks, etc. Cornish Rolls, 12x20, weight 6,000 lbs., price \$350; Feeders, Rock Drills and Compressors, Bumping Tables, Chlorination Mills, etc. Blake Crushers, 7x10 weight 8,100 lbs, only \$250

Best Machinery
and Leas:
Money for it



THE ROGERS
IMPROVED CRUSHING ROLLS
Unsurpassed for Fine
Crushing.

THE STEARNS-ROGER MFG. CO.,

DENVER, COLO., U. S. A.

MINING EQUIPMENTS, CHLORINATION MILLS, GENERAL MACHINERY.

FRASER & CHALMERS,

CHICAGO, ILL.,
U. S. A.

ENGINEERS AND MANUFACTURERS OF **MINING AND METALLURGICAL MACHINERY.**

Beg to announce that they now manufacture and control the sale of the unrivaled

OTTO AERIAL... TRAMWAY

Over Seven Hundred lines in operation.

Spans up to Two Thousand feet and more.

Highest Awards at World's Columbian Exposition.

Catalogues sent on application, giving full description and details.



OTTO AERIAL TRAMWAYS

Give the best working results in every case, and never-failing satisfaction.

All difficulties of transportation surmounted by an economical and effective carrier.

Be sure you investigate the Otto Tramway before purchasing.

Write us your requirements and we will take pleasure in preparing complete specifications.

FRASER & CHALMERS,
MANUFACTURERS OF THE
OTTO TRAMWAY.

Also 80 Broadway, NEW YORK;
SALT LAKE CITY, UTAH;
HELENA, MONT.;
DENVER, COLO.;
CITY OF MEXICO, MEX.



The Chicago & North-Western Railway

REACHING with its 7,966 miles of road the famous Water Powers, Coal Fields, Iron Ore Ranges, Hard and Soft Lumber Districts located in Illinois, Wisconsin, Michigan, Iowa, Minnesota, South Dakota, North Dakota, Nebraska and Wyoming, and by traffic arrangements with other railways, 7,350 stations located on 41,000 miles of railroad (one-ninth of the entire railroad mileage of the world, and one-fourth of the railroad mileage of the United States), has on its line more industries than any other western railroad.

Manufacturers contemplating moving or establishing branch factories in the West are requested to inquire what we can offer them before locating elsewhere.

H. R. MCCULLOUGH,
GENERAL FREIGHT AGENT,
CHICAGO.

Hoisting, Crushing AND Mining Machinery

EARLE C. BACON,

ENGINEER,
Havemeyer Building, New York.

WORKS:
Farrel Foundry & Machine Co. and Pacific Iron Works.

BACON'S HOISTING ENGINES

For Every Possible Duty.
MINE CARS, SKIPS and MINE EQUIPMENT.

"FARREL'S" (Blake Pattern)

ORE AND ROCK CRUSHERS

AND
HIGH SPEED OR GEARED CRUSHING ROLLS

COMPLETE HOISTING, CRUSHING AND MINING PLANTS OUR SPECIALTY FOR OVER 20 YEARS, AND IN USE IN ALL PARTS OF THE WORLD.
See Every Completely Illustrated Catalogue.

FOR SALE.

THE ONLY COMPLETE HISTORY OF THE Development of Mining, Metallurgy and Engineering in the United States

One Complete Set of THE ENGINEERING AND MINING JOURNAL, Volumes 1 to 60.

THESE VOLUMES ARE VALUABLE BEYOND PRICE.

The files of the ENGINEERING AND MINING JOURNAL form the only complete history of the development of Mining, Metallurgy and Engineering in the United States during the past 30 years, and contain the only records of Mines, Mining Stocks, new processes and appliances, descriptions of mines, of men connected with mining, of the Bonanzas and the frauds in mining.

ONLY ONE FULL SET HAS BEEN COLLECTED AFTER YEARS OF EFFORT.

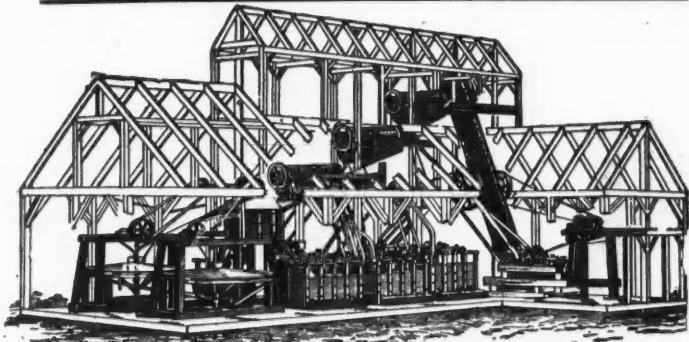
FOR FURTHER PARTICULARS ADDRESS
THE SCIENTIFIC PUBLISHING COMPANY, - 253 Broadway, New York.

CONCENTRATION MACHINERY.

Walburn-Swenson Co.,

—SUCCESSORS TO—

Fort Scott Foundry and Machine Works Co., Chicago



**Complete Plants
for the Concentration of Ores.**

COAL WASHING PLANTS, FURNACE CASTINGS, MINING
MACHINERY, EXPERIMENTAL PLANT FOR
TESTING ORES BY CONCENTRATION.

