

THE ENGINEERING AND MINING JOURNAL



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

VOL. LVII. APRIL 21. No. 16.

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 TO THE ENGINEERING AND MINING JOURNAL are PAYABLE IN ADVANCE. Price: For the United States, Mexico and Canada, \$5 per annum; \$2.50 for six months: all other countries in the Postal Union, \$7.

The address slip on the paper will show date of expiration of subscription. Subscribers wishing their address changed will please give the name of the old post-office as well as the new one.

NOTICE OF DISCONTINUANCE.—The JOURNAL is not discontinued at expiration and is sent to subscribers until an explicit order is received by us, and all payment of arrears is made, as required by law. The courts invariably hold a subscriber responsible to the publisher for the subscription price of all papers received until the paper is paid for in full up to date and ordered discontinued. PAPERS RETURNED ARE NOT NOTICE OF DISCONTINUANCE.

ADVERTISING RATES furnished on application. REMITTANCES should always be made by Bank Drafts, Post-Office Orders or Express Money Orders on New York, payable to THE SCIENTIFIC PUBLISHING CO.

THE SCIENTIFIC PUBLISHING COMPANY.

OFFICERS: R. P. ROTHWELL, Pres. & Gen'l Mang. SOPHIA BRAEUNLICH, Sec'y & Treas. P. O. BOX 1833. 27 Park Place, New York. Cable Address: "Rothwell, New York." Use A B C Code, Fourth Edition.

LONDON OFFICE:

20 Bucklersbury (Room 366), London, E. C., England. Edward Walker, Manager.

CHICAGO OFFICE: "The Rookery," Room 531.

CONTENTS.

Table listing various articles and their page numbers, including 'Announcement of Removal', 'Brooklyn Bridge Legislation', 'The Reading Reorganization', etc.

* Illustrated.

Table listing market news and prices for various regions and commodities like 'MINING NEWS', 'FOREIGN NEWS', 'IRON', 'METALS', 'CHEMICALS AND MINERALS', etc.

ANNOUNCEMENT OF REMOVAL.

For 22 years the "Engineering and Mining Journal" has had its offices at 27 Park Place, moving into them May 1st, 1872. In these years the business of the paper has increased enormously, and quarters which in the beginning were abundantly large, have been several times added to, but have become wholly inadequate to its needs.

While we go into our new offices with great pleasure and high hopes for the future, we feel deep regret at leaving the old quarters in which so much hard and good work has been done and so great a measure of success has been achieved.

The Brooklyn Bridge trustees have been legislated out of office and there will now be an opportunity to have introduced some of the improvements in the running of the trains which have been so long demanded by the public and which are well understood by engineers.

The Reading Receivers, have, it is said, practically abandoned the attempt to formulate a plan for the reorganization of the company, and have asked Mr. J. Pierpont Morgan to undertake the task.

While English investments in gold mining in India have had results of a somewhat varied character, the shareholders of the leading companies in the Mysore district, which is now the chief producing region of India, have certainly no reason for complaint.

In the United States we are apt to consider our railroad rates as lower than those of other countries, and this is probably true of freight, but in passenger rates the Indian railroads go far below ours.

remembered that wages and other charges are paid in silver also, though imported machinery must be paid for in gold at a premium. The lowest average rate was found on the Madras Railway; it was 0.414c. per passenger-mile. This rate would give fares in this country of about 37c. from New York to Philadelphia, 99c. from New York to Boston, about \$3.75 from New York to Chicago, and about \$14 from New York to San Francisco.

These low rates are made both possible and profitable by the dense native population which furnishes the railroads with an enormous number of passengers who are satisfied with the cheapest kind of accommodations, provided the charge is low. Over 95 per cent. of the passengers are carried in the fourth-class cars, which are used only by the natives, and hardly 1 per cent. use the first-class. While in this country the average passenger-train load is 42 persons, on all the Indian roads it was last year 231, or over five times as large, while in one case—the East Indian Railway—the average was 247 persons.

THE LARGEST GOLD MINE.

The Robinson Gold Mining Company, in the Transvaal, an abstract of whose report will be found on another page, enjoys just at present the distinction of operating the largest gold mine in the world, if the actual output of the yellow metal be taken as a standard. The Alaska-Treadwell mine in Alaska is worked on a much larger scale and produces a greater amount of ore, its last report showing 237,235 tons worked by 240 stamps, while the Robinson last year ran only 60 stamps and crushed 94,842 tons of ore. The exceedingly low grade of the Alaska-Treadwell ore, which produced a little less than \$3 per ton, contrasts with an average of about \$17.50 per ton for the Robinson, giving the latter the first place as a gold producer.

The Robinson last year derived about 79 per cent. of its production from the ore worked in the mill, 8 per cent. from concentrates by chlorination, and 13 per cent. from the reworking of tailings by the cyanide process. The latter yielded a fair profit, though the extraction was only 68.7 per cent. of the assay value, a proportion which the company hopes to increase. It is to be noted that in this mine, which has the deepest workings of any on the Witwatersrand, the proportion of pyritic to free-milling ore is increasing very rapidly with depth, and the report anticipates an early date when the free-milling ore will entirely disappear. This can hardly be a pleasant outlook for those Witwatersrand companies which have based their expectations on a continuance of free gold and cheaply worked ores in the deep levels on the Main Reef, of which so much has been said. The Robinson is providing for the future and expects to extend the concentrating plant and the use of the chlorination process, as well as that of cyanide on the mill tailings.

Like all the Transvaal companies the Robinson relies chiefly upon native labor; but does not find it altogether profitable or reliable. At present, however, it is a necessity, and will probably continue so for a long time to come.

OPEN-HEARTH STEEL IN GREAT BRITAIN.