Works,
Chicago Heights, Ill.

Eastern Office,
27 William St., New York.

Address General Office
944 Monadnock Block, Chicago, Ill.

UNION IRON WORKS. MINING AND MILLING MACHINERY.

All Classes of Marine Work.

Hoisting & 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.")

Branch Office: NEW YORK,
145 Broadway
SEND FOR CIRCULAR.

RISDON IRON WORKS,

—MANUFACTURERS OF—

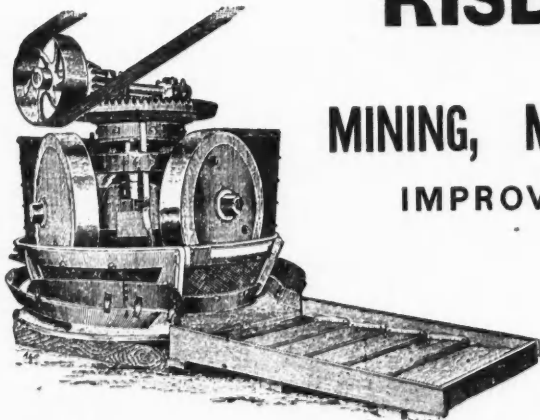
MINING, MILLING, PUMPING AND HOISTING PLANTS.

IMPROVED BRYAN ROLLER QUARTZ MILLS.

JOHNSTON CONCENTRATORS.

AIR COMPRESSORS.

HEINE SAFETY BOILERS.



No. 3.

Office and Works: Cor. Beale and Howard Sts., SAN FRANCISCO, CAL.

Cable Address: "RISDONS," SAN FRANCISCO.

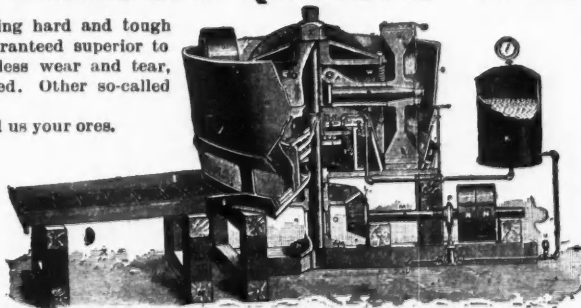
MERRALLS' HYDRAULIC QUARTZ MILL

The only Mill in the world for reducing hard and tough ores cheaply, either wet or dry. Guaranteed superior to Stamps; less power required, very much less wear and tear, and a much higher per cent. of gold saved. Other so-called Quartz Mills are positively "not in it."

In operation daily. Custom Mill. Send us your ores.
Call or address

Merralls' Mill Co.,

45 and 47 Fremont Street,
SAN FRANCISCO, CAL.



THE MIDLAND TERMINAL RAILWAY

Only Broad Gauge Route
to Cripple Creek District.

Sixty Miles Shortest Line Between
Denver and Cripple Creek.

H. COLLBRAN, President, DENVER, COLO.

**DODGE AND GIANT ROCK
BREAKERS.**

IMPROVED MILLS
That successfully take the place of
stamps.

AMALGAMATORS,
Doing away with plates on all kinds of
mills for saving gold.

DISTRIBUTORS

That save a vast amount of care and
labor, divide the pulp and water
evenly to two or more lines
of concentrators.

SEPARATORS.

Sizes the ore from the mill, separates
the sands from the jig, and slimes
for the slime concentrator.

JIG CONCENTRATOR

For working the sands from the
separating box.

SLIME CONCENTRATOR.
Works the slimes from the separator.

DRY JIG,
Concentrates ores where there is a lack
of water.

MILLS,

To crush to any degree of fineness
desired.

GRAVEL MILL,
Works cement gravel, without crush-
ing the gravel.

**CONTINUOUS AND CHARGE
ROASTING FURNACES.**

THE ABOVE MACHINERY IS BEING SET UP AND CAN BE SEEN AT OUR STORE.

DODGE MINING MACHINERY CO., M. B. DODGE, Manager,

Send for Circulars and Catalogue.

65 FIRST STREET, SAN FRANCISCO CAL.

The Edward P. Allis Company, Milwaukee, Wis.

Established 1860.

Mining Milling and Smelting Machinery; Crushers, Rolls, Jigs, Concentrators, Screens, Stamps, Pumps, Compressors, Hoists, Boilers, Etc., Etc.

REYNOLDS
CORLISS ENGINES.

Work the Best; Prices the Lowest.

The Reliance Crushing Rolls



The Best in the World.

Reliance Works.

BRANCH OFFICES

- SAN FRANCISCO, CAL.....9 Fremont St.
- BUTTE, MONT.....30 W. Granite St.
- SALT LAKE CITY, UTAH.....73 So. Main St.
- DENVER, COLO.....427 17th St.
- MINNEAPOLIS, MINN.....416 Corn Exchange.
- CHICAGO, ILL.....509 Home Ins. Bldg.
- KANSAS CITY, MO.....43 Armour Bldg.
- PITTSBURGH, PA., German Nat. Bank Bldg.
- NEW YORK CITY26 Cortlandt St.
- CITY OF MEXICO.....Calle Gante No. 12

Write for our New Catalogue

DIRECTORY OF MANUFACTURERS OF EXPLOSIVES.