The British Iron Trade Association has added to its previous reports a statement of the production of open-hearth steel in the United Kingdom for the year 1893. This production has reached a point when it is not very far below that of Bessemer steel, and it has for three years past shown less fluctuation, while in several districts the output has shown a considerable growth. The total make of open-hearth steel ingots last year was 1,456,323 tons (of 2,240 lbs.), an increase of 37,493 tons, or 2.6 per cent. over 1892, but a decrease of 58,215 tons, or 4.1 per cent. from the maximum output in 1891. The production by districts for three years past has been as follows:

	1891. Tons.	1892. Tons.	1893. Tons.
Scotland.....	478,602	461,967	447,067
Northeast Coast.....	439,278	425,156	482,120
Wales, North and South.....	255,719	223,511	233,939
Sheffield and Leeds.....	145,181	115,491	143,337
Lancashire and Cumberland.....	122,732	109,719	77,149
Staffordshire, &c.....	73,026	79,956	67,713
Totals.....	1,514,538	1,418,830	1,456,323

The Scotch production, it will be noted, has declined slightly, while that of the Northeast Coast has increased until that district has become the foremost producer. The Sheffield and Leeds district shows violent fluctuations, for which it is difficult to account.

The basic openhearth process has made less progress in Great Britain than on the Continent of Europe, probably because there has been less occasion for its use. The total number of open-hearth furnaces in Great Britain at the close of 1893 was 365, of which 325 were acid and only 40 basic furnaces. The average number at work during the year was 198 acid and 26 basic, a total of 224 furnaces. Of the steel produced 1,377,664 tons, or 94.6 per cent., was made in acid, and 78,645 tons, or 5.4 per cent., in basic furnaces. The average yearly production per furnace was 6,956 tons for the acid and 3,025 tons for the basic furnaces, or 6,501 tons for

all the active furnaces. The basic steel output showed last year a very considerable reduction, 78,645 tons reported comparing with 108,056 tons in 1892, the decrease being 29,411 tons, or 27.2 per cent.

The total production of manufactured steel from open-hearth ingots was last year 1,216,287 tons, an increase of 100,893 tons, or 9 per cent. over the preceding year. The largest item of this production was plates and angles, of which there were made 526,775 tons, which is 43.3 per cent. of the whole. The next item in amount was 211,640 tons of blooms and billets, chiefly for export; bars and other forms of merchant steel made 202,313 tons. The remaining items were comparatively small, including 61,051 tons of tires; 39,304 tons of rails; 33,511 tons of castings, and 27,582 tons of forgings of various kinds. The total finished steel reported was 240,036 tons less than the amount of ingots; if we allow a waste of 10% of the latter in conversion, there still remains a difference of about 100,000 tons which the returns given do not account for. These may be partly in stock, or may prove partly exported in the form of ingots.

The open-hearth steel manufacture, upon the whole, made as good, or probably a little better, showing than any other branch of the English iron industry, and the fact that it practically held its own may be taken as evidence that the process and its product are gaining in favor.

GOLD EXPORTS NOW AND LAST YEAR.

In another column we have given an abstract of an article from "Kierman's News Letter," which is an interesting history of the course of the gold movement for three years past, the occasion being the resumption last week of gold exports on a considerable scale. Incidentally it also traces the origin of the silver panic of last year, which had been impending ever since the Baring failure late in 1890, and had, so far as this country was concerned, been postponed only by the extraordinary crops of 1891, and the great export demand of the following year. Postponed, but not prevented; for the sensitive state of the commercial world everywhere, which followed the Argentine collapse, the direct cause of the overthrow of the great Baring house; the consequences of our mistaken financial policy and the recurrence of an excess of production over demand were bound to result in a crisis sooner or later, so that only a determining cause—such as the closing of the Indian mints proved to be—was needed to bring the panic into full action.

We have heretofore taken occasion in the columns of the "Engineering and Mining Journal" to show why gold should be exported from this country at times when the so-called balance of trade, as shown by the merchandise returns, was in our favor, or at least not against us.* The explanation of the necessity of such exports was found: 1. In payments for freight and other charges on exports made on foreign bottoms: 2. Interest on securities and rentals on real estate owned here by persons residing abroad. 3. Remittances made of money earned here by immigrants. 4. Money spent by American travelers abroad. 5. Payments for our securities returned and repayments of loans of foreign capital.

Under the present conditions, as shown in the article already referred to, the fifth cause is not at present operative to any considerable extent. The others always call for a large amount; how large it is impossible to determine with accuracy. When the merchandise balance is largely in our favor, as at the present time, these amounts are provided for by exchange and bankers' bills; when, as a year ago, there is no balance to draw against, gold must be shipped to meet them.

The present condition, therefore, may be stated as follows: We have a sufficient balance in our favor to meet all the usual calls, and there is not now, nor is there likely to be, any unusual or extraordinary demand. There is a state of equilibrium, in which a rise in the interest rate in the European markets or a temporary scarcity of bills may send up the rate of exchange to a point where there is a small profit in shipping gold drawn from our large stock of idle money.

A rise of half a cent in exchange or an increase of one-quarter per cent. in the discount rates of the Bank of England or the Bank of France may at any time be followed by such shipments. They are made, not because there is a demand for them to pay our debts, but simply because the money can be used for the time at a profit. They have, in fact, no more significance than the remittances made from Chicago or San Francisco to New York, or in the opposite direction, which are common at certain seasons of the year.

The natural apprehension aroused by the abnormal drain on our gold reserves witnessed in the first half of 1893 has led many people into a habit of considering any gold shipments as an unfavorable sign. The conditions, however, as we have shown, are entirely different from those of last year. Gold exports are no longer a danger signal, but simply an incident of business which would call, in any except a post-panic period, for no especial remark. They may continue for a few weeks longer, or they may cease with the present week, but there is no probability that they will rise to any considerable amount; especially as our surplus is daily finding wider opportunities for profitable use at home.

* See the "Engineering and Mining Journal" for February 11th, 1893, page 122; May 27th, 1893, page 482; June 3d, 1893, page 596, and October 23th, 1893, page 442.

NEW PUBLICATIONS.

THE MONEY OF THE UNITED STATES: ITS CHARACTER, LEGAL STATUS AND VOLUME. By Maurice E. Muhleman, Cashier of the United States Sub-treasury at New York. New York; the "Safety Valve." Pages 72, with 2 tables. Price, 75 cents.

In this compact little volume Mr. Muhleman has given us a convenient compendium of the history and the present condition and status of the various forms of metal and paper which make up our circulating medium. A glance through its pages will suffice to show the unsatisfactory condition in which it exists at present, owing to the variety of legislation affecting the different issues.

In the first part, which is historical, many interesting facts are given, some of which are not generally known. How many of us, for instance, know anything about the issues of treasury notes made in 1813, in 1838 and in 1847? Or, coming to more recent times, how many of us could enumerate the various descriptions of notes issued during the war period? The historical account continues up to the resumption of specie payments and the general reorganization of the currency made (or rather attempted) by the act of 1893.

The second part, which is, of course, also historical to some extent, shows the volume of currency now in existence, or supposed to be in existence, the authority under which each kind is issued, the legal tender standing and many other useful points. We have said above "supposed to be in existence," for the fact is that in most cases the Treasury is cognizant only of the facts of issue and redemption, and cannot determine what becomes of the money. The actual amount of gold coin in the country is, for instance, a matter of estimate and conjecture, on which the opinions of authorities vary widely. To take another case, there is still, according to the Treasury books, some \$15,300,000 of the old paper fractional currency unredeemed; it is certainly not in circulation, and probably very little of it is in existence.

The concluding part of the book gives an abstract of the various plans proposed for the solution of the currency problem, in Congress and elsewhere. Of these only condensed accounts are given and no opinions are expressed; indeed Mr. Muhleman has avoided everywhere the expression of opinion, and has sought to give only facts. He has succeeded in making a very convenient manual of reference on a subject about which every one ought to be informed.

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.

The Geological Surveys in Alabama. By Eugene Allen Smith. Reprinted from the Journal of Geology. Pages 13.

Bulletin of the United States Fish Commission, Vol. XI., 1891. Published by the Government Printing Office, Washington. Pages 431. Illustrated.

Eighth Annual Report of the Commissioner of Labor, 1892. Industrial Education. Published by the Department of Labor, Washington, D. C. Pages 707.

Gas-Lighting and Gas-Fitting. By Wm. Paul Gerhard, C. E. Second Edition. The D. Van Nostrand Company, New York. Pages 190. Price 50 cents.

The Alchemical Essence and the Chemical Element. By M. M. Pattison Muir. Published by Longmans, Green & Co., London and New York. Pages 94. Price \$1.50.

Mining Royalties: Their Practical Operation and Effect. By Charles Ashworth James. Published by Longmans, Green & Co., London and New York. Pages 277. Price \$1.75.

Popular Lectures and Addresses, Vol. II. Geology and General Physics. By Sir William Thompson. Published by Macmillan & Co., London and New York. Pages 599. Price \$2. Illustrated.

Tidal Rivers; Their Hydraulics, Improvement and Navigation. By W. H. Wheeler, M. Inst. C. E. Published by Longmans, Green & Co., London and New York. Pages 467. Price \$5. Illustrated.

The Colonial Office List for 1894. Historical and Statistical Information of the Colonial Dependencies of Great Britain. By John Anderson. Published by Harrison & Sons, London. Pages 489. Price \$1.75. With maps.

Diamonds and Gold in South Africa. By Theodore Rennert, M. Inst. M. E.; Asso. M. Inst., C. E. Published by J. C. Juta & Co., Cape Town, Port Elizabeth and Johannesburg, South Africa. Pages 242. Illustrated.

Agricultural Analysis. A manual of Qualitative Analysis for Students in Agriculture. By Frank T. Addyman, B. Sc. (Lond.), F. I. C. Published by Longmans, Green & Co., London and New York. Pages 192. Price \$1.75. Illustrated.

Practical Agricultural Chemistry for Elementary Students. By J. Bernard Coleman, A. R. C. Sc., F. I. C., and Frank T. Addyman, B. Sc., F. I. C. Published by Longmans, Green & Co., London and New York. Pages 88. Price 50 cents. 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. All letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Our Mr. Wilson entered into partnership in London only with Messrs. Walker & Peile, of Whitehaven, in January, 1889; and in April, 1892, Mr. Wilson severed his connection with them and established the firm of Arthur Wilson & Co., with which firm Messrs. Walker & Peile have not, and never had, the slightest connection.

The business over which litigation is now in progress with Messrs. Walker & Peile was carried through by their firm in Whitehaven, Cumberland, two years prior to the formation of the late firm of Walker, Peile & Wilson, which firm, therefore, had nothing to do with the matter in question.

As the case will soon again be before the courts, we shall be obliged by

your publishing our letter of the 27th of February, addressed to your London representative, a copy of which we inclose.

Inclosure:

In the issue of your journal, dated February 17th, 1894, we observe a paragraph in which it is stated that: "A suit has been brought in the Court of Queen's Bench to recover damages from certain parties engaged in promoting a mining company, one of the defendants in the case being a Mr. Edward Walker, a member of the firm of Arthur Wilson & Company, of London."

To avoid any misapprehension, we beg to inform you that Mr. Walker is not a member of our firm, and that we have been in no way connected with the matter in question. ARTHUR WILSON & Co. LONDON, E. C., April 7, 1894.

The California Mining District, Colorado.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The California Mining District is situated in the southwestern part of Colorado, and on the southeastern slope of an isolated group of mountains, called La Platas, in La Plata County, and about 12 miles from Durango. It covers an area of nearly 100 sq. miles. The whole mountain group is an upheaval of carboniferous strata, with underlying metamorphic granite. The district is, by the three streams heading here, divided into the La Plata, Lightner Creek and Junction Creek sides, of which the first named has received more attention than the other two. Along the river there are placer claims located, and to this placer ground is chiefly due the discovery of the large bodies of free-milling ore, made late last fall.

The mineral veins are numerous throughout the mountains and fissures filled with porphyry, trachyte and talc crossed in all directions. The general course, however, seems to be southwest and northeast with a slight dip to the north. The gold-bearing veins predominate, although both silver and copper leads are found. The gold occurs either free or associated with tellurium or iron. In some instances, as in the Bulldozer, the tellurium has left the gold free, which there appears as a brownish red spongy mass.