The famous **"TROISDORF BLASTING CAPS"**

MANUFACTURED BY THE

RHENISH WESTPHALIAN EXPLOSIVE CO., Ltd.,
COLOGNE, GERMANY,

are known for their superior quality all over the world, and sold by all the leading Dealers in Dynamite or other Explosives.

FR. SCHROEDER, Sole Agent for the United States,
66 Maiden Lane, New York.



RHENISH WESTPHALIAN
EXPLOSIVES COMPANY LIM^d.
COLOGNE.

REPAUNO CHEMICAL COMPANY,
ATLAS POWDER. • JUDSON POWDER
AND REPAUNO GELATINE.

A FUMELESS Explosive for Tunnel Work.

New York Office:
97 Cedar Street.

General Office:
Wilmington, Del.

Chicago Office:
1321 Monadnock Block.

ELECTRIC BLASTING.

SEND FOR CATALOGUE



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.

"PULL UP" BLASTING MACHINE.

The strongest and most powerful machine ever made for Electric Blasting. No. 3 fires 30 holes. No. 4 fires 50 holes. No. 5 fires 100 holes. They are especially adapted for submarine blasting, large railroad quarrying, and mining works.

VICTOR BLASTING MACHINE.

No. 1 fires 5 to 8 holes; weighs only 15 lbs., adapted for prospecting, stump blasting, well sinking, etc.

Standard Electric Fuse and Blast Tester. Wire Reels, new design, Leading and Connecting Wire.

—MANUFACTURED ONLY BY—

JAMES MACBETH & CO., 128 Maiden Lane, New York City.



BLASTING CAPS

Gold and Silver Medal Brands

ARE THE STRONGEST AND BEST IN THE WORLD

MANUFACTURED BY

The Metallic Cap Mfg. Co.,

271 Broadway, New York.

THE NEWSPAPER

can do the work in a day that a hundred most efficient and active salesmen cannot accomplish.

GIANT POWDER,
GIANT GELATINE
FUMELESS POWDERS,
JUDSON POWDER,

The Standard Explosives.

The Atlantic Dynamite Company of N. J.
New York, Boston, Pittsburgh, Baltimore,
Chicago, St. Louis, Chattanooga,
and other Principal Cities.

THE CLIMAX FUSE CO.

271 Broadway, NEW YORK

MANUFACTURERS OF THE

Celebrated **"Climax" Brand**

PATENT IMPROVED
WATER-TIGHT SAFETY FUSE

Warranted Unequaled

Situations Wanted—10 Cents a Line.

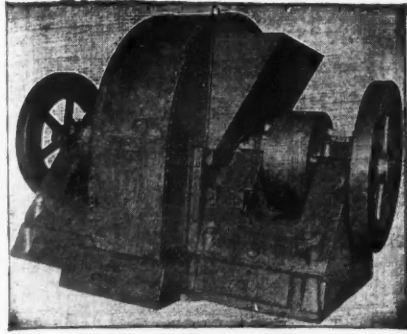
THE STANDARD FOR 20 YEARS



INFALLIBLE. STRONGEST.

J. H. LAU & CO., Manufacturers
67 CHAMBERS ST., NEW YORK

STEDMAN'S FOUNDRY AND MACHINE WORKS, 17 George Street, AURORA, INDIANA.



Disintegrators and Pulverizers

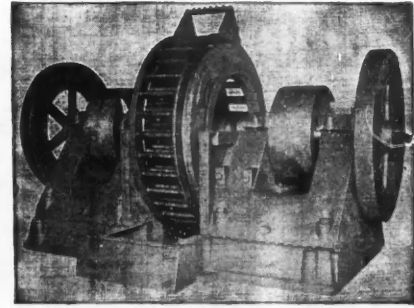
FOR REDUCING CLAYS, IRON ORES, COAL, ETC., FOR VARIOUS PURPOSES.

Graphite Crucibles and Slag for use in Rolling Mills, Guano, Phosphate, Bones, Etc., for Fertilizer.

We have positively the best and most satisfactory mill on the market.

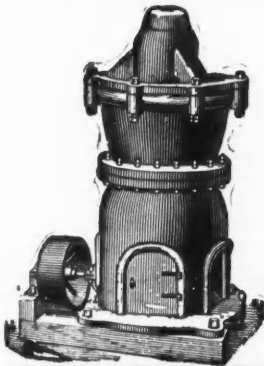
This machine is a perfect success for breaking up or pulverizing GOLD and SILVER SLIMES.

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.

THE McCULLY ROCK and ORE CRUSHER



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," '93, 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.

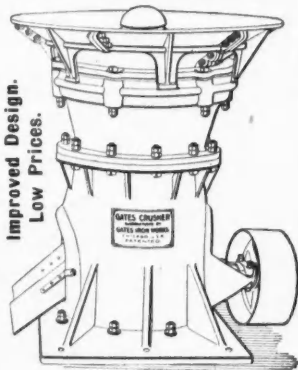
Situations Wanted, Only 10 Cents a Line.