Although known since 1878 very little systematic work had been done in the district until last fall, when a large body of free milling ore was found in Tiburico gulch, which is known as the Bowkers find.

This is a flat vein on the north side of the gulch, of heavily iron-stained porphyritic quartz, partly decomposed, the extreme sides of which is estimated to be 200 ft. deep and 1,000 ft. wide and supposed to penetrate the mountain into Lightner Creek basin. It is exposed for 600 ft. and gives an average value of \$8 per ton.

The Montezuma, in Burnt Timber gulch, is a fissure vein between walls of diorite formation 80 ft. apart. The ore is said to run \$13 in gold and to be very easily worked.

The Columbus group, in Silver Lake basin, comprising three claims, is a recent discovery. The vein is a true fissure 21 ft. between walls. The ore is a telluride and the whole vein mineralized.

Other discoveries in the Treasure Basin and the Quiet Hill have added bodies of low grade gold ore to those described, and demonstrate that La Plata mountains are not what they long were known as, Specimen Camp, "but that it has a large supply of low grade ores.

The Oro Fino Camp, at the head of Flagless Fork and Junction Creek, is a strictly free-milling camp. The veins are well-defined fissures, traceable for considerable distances and sufficient work has been done on several properties to sustain the above fact.

The Bessie G. mine has been worked for several years under lease, and in spite of high royalties has paid the lessees handsomely. The vein is a tellurium running as high as \$10 a lb.

The Western Belle, in Wall's Gulch, is owned and operated by a Lancaster syndicate which also owns and operates acyanide mill at the mouth of the gulch, where ore from several mines has been tried. As a result it can be said that the cyanide process, as far as extraction goes, is a success, although this particular mine, for several reasons, failed in other respects.

DURANGO, Colo., March 14, 1894.

E. HORNER.

Russian Finances.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your "Engineering and Mining Journal" of February 17th last you communicate, page 164, the following note:

"The Russian budget for 1894 shows an expected deficit, variously stated at from 35,000,000 to 65,000,000 roubles. As taxation has been pushed almost to the extreme limit it will not be possible to raise the money in that way, and it is stated that the deficit will be made up by taking money from the reserve fund, which has been accumulated for use in case of war."

This is an error. Nearly all foreign countries take a special pleasure in telling the most extraordinary stories about that wild country called Russia. When they talk of bears and wolves running about in the finest streets of St. Petersburg, of policemen and soldiers ill-treating peaceful citizens and innocent children, we take it coolly and pity those poorly informed foreigners. But if they try to undermine the credit of Russia we are as easily affected as Americans, because we feel our pocket endangered.

I consider, therefore, my duty to tell you the truth, requesting you kindly to allow space in one of your next numbers for the following official and in every respect correct statement:

The Russian Budget for 1894.—Receipts, 1,004,823,277 roubles; extraordinary receipts, 19,764,940 roubles; balance left from the 1891 3% gold loan, 59,013,309 roubles; total of receipts, 1,083,601,526 roubles. Expenses: Ordinary, 931,222,950 roubles; extraordinary—railways and ports, 65,293,701 roubles; modifications in the army and creation of a special reserve fund for its support, 35,700,000 roubles; assistance in connection with the construction of the Siberian Railway, 1,384,875 roubles. Total extraordinary expenses, 102,378,576 roubles; total expenses, 1,083,601,526 roubles.

On December 15th, 1893, the Minister of Finance had at his disposal at the Bank of the Empire, in the Imperial Mint and with bankers abroad the following means belonging to the state: Gold and interest bearing metallics, 233,413,503 roubles; silver, 8,942,201 roubles; banknotes and interest-bearing papers, 50,635,635 roubles. These amounts do not include

money in the various treasuries of the Empire, at custom-houses and money in transit by the post at that date.

Comparing the budgets of 1894 and 1893 we find: the ordinary receipts of 1894 exceed those of 1893 by R. 52,064,390; the ordinary expenses of 1894 exceed those of 1893 by R. 41,700,950. The budget of 1894 is resulting in an overplus of receipts of R. 23,600,000, which shall be kept for the disposal of extraordinary expenses.

Notwithstanding several years of very poor crops, and especially 1891, which required much assistance from our Government, the report of the controller of the Empire stated for 1892 a surplus of R. 83,600,000, exceeding the ordinary receipts, against the estimate of the budget for that year. The "realized surplus" of the ordinary receipts for 1893 is not so much, but still not less than R. 65,000,000. Consequently there is no deficit at all in sight for this year. There is no reason for taking money from any reserve fund whatever, and your correspondent may be perfectly sure that we are very far from taxation having been pushed almost to the extreme.

We can and are ready to support much greater taxes. We are taxed at a very moderate rate indeed, not to be compared with any of the civilized countries in Europe. Russia is advancing slowly but safely. I wish Americans would come with honest intelligence and large capital to Russia and open our untouched, rich deposits of gold, silver, platinum, copper, iron, etc., for the benefit of their own pockets and of our rather too indolent rich proprietors and capitalists. They would not think any more of speculating in South American or some other doubtful funds of far distant colonies and feel happy, remaining in this good country for the rest of their days.

W. A. ABEQ.

St. PETERSBURG, April 4, 1894.

THE MINERAL INDUSTRY OF TASMANIA.

The following interesting and valuable article on the mineral industry of Tasmania has been specially prepared for us by Mr. A. Montgomery, Inspector of Mines and Geological Surveyor of that province:

The mining industry of this colony is one of the most important sources of wealth, minerals and metals constituting at the present time about 40% of the total value of its exports. The value of minerals produced for the year ending June 30th, 1892, was £639,554, and for that ending June 30th, 1893, £678,622, being an average per head of the population of the colony (about 150,000 souls) of £4 8s. As will be seen from the tables quoted below, tin has been the metal produced in the greatest value, gold and coal being next in importance; silver-lead, however, is now rapidly becoming of greater consequence than gold, and bids fair to rival tin, while copper, though not yet exported in quantities worth mentioning, is confidently expected to shortly come to the front.