THE ACKNOWLEDGED PERFECT PULVERIZER

OF ALL REFRACTORY SUBSTANCES IS "THE GRIFFIN MILL."

MANUFACTURED EXCLUSIVELY BY

BRADLEY PULVERIZER COMPANY, Boston. SEND FOR CATALOGUE.



Improved Design. Low Prices.

BRANCH OFFICES:

136 Liberty St., N. Y.
73a Queen Victoria St., London.
Butte, Montana.
11 Calle de Gante, City of Mexico.

CHICAGO CITY OFFICE:
1112 MASONIC TEMPLE.

GATES ROCK AND ORE BREAKER

Still leads the world It has greatly cheapened the cost of Macadam and ballast and made low grade ores profitable.

GENERAL MINING MACHINERY OF IMPROVED DESIGNS.

- Stamps
- Concentrators
- Pans and Settlers
- Hoists
- Rolls
- Connersville Blowers
- Smelters
- Elevators
- Chlorination Works
- Cyanide Plants
- Screens, Cars, Etc.

Our Specialty is the Complete Plans and Installation of Mills. Engineers ready to visit any part of the World in the Interest of Customers.

Agents for Hadfield's Manganese and Chrome Steel, Manfd. by Taylor Iron and Steel Works.

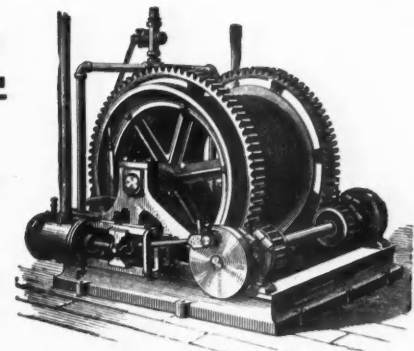
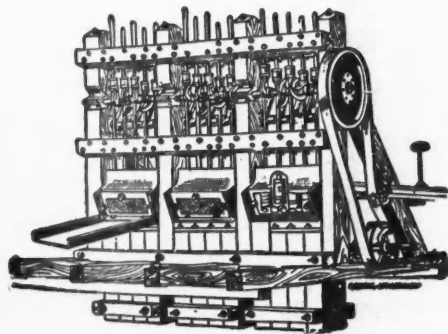
Tremain Steam Stamp Mills. Agents for Trenton Wire Rope. **GATES IRON WORKS, Dept. E, 650 Elston Ave., CHICAGO, ILL.**

H. H. SCOVILLE & CO., ENGINEERS AND MACHINISTS

MANUFACTURERS OF

MINING : MACHINERY.

- Gold Mills,
- Wet and Dry Crushing Silver Mills,
- Smelting Furnaces,
- Concentration Machinery,
- Leaching and Chlorinating Plants,
- Hoisting and Pumping Machinery.



250, 252, 254 SOUTH CLINTON STREET, CHICAGO, ILL.

Professional Men Read the Latest Book. Consult Running Catalogue. See Page 2.

WIRE ROPE MANUFACTURERS.

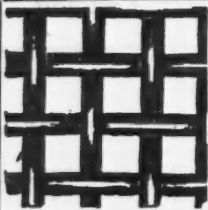
BRODERICK & BASCOM ROPE CO.
SOLE MANUFACTURERS OF

Established
1875.



St Louis,
Mo.

THE MOST POWERFUL ROPE MADE.
SEND FOR ILLUSTRATED CATALOGUE.



LUDLOW-SAYLOR WIRE CO.,
114 So. 4th Street, ST. LOUIS, MO.
Mining Screens and Mining Cloth OF ALL GRADES
WIRE ROPE.
Wrought Iron Fencing. Workers in Wrought Iron Wire and Brass.
WIRE AND IRON FENCING.



Perforated Metals
FOR ALL USES IN
Mining and Ore Dressing.

H. CHANNON COMPANY,

DEALERS IN

Contractors' and Railway Supplies.



WIRE ROPE

MANILLA ROPE, WIRE ROPE,
TACKLE BLOCKS, CHAIN HOISTS,
WINCHES AND WHEELBARROWS,
CHICAGO, ILL.

24-26 MARKET ST.,

WIRE ROPE
FOR ALL PURPOSES
IRON AND STEEL WIRE OF ALL KINDS WIRE ROPE TRAMWAYS
TRENTON IRON CO.
N.Y. OFFICE
COOPER, HEWITT & CO.
17 BURLING SLIP.
CHICAGO OFFICE
TRENTON, N. J.
MONADNOCK BUILDING.

JOHN A. ROEBLING'S SONS CO.
IRON & STEEL
WIRE ROPE
TELEGRAPH WIRE
COPPER WIRE
Works at Trenton, N. J.
WAREHOUSES
117 LIBERTY ST. NEW YORK.
25 FREMONT ST. SAN FRANCISCO.
173 LAKE ST. CHICAGO, ILL.
INSULATED
MAGNET WIRE
&
ELECTRIC WIRES.



FRANK R. FIELD,
ENGINEER,
712 Cooper Building,
DENVER, COLO.
Detachable chain belt,
sprocket wheels, malleable
and steel elevator buckets,
elevating and conveying
appliances.

FOR THE GOLD FIELDS
... OF ...
Mercur, Utah,

TAKE THE



... TO ...

Salt Lake City!

THE FAMOUS
MARYSVALE DISTRICT,
AS WELL AS

Tintic, Eureka, Bingham,
Henry Mountains La Sal,
And the Promising Placers of the
GREEN GRAND AND COLORADO RIVERS,

ARE LOCATED ON THE
RIO GRANDE WESTERN RY.

Send 2c. in postage to General Passenger Agent
for copy of pamphlets.

D. C. DODGE, S. H. BABCOCK,
Vice-Pres. and Gen. Mgr. Traffic Manager.
F. A. WADLEIGH,
General Passenger Agent, Salt Lake City.

THE
MIDLAND RAILWAY
OF KENTUCKY.
—THE SHORT LINE BETWEEN—
CINCINNATI AND FRANKFORT
—AND—
Frankfort, Georgetown and Paris!
C. D. BERCAW,
General Passenger Agent.



Roller, Steel and Special Chains
—FOR—
**ELEVATING
AND CONVEYING
MACHINERY**
FOR HANDLING MATERIAL OF ALL KINDS.
**POWER TRANSMISSION
MACHINERY.**
COAL MINING MACHINERY.
Wire Cable
Conveyors.
For long and
short distance
conveying.

THE JEFFREY MFG. CO. 163 Washington St.
Columbus, Ohio. NEW YORK.
Send for Catalogue.

COAL AND ORE HANDLING MACHINERY.

FRICION CLUTCH HOISTING ENGINES, BOILERS, SKIPS, BUCKETS, also CRANES of all TYPES.
BROWN HOISTING & CONVEYING MACHINE CO., CLEVELAND, O.

Branch Offices, Havemeyer Building, NEW YORK; Carnegie Building, PITTSBURG, PA. General Western Office, Marquette Bldg., CHICAGO, ILL.



CUMMER DRYERS, CUMMER ROASTERS, CUMMER CALCINERS.

For Treating All Kinds of Materials.

Write for Catalogue.

THE F. D. CUMMER & SON CO., Cleveland, O.

San Francisco Office: 109 California Street.

Represented in Foreign Countries.

WALKINS ELECTRIC CONVEYING SYSTEM

FOR HANDLING MATERIALS, COAL, ORE, GRAIN AND MERCHANDISE.

Electrical Apparatus for Mines a Specialty. Power Plants, Conveyors, Hoists, Etc.

WALKINS System Combined Electric and Cable Railways for Mountain Railways.

LOUIS E. WALKINS, C. & E. Engineer,

Office and Address: P. O. BOX 766, SPRINGFIELD, MASS.

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, 35s.; half yearly, 20s., payable in advance by Bank draft or P. O. order.

The S. A. Mining Journal publishes editorials on all important mining matters in South Africa, company meetings, reports of Chambers of Mines and Government news, statistics of the gold output monthly, current market prices of mine materials, machinery, stores and statistics of labor wages.

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. Apply to the Manager,

JOHANNESBURG, TRANSVAAL, SOUTH AFRICA.

VULCAN WIRE ROPEWAY

CONVEYING ORE, CORDWOOD ETC.



ENGLISH MOUNTAIN GOLD MINES COMPANY, NEVADA COUNTY, CALIFORNIA.

Our Vulcan Wire Ropeway, with Automatic Ore Loader and Dumper, make a complete and successful plant for transporting Ore, Wood, etc., over a rough, mountainous country.

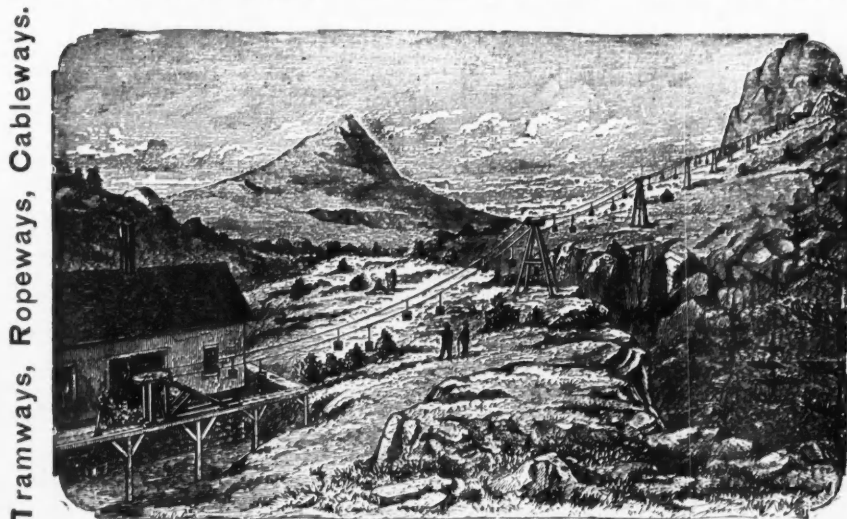
C. H. MALLIN, Supt.

NOTE.—With Vulcan Loader one man can load 250 tons Ore in 10 hours.