The metalliferous ores are found in the northeastern and western portions of the island (which has a total area of 26,215 square miles), where older Palaeozoic and Archæan rocks abound; the remainder being covered with massive sheets of diabase greenstones of Mesozoic age, in which no useful metallic minerals are known to exist, or else occupied by coal measures, strata of Permian-carboniferous to Mesozoic age, containing coal, clays and building stone. Alluvial deposits derived from the old metalliferous rocks, of all ages from Miocene to recent, are found at intervals in basins and furrows in the bedrock, and yield much ore. Many of them are covered with basalt of Pliocene age. The older Palaeozoic formations are not yet satisfactorily classed as regards their age, and probably range from Archæan to Devonian. Gold is most abundant in the areas regarded as Lower Silurian, but is also found to a less extent in the Upper Silurian districts. Silver-lead appears to be mostly confined to the Upper Silurian formation, and the serpentine rocks of later date intruded through it, while tin is usually found either in granite or not far from it. The granite is intrusive through the Silurian rocks, but is older than the Carboniferous period, it is a coarse-grained porphyry as a rule, with prominent crystals of ortho-clase, but appears to be very susceptible to internal chemical changes which often alter very materially both its appearance and mineral composition. These altered portions often carry workable tin ore. Dykes of quartz-porphry and topaz rock are associated with the main granitic intrusions, and generally accompanied by important deposits of tin either in the dykes themselves or in their vicinity.

Gold.—The deposits of gold in Tasmania, both in reefs or lodes and in alluvial gravels, belong to very common types. The reefs are, however, more broken and less regular than those of Victoria, in the neighboring mainland of Australia. They are usually fissure lodes containing quartz impregnated with gold and sulphides. The latter are most commonly copper and arsenical pyrites; galena, blende and stibnite being less common. A few reefs are heavily charged with sulphides, but most have but little. The best lode has been that of the Tasmania Company, at Beaconsfield, which, since 1877, has yielded a little over 11 tons of gold. About three-fourths of the colony's production has been from lodes and only one-fourth from alluvial ground. The production of gold in Tasmania has been as follows:

Year.*	Quantity, ounces.	Value, £.	Year.	Quantity, ounces.	Value, £.	Year.	Quantity, ounces.	Value, £.
1867	813	2,708	1876	11,107	44,923	1886	31,015	117,250
1868	1,363	4,832	1877	5,777	23,289	1887	42,609	158,533
1869	692	2,536	1878	25,249	100,000	1888	39,611	147,154
1870	137	511	1879	60,155	230,893	1889	32,333	119,733
1871	964	3,666	1880	52,595	201,297	1890	23,451	87,114
1872	6,005	23,467	1881	56,693	216,901	1891	39,203	149,816
1873	6,969	27,514	1882	49,122	187,337	1892	45,110	174,070
1874	4,651	18,390	1883	46,378	176,442	1893	35,012	130,796
1875	4,651	18,491	1884	42,340	160,404			
	3,010	11,982	1885	41,241	155,309			
Total.....							708,496	2,694,682

* Production previous to 1867 estimated.
† Production in last quarter of 1893 estimated.

Silver-Lead.—Argentiferous galena is found pretty widely throughout Tasmania, principally in slates and sandstones of, probably, Upper Silurian age and in serpentine igneous rocks associated with them, but also in less quantity in granite and in Archæan schists and quartzites. In one district it is found in conjunction with blende, copper pyrites, iron pyrites and arsenical pyrites, in a tin lode in sufficient quantity to be very

troublesome, much difficulty being experienced in separating the lead from the tin ore. The principal lead and silver district is that round Mounts Zeehan and Dundas on the west coast. Here a large number of lodes have been found and are being constantly added to, mostly small from one to six or eight feet in width, but some very large, up to 500 ft. across. The gangue is generally carbonate of iron, quartz, and lodeslate.

The associated metallic minerals are usually pyrites (of iron, and, less frequently, copper) and blende. The average assay of the picked galena is about 64% of lead and 65 oz. of silver to the ton, but the quality varies a good deal. Sometimes tetrahedrite and native silver are present and enhance the value. Where the large bodies crop out in high ground they are found to be very thoroughly oxidized to gossans down to and even considerably below the water level, and in the upper parts these gossans are very poor both in silver and lead, the metals having been leached out of them. The climate of the district is very wet, which probably accounts for this removal of the metals from the oxidized cappings. Below the water level the good ore begins to come in. In the neighborhood of the serpentine intrusions the gossans frequently contain a good deal of chromate of lead (crocoisite) in very beautiful crystals.

Owing to the wet climate the country is covered with very dense, almost impenetrable, forest and is besides very swampy. This has been much against the rapid development of the mines. As there is no ore worth speaking of to be got above the water level, almost every mine has to be fitted with steam machinery for pumping, which has necessitated the construction of a railway 28 miles in length to the port of Strahan and of roads and tramways to each mine. The opening of the mines, therefore, consumes a very considerable amount of time and capital. The railway was opened for traffic in the end of 1891, since when the progress of the fields has been rapid, though much hampered by the severe commercial depression that has reigned in the Australian colonies for the last two or three years. Several concentrating mills have been built and two smelting establishments started, but both of the latter soon came to grief through not starting with sufficient capital. At present the picked first-class ore and the clean concentrated galena from the mills are bagged and shipped to Australia and Europe to be smelted, the total cost for freight and smelting and selling charges amounting to rarely less than £6 a ton. A resumption of local smelting is looked forward to and would be a great benefit to the mines.

All the Tasmanian silver ores, with only very few local and unimportant exceptions, are associated with much lead, and therefore easily smelted; dry ores are almost unknown, and no silver is obtained either by lixiviation or amalgamation. The silver-lead ores being shipped for sale, no returns of the values of the silver and lead separately are obtainable. The production of silver-lead in Tasmania has been as follows:

Year.	Tons (2,240 lbs.)	Value, £.	Year.	Tons (2,240 lbs.)	Value, £.	Year.	Tons (2,240 lbs.)	Value, £.
1888	417	5,838	1890	2,053	26,487	1892	9,326	45,502
1889	415	7,044	1891	4,810	52,284	1893	15,324	183,888
Total.....							32,345	321,043

* Last quarter estimated.