VULCAN IRON WORKS, 135-145 Fremont St., San Francisco, Cal.

CALIFORNIA WIRE WORKS,

Office: 8 & 10 PINE ST., SAN FRANCISCO, CAL. Works: 332 BAY ST.



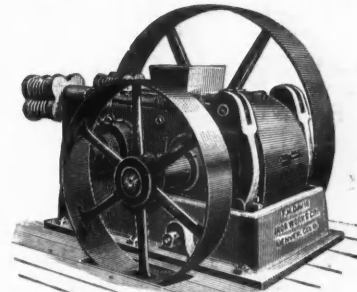
Tramways, Ropeways, Cableways.

Grip Pulleys, Power Transmission.

HALLIDIE'S PATENT WIRE ROPEWAY.

Simplest and most economical method of transporting Ore, Fuel, Earth, Etc. Satisfaction Guaranteed. Erected all over the country. Send for Illustrated Catalogue.

THE DAVIS CRUSHING ROLLS



SIMPLE. DURABLE. EFFICIENT.

SEND FOR CATALOGUE.

THE F. M. DAVIS IRON WORKS.
DENVER, COLORADO.

Milwaukee Beer Is Famous

Pabst
Has Made It So.

Been Sick? Get well by using **PABST MALT EXTRACT**
... The "Best" Tonic

THE GULF SHORT LINE

NO CHANGE OF CARS

THE ONLY LINE FROM COLORADO TO TEXAS AND THE SOUTH WITHOUT CHANGE OF CARS

SHORTEST LINE
QUICKEST TIME
BEST SERVICE

Magnificently equipped through vestibuled trains, between **DENVER AND CHICAGO** WITHOUT CHANGE

To Texas, Old Mexico, Louisiana, Florida and ALL South-eastern and Southern Tourist Points.

See that your ticket reads:
"Via the U. P. DENVER & GULF RAILWAY"

For full information regarding rates, routes, tickets, etc., call on your nearest agent, or address,
S. L. WINCHELL, Gen. Pass'r Agent
DENVER, COLO

LEAD. ANTIMONY.
COOKSON & CO.,
 NEWCASTLE-ON-TYNE, ENGLAND.
Smelters, Refiners, Desilverizers and Manufacturers.

BUYERS OF
ANTIMONY and LEAD ORES, CRUDE ANTIMONY, and
Argentiferous and Auriferous Leads and Ores.

MANUFACTURERS OF
STAR ANTIMONY branded "C."
WHITE LEAD, dry and ground in best refined Linseed Oil.
RED LEAD, GLASSMAKERS' RED LEAD, MASSICOT and LITHARGE.
PIG, SHEET and PIPE LEAD.
SPECIAL.—Lead in various forms for Chemical and Electrical purposes.
 Selling Agents in the United States, **EDWARD HILL'S SON & CO.,** 25 and 27 Cedar St., New York.

C. PASS & SON, LTD.,
 BRISTOL, ENGLAND.

Sell } Soft Pig Lead, Antimonial Lead, Tin
 and Antimony Alloys.
 Buy } Dross or Residues Containing Tin
 Copper or Lead.

ANTIMONY.

MATHISON & CO.,
 Office: 29-31 LIBERTY ST., NEW YORK.
 Works: CHELSEA, STATEN ISLAND, N. Y.
BUY ANTIMONY ORES and CRUDE ANTIMONY.
 Manufacturers U. S. Brand Star Antimony.

NEWARK PULVERIZING WORKS,
 108 Passaic Street, Newark, N. J.
Public Grinders. Ores, Chemicals and Drugs re-
 duced. Our mill is complete and equipped to handle
 large orders promptly. C. B. WOODWARD, Prop.

ELLIOTT'S METAL CO., LTD.

Selly Oak Works, near Birmingham
 and Pembrey Copper Works,
 Burry Port, South Wales.
SMELTERS, REFINERS,
Desilverizers, Manufacturers.
BUYERS OF
COPPER, SILVER, GOLD AND
LEAD ORES, etc.

PENN SMELTING and REFINING WORKS.
ASSAYING, REFINING, TESTING, Etc.
Gold, Silver, Platinum, Etc., Bought
 903 Filbert Street, Philadelphia, Pa.

PHELPS, DODGE & CO.,
 IMPORTERS OF
TIN PLATE,
 Roofing Plate, Sheet Iron, Copper,
 Pig Tin, Wire, Zinc, etc.
 MANUFACTURERS OF
COPPER and BRASS.
 CLIFF STREET, NEW YORK.

PICHER LEAD COMPANY,
 MANUFACTURERS
SUBLIMED WHITE LEAD
AND
PIG LEAD.
 Rooms 319-320, Western Union Building,
 CHICAGO, ILL.

QUICKSILVER FOR SALE
 BY
THE EUREKA COMPANY
 OF SAN FRANCISCO.
 426 California St., Room 1, San Francisco, Cal.
 HASS BROTHERS, Agents, 17 William St., New York.