Copper.—Ores of copper in small quantities are common in association with those of lead and tin throughout the colony, but only a very few of the deposits have been worth working, and the production of the metal is, up to the present, infinitesimal. A little ore has been shipped, but the total export of metallic copper in ore, up to the end of 1893, will not probably exceed 40 tons. During the last three years exploration work steadily carried forward on the large pyrites mass at Mount Lyell has proved that it is a very valuable copper mine. After a careful study extending over some three or four months, Dr. E. D. Peters, Jr., the eminent American copper metallurgist, estimated the ore in sight at 4,500,000 tons, of an average value of 4½ per cent. of copper, three ounces of silver per ton, and 2½ dwt. of gold per ton (2,240 lbs.). He reports that the ore can be worked at a profit of £1 10s. 5d. a ton, and ends by saying: "I will only say in conclusion that in the past 20 years I have never seen a mining and metallurgical proposition that promises so certainly to be a great and enduring property as this." The pyrites body is now exposed for 800 ft. in length, and is 300 ft. in width and proved by adits to a depth of 180 ft.; it is quite similar to the celebrated Rio Tinto lode in Spain, but is nearly three times as rich per ton. The writer and others have verified the average values quoted by Dr. Peters and agree with his favorable opinion of the mine. Besides the low-grade pyrites there are pockets of very rich silver-copper glance and tennantite (arsenical fahl ore), assaying from 500 to 4,000 oz. of silver to the ton, and containing up to 20% of copper. One winze, 55 ft. deep, in this has yielded over 146,000 oz. of silver and 24 tons of copper. These rich pockets lie between an oxidized hematite portion of the ore-body and the unaltered pyrites, and are doubtless secondary deposits derived from the leaching of the superficial portions. The mine is only about 25 miles from the port of Strahan. It is proposed to construct a railway to it, and to erect large smelting works, capable of treating from 500 to 1,000 tons of ore a day, close to the mine in the valley of the Queen River, where ample water power is obtainable. The owners have gone to the London market for the money required for the railway, smelting works, and opening of the mine on the required large scale, and though the consummation of the deal has been delayed till next year it is understood that this is only temporary. A sum of £300,000 is required to put the mine on a proper basis, and then an annual out-put of from 5,000 to 10,000 tons of copper may be confidently expected. The colony therefore expects before long to take place among the large producers of copper.

(To be continued.)

Akka-Haifa & Damascus Railway.—The Syria Ottoman Railway Company, Limited, has been organized in London for the purpose of constructing and operating a railway from Akka and Haifa, on the Mediterranean coast of Syria, to Damascus, and also to improve the Akka-Haifa harbor and establish a navigation service on the Sea of Galilee. The main line will be about 150 miles long, and pass through a country, containing about one million inhabitants. The road will enable travelers from Damascus to reach the sea in about five hours instead of 12 to 14 as at present by diligence.

SEBENIUS' ROTATING INGOT MOLDS.*

By J. L. Sebenius.

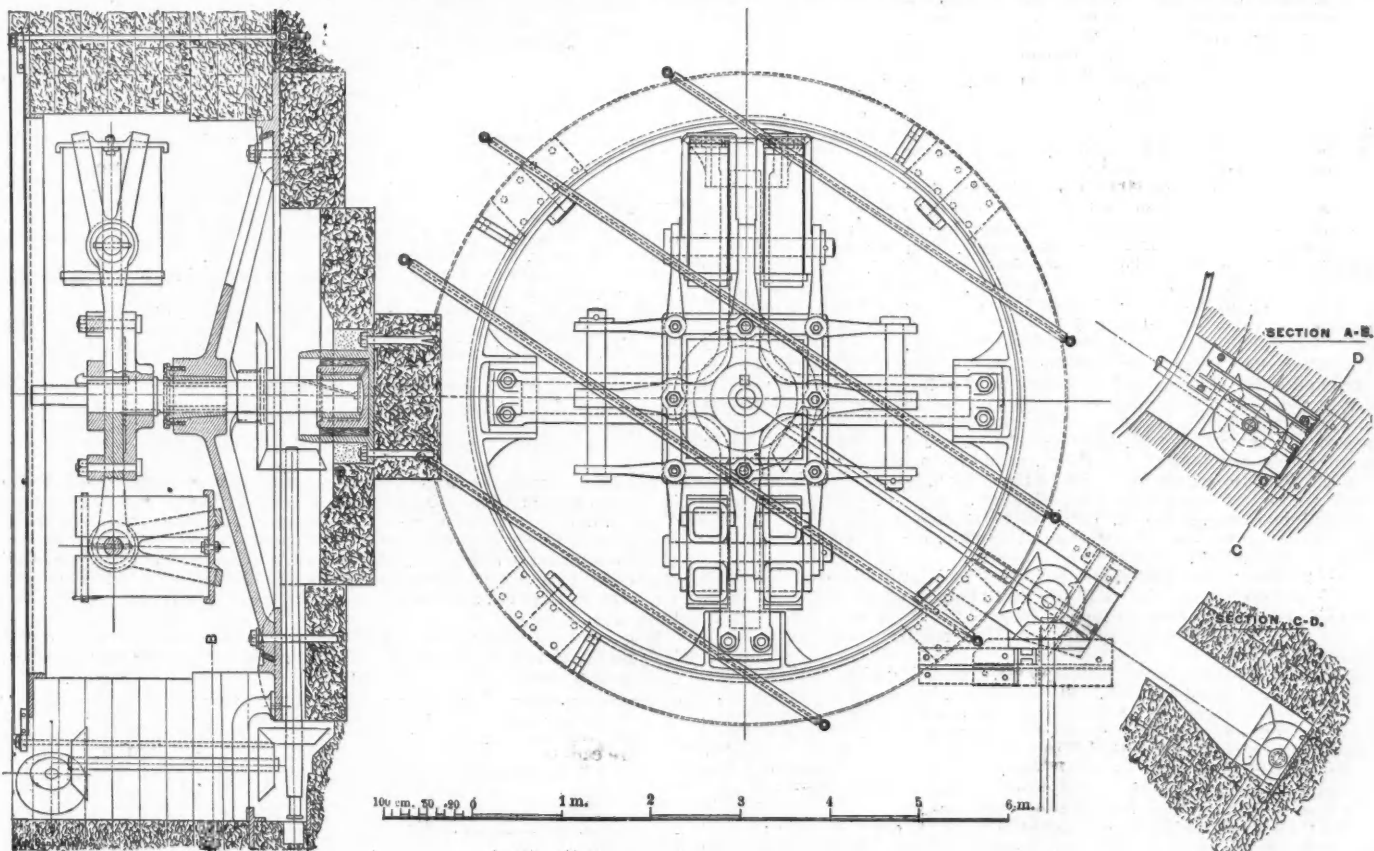
During a long experience in the manufacture of steel, I have made many experiments and tried various methods to prevent the formation of blow-holes. The use of silicon and aluminum has been partially successful, but at the expense of the quality of the metal, and does not rid the steel of the absorbed gases; these are merely distributed, making a large number of small blow-holes. Final success in the experiments has been reached by bringing the liquid steel directly at the close of casting under the influence of centrifugal force. As the steel gradually solidifies, the gases, which heretofore have been dissolved in it, are liberated. If force, or only an insufficient force, is acting upon the steel, these gases remain inclosed in the ingot, forming bubbles or blow-holes; but if, on the contrary, an adequate centrifugal force is acting on the metal, they are forced to leave their position and move toward the center of rotation.

The next step was to construct an apparatus by means of which the melted steel could be brought under the influence of centrifugal force; this apparatus has, so far, given entire satisfaction. Two of these rotators are now in operation in Sweden, and several are now under construction in other countries.

The machine is shown in the accompanying drawings. It consists of a horizontal yoke, attached firmly to a vertical shaft. The yoke itself is composed of arms set radially at right angles to each other, and to the end of each of which is fastened, by means of a pivot, a strong steel trap,

this defect. The physical and chemical conditions are the same throughout the entire ingot, except that steel of a high percentage of carbon shows, on the upper surface of a centrifuged ingot, a light skin, a fraction of an inch in thickness, which proves to be somewhat harder than the rest of the ingot. This fact I explain in the following manner: When, in an ordinary ingot, the liquid steel is solidifying, this action commences at the outer edge of the ingot and, proceeding inward, particles of carbon refuse, if I may use such an expression, to unite with the solidifying mass of steel, and these particles, in the form of carbon (or it may be, a carbide of iron), work their way toward the liquid center of the ingot, where they are ultimately captured by the final solidification of the entire mass of steel. In centrifuging, on the other hand, these particles, whether carbon or carbide, on account of the centrifugal force, and their lighter specific gravity, are forced out of the liquid steel, and, as they can hardly be expected to disappear, as the gases do, they naturally must be somewhere in the ingot, and they are, in fact, found in the very edge of the upper end. Here, however, they do no harm, since some small part of the end of the rolled-out ingot has to be sacrificed anyhow, on account of the piping. When this small part has been cut off, every rod, bar, rail or plate manufactured from centrifuged steel is homogeneous.

Through this method the following advantages have been secured, according to my experience: 1. Ingots are obtained free from blow-holes and sound, without adding any detrimental substances whatever. 2. The amount of carbon in the steel is evenly distributed throughout the whole ingot. 3. The piping is reduced about 80%. 4. The amount of fuel used in the heating-furnace is lessened, for the reason that, as there



SEBENIUS' ROTATING INGOT MOLDS.

movable in the vertical plane around the pivot. In this trap the molds are placed. When the apparatus is set in rotation the trap and the molds, with an increasing speed, deviate from the vertical position, until finally, when full speed is attained, the molds have taken up a radial position with the open ends turned toward the center of rotation. When the machine is brought to rest, the molds again take up their former vertical position.

The liquid steel is poured into the molds above referred to from one or two ladles, so constructed as to fill four molds at once, thus avoiding unnecessary loss of time. The fluidity of the liquid steel is an important factor in attaining the desired results. As soon as the molds are filled, the rotator is set in operation, and a speed of about 120 revolutions per minute is maintained until the steel in the mold is solidified. During the whole time of rotation gases are seen to escape from the open ends of the molds, and when they cease to do so it is known that the steel has taken up the solid state. For ingots of, for instance, about 15 in. square, the solidification will require about 10 minutes; and for every ton treated in this way, about 5 to 6 H. P. will be required.

If Bessemer or open-hearth steel is "centrifuged," the resulting quality is the same as that of ordinary crucible-steel of the same chemical composition. This can readily be explained: The crucible cannot change the steel in any other way than by making it denser, and thus the ingots sounder; and, if this soundness can be effected by other means, crucible and centrifuged steel of the same chemical composition must show the same physical qualities. In steel of a high percentage of carbon, the ingots, as generally made, show an inner core clearly harder or higher in carbon than the rest of the ingot. The centrifuged steel does not show

are no blow-holes, no welding heat is needed; and, for the same reason there is a saving in time, and also in the material that would be lost through oxidation in a more intense heat. The ingot requires only the heat needed to make it pliable for the rolling-mill. 5. The steel, after being centrifuged, shows all the physical qualities of a crucible steel of the same chemical composition.

New Railroad in India.—It is proposed by the Rajpipla State to construct a railway from Ankleswar station on the Bombay, Baroda & Central India Railway, to Nandod, the capital of the State. The line will be 2 ft. 6 in. gauge and about 40 miles in length. The officers of the Bombay, Baroda & Central India Railway are locating the line. The proposed railway is roughly estimated to cost about 30,000 reis per mile.