NOTICE TO ORE SHIPPERS!
 By shipping your ores to us you can obtain the
 highest prices paid on competitive bids in the public
 market, together with a careful and accurate sample,
 as with our new mill and improved machinery we are
 able to give perfect satisfaction to all shippers. Write
 for our Pocket Reference Book. The highest cash price
 paid for gold bullion and old gold. Prompt returns.
State Ore Sampling Co.,
 Albany Hotel Building, DENVER, COLO.

BISMUTH.
PURIFIED METAL For Alloys, Electrical
 Work, Etc.
BILLINGS, CLAPP & CO.,
 Manufacturing Chemists,
 BOSTON, MASS.

AMERICAN ZINC-LEAD CO.
 MANUFACTURERS OF
ZINC-LEAD PIGMENT & COPPER MATTE,
 Working under the F. L. Bartlett patents.
HERBERT NASH, Treas., Mason Building, Boston.
F. L. BARTLETT, Gen. Manager, Cañon City, Colo.

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.**

Write to the Scientific Publishing Co. for Scientific and Technical Books.

The Electro-Cyanide Gold & Silver Extracting Company.
 U. S. PATENT. INCORPORATED UNDER THE LAW OF THE STATE OF NEW YORK.
 This process is, according to experts, the simplest cyanide process, a combination of barrel-cyanidation and
 electro-amalgamation. It works quickest of all—four to five hours. It extracts up to 95 per cent, gold and a
 high percentage of silver. Precious metals are obtained as an amalgam, which has only to be retorted and smelted.
 No refining.
THE ELECTRO-CYANIDE GOLD & SILVER EXTRACTING CO.,
 187 SIXTH AVENUE, NEW YORK, N. Y.

Matthiessen & Hegeler Zinc Co. **S** **MELTERS OF**
LASALLE, ILLINOIS. **S** **PELTER**
 ———— And Manufacturers of
S **HEET ZINC and**
S **ULPHURIC ACID.**
 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.**

BALBACH SMELTING AND REFINING COMPANY.
EDWARD BALBACH, Jr., Pres. **J. LANGELOTH, Vice-Prest.**
 Newark, New Jersey.
SMELTERS AND REFINERS OF GOLD SILVER, LEAD
AND COPPER ORES.
 BULLION AND ARGENTIFEROUS COPPER MATTE received on consignment or purchase.
 SMELTING & REFINING WORKS, NEWARK, N. J.
 ELECTROLYTIC COPPER WORKS.



From Ridgway to Telluride, Ophir,
 Rico, Dolores, Mancos, La
 Plata and Durango.

Opening up the most magnificent scenery in the
 Rocky Mountains, heretofore inaccessible, and
 passing through the famous

MONTEZUMA AND SHENANDOAH VALLEYS,
 The Great Agricultural Region of,
THE DOLORES RIVER
 AND THE
 Famous Gold Fields of San Miguel County
 and the La Plata Mountains.

This new line brings the tourist within easy ride of the
 wonderful

HOMES OF THE CLIFF DWELLERS.
 In connection with the Denver & Rio Grande it forms
 a new and attractive

All Rail "Around the Circle" Trip.
 E. T. JEFFERY, Receiver.

CONSOLIDATED
KANSAS CITY SMELTING AND REFINING CO.

INCORPORATED UNDER THE LAWS OF NEW YORK.

CAPITAL PAID IN, \$2,700,000.

BUYERS OF ALL CLASSES OF
GOLD, SILVER, LEAD AND COPPER ORES
BULLION, MATTES AND FURNACE PRODUCTS,
GOLD BARS, SILVER BARS AND MILL PRODUCTS.

PRODUCERS OF GOLD AND SILVER, COMMON AND CORRODING PIG LEAD, INGOT COPPER. OUR
 "KANSAS" AND "K. C. S. & R. CO." BRANDS PIG LEAD THE MOST RELIABLE IN THE MARKET.

GENERAL OFFICE, ARGENTINE, KANSAS.

TELEGRAMS TO KANSAS CITY, MO.

SALES OFFICE: 20 NASSAU STREET, NEW YORK.

A. V. MEYER, President and Treasurer.

N. WITHERELL, Vice-President.

H. HUFER, 3d Vice-President and General Manager

R. S. TOWNE, 2d Vice-President.

R. D. EVERETT, Secretary and Assistant Treas.

EDWARD BRUSH, Assistant Secretary.

C. E. FINNEY, Purchasing and Freight Department Manager.

THOMAS B. ADAMS, Assistant Treasurer.

JUDD STEWART, General Auditor.

SMELTING WORKS: Argentine, Kan.; El Paso, Tex.; Leadville, Colo.

REFINING WORKS: Argentine, Kan.

-- AGENCIES: --

In United States:

Denver, Colo.

Cripple Creek, Colo.

Salt Lake City, Utah.

Spokane, Wash.

New York City, N. Y.

Chicago, Ill.

St. Louis, Mo.

In Mexico:

San Luis Potosi.

City of Mexico.

Chihuahua.

Pachuca.

Hermosillo.

Jimenez.

"BURLEIGH"
 ROCK DRILLS,
 AIR COMPRESSORS,
 General Mining Machinery.
BURLEIGH ROCK DRILL CO.,
 Fitchburgh, Mass.

The Florence & Cripple Creek Railroad.
 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
W. E. JOHNSON, Pres. and Gen. Mgr.,
 DENVER, COLO.

Parliamentary Tactics.
 Cloth, 50 Cents.
 This book is so arranged that it can be carried in the pocket.
THE SCIENTIFIC PUBLISHING CO.,
 253 Broadway, New York.

Montana Ore Purchasing Co.

F. AUG. HEINZE, Pres. and Genl. Mgr. STANLEY GIFFORD, Vice-Pres. ARTHUR P. HEINZE, Sec. & Treas.
Capital, \$1,000,000.

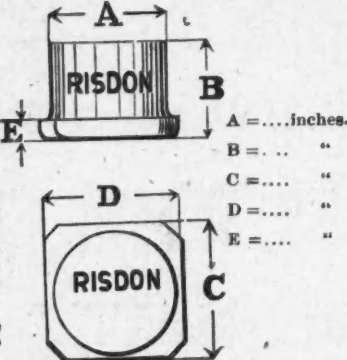
PURCHASERS, SMELTERS AND REFINERS OF
Copper, Silver and Gold Ores.
 Smelting Works: BUTTE, MONT.
 Offices: BUTTE, MONT., and 115 BROADWAY, NEW YORK.

Hammered Steel Shoes and Dies.

MINERS, ATTENTION!



We beg to call attention to our "RISDON HAMMERED" Shoes and Dies, which are made of a special quality of steel, are hammered and then compressed in moulds so as to give the greatest possible density.
 These Shoes will outlast any other make, and will not chip or cup.
 We have attached a sketch showing sizes; fill in the size of your Shoes and Dies, and order a trial set.
 Our prices are as low as any, and the article we offer should commend it to all mine owners and mill men.



RISDON IRON WORKS.

Office and Works: Corner Beale and Howard Streets, SAN FRANCISCO, CAL.

THE ORE DEPOSITS OF THE United States.

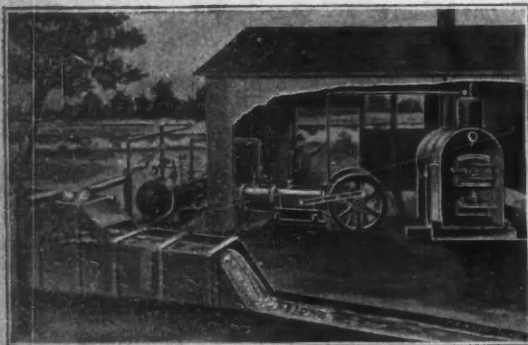
BY **J. F. KEMP, A. B., E. M.**
 Professor of Geology,
 School of Mines, Columbia College.

SECOND EDITION.
 Revised and Enlarged and
 Many New Illustrations Added.
Price \$4.00.

THE SCIENTIFIC PUBLISHING CO., Publishers,
 253 BROADWAY, NEW YORK.

SAN FRANCISCO, CAL., 12 Montgomery St. CHICAGO, ILL., 737 Monadnock Bldg. DENVER, COLO., 206 Boston Bldg. LONDON, ENG., 20 Bucklersbury.

THE HALSEY PNEUMATIC PUMP



THE AIR LIFT SYSTEM
 Applied to Bored or Artesian Wells.

AN automatic, reliable and satisfactory method of pumping from **MINES, STREAMS** or any open source of supply with **SMALL SUBMERGENCE** by direct pressure of

COMPRESSED AIR

No finished or fitted parts in water chamber.
 Takes water as it comes—slowly or rapidly,
 Works completely drowned, if necessary.

Pneumatic Engineering Co., 100 Broadway, N. Y.

J. GEO. LEYNER,
 MANUFACTURER OF
AIR DRILLS, COAL CUTTERS, AIR COMPRESSORS,
 AND ALL KINDS OF
MINING MACHINERY.
 1716-1722 Wynkoop St., Denver, Colo.

The Denver, Leadville & Gunnison Railway.

The Colorado Scenery Route.
 70 to 125 miles shorter than other lines Denver to Leadville.
 Through wonderful Platte Canon.
B. L. WINCHELL, Gen'l Pass'r Agt.
 DENVER, COLO.

"Scenic Line of the World"

THE **DENVER AND RIO GRANDE RAILROAD**
 PASSING THROUGH **SALT LAKE CITY**
 En Route to and from the Pacific Coast.

THE POPULAR LINE TO **Leadville, Glenwood Springs, Aspen AND GRAND JUNCTION.**

THE MOST DIRECT ROUTE TO **Trinidad, Santa Fe and New Mexico Points**
 Reaching all the principal towns and mining camps in Colorado, Utah and New Mexico.

THE TOURIST'S FAVORITE LINE
 TO ALL MOUNTAIN RESORTS.
 All through trains equipped with Pullman Palace and Tourist Sleeping Cars.

For elegantly illustrated descriptive books free of cost address
E.T. JEFFERY, A.S. HUGHES, S.K. HOOPER,
 Pres't and Gen'l Mgr. Traffic Mgr. Gen'l Pass. & Tkt. Agt.
DENVER, COLORADO.

-
,
,
.
-
k

er

t.
-
)

E

.
n

B

B
oo
oo
R,
s