Extending the Tientsin & Shanhaikwan Railway.—Steps are being taken to extend this road eastward from the foot of the Great Wall to the Taling River which flows through "The Barrier" and enters the sea some 60 miles east of Newchwang. Already the road from Shanhaikwan to the Taling River, a distance of some 360 li, has been levelled, and it is expected that this spring will see the work of laying the sleepers and rails commenced. The road in one or two places is difficult, and entails a considerable amount of blasting at the further end to carry it through some high hills, spurs of the Chan-pehshan or "Long White Mountain," and a massive bridge has already been planned to carry the line across the Taling River, which is very wide and deep at the point where it is to be crossed. This will probably be the most difficult part of the work. From the Taling River to Moukden, which is to be the present terminus of the railway, the work is comparatively easy.

* Abstract from discussion of Prof. R. Akerman's paper on the "Bessemer Process in Sweden," before the American Institute of Mining Engineers.

THE PHOSPHATE BEDS OF TENNESSEE.*

By Dr. J. M. Safford.

The phosphate beds of middle Tennessee, now attracting so much attention, are found interstratified with the rocks of the highland, or plateau, country, lying west of the meridian of Nashville, and between that and the Tennessee River. They are met with in all the counties within the limits mentioned. Their geological horizon or position is a very definite one, well marked and easily found. They have thus a wide range and a definite stratigraphical place over a great territory, but it must not be understood that they are everywhere thick and good enough to be worthy of consideration. Over much of the territory they occur in traces, a few inches in thickness, or they are too much mixed with sand, or even run wholly into sandstone. It is only in certain favored, yet locally extensive, regions, where they occur in sufficient volume to be made available for mining purposes.

An examination of the geological relations shows that there are two distinct beds of the phosphates, one above a stratum known as the black shale; the other below the shale. The one above is a bed or layer of concretionary masses, balls and kidney and knee shaped forms from the size of walnuts to that of a man's head. These are sometimes loosely disposed in a greenish or bluish shale, and sometimes tightly packed together like so many cannon balls in a layer 8 or 10 in. thick. Ordinarily the layer has less thickness, often, in fact, being represented by only a few scattered concretions. But thick or thin, it may be said to be universally present, its kidneys serving to indicate the place of the black shale and the underlying bed when these are concealed by debris or soil.

The other phosphate, that underlying the shale, and the more important of the two, is, in its best presentations, a well defined, continuous stratum of dark bluish or bluish-black, rarely grayish, rock, with fine or coarse grain. Its regularly stratified character and its dark color make it look like a bed of stone-coal. This comparison is a good one and gives a satisfactory idea of the way it lies, and, indeed, of the manner in which it will have to be mined.

The black shale which lies between the two phosphate beds is found, as a rule, in its proper place or horizon in all the counties. It is rarely absent or wanting. It is nearly black, contains some bituminous matter, and flames up when thrown upon live coals, very much as a piece of porous brick would that had been soaked in coal oil. Owing to these properties it has been considered by persons, ill-informed on the subject, to indicate or to be the "blossom" of stone coal. Hence it has been shafted and tunneled and pitted in a thousand places in Tennessee for coal, with much expenditure of muscle and money, and all to no purpose. This black shale is far older than the coal. It runs, in its easterly extension, under the Cumberland Mountain and a thousand feet below the lowest coal. And this brings out the age of the phosphate beds, for they and the black shale go together. All three pertain to the same Devonian period. A typical section, showing the different formations in their regular order from the surface down, would be as follows:

No. 1. The uppermost formation of the section, is a great body of bluish shale which has been named Harpeth shale. It is of sub-carboniferous (Mississippian) age, is 150 ft. or more in thickness and makes up the middle portion of the hills in Lewis, Hickman and wellnigh all the counties of this belt.

No. 2. The upper phosphate bed (the balls and kidneys) has been sufficiently spoken of. We only add that analyses of this material, made by various persons, show a range of from 60 to 77% of bone phosphate.

No. 3. The black shale ranges in thickness from a mere trace or nothing to 10 ft.

No. 4. Is a local layer of bluish shale, containing phosphatic kidneys. I have seen it 3 and 4 ft. thick. Its occurrence, however, is exceptional.

No. 5. Is the lower phosphate bed, and the one having most importance. I add to what has been said above, that its material often shows, under the magnifier, points of pyrites. The coarse-grained varieties, under the same conditions, abound in small, seed-like bodies or fragments of a compact phosphate, and also show, as a rule, a small spiral shell, and now and then a fish tooth or a fragment of a fishbone.

The thickness of this lower phosphate ranges from a few inches to 52 in., or to something more than 4 ft., good phosphate rock. This latter thickness of rock I have not seen, but, from a reliable source, I have no doubt as to its correctness. The thickness I have myself seen is 3 ft.

No. 6. This division, underlying all and generally occupying a low position in the valleys, is limestone, in some places of Niagara age, in others of Hudson or Nashville. This completes the series of formations. Nos. 2, 3, 4 and 5 are Devonian. No. 6 is Silurian.

The probable extent of the deposits is still to be determined. An army of prospectors is already in the field, but little scientific work has yet been done. The Swan Creek Valley, in Lewis and Hickman counties, is the region which has so far attracted most attention.

Boom Town Litigation.—The suit of the Berryville Land Company of Virginia against D. B. Strouse, of Salem, was decided in the County Circuit Court in favor of the defendant, relieving him of \$8,000 worth of stock subscribed for. This company, like many others, had failed to make good its prospectus in certain particulars.

Russian and American Petroleum.—The respective consumption of American and Russian petroleum in the various countries is, according to recent statistics given by London "Engineering," as follows:

	Amer.	Russ.		Amer.	Russ.
Germany, Belgium and Holland.....	90%	10%	France.....	77%	23%
Austria-Hungary.....	...	100%	Great Britain and Ireland.....	68%	31%
Turkey.....	1%	99%	India.....	35%	62%
Italy.....	62%	38%	China.....	71%	29%
Spain and Portugal.....	100%	...	Japan.....	75%	25%

Of the world's consumption of petroleum about 58% is of American and about 42% of Russian origin.

*Abstract from paper read at the April meeting of the Engineering Association of the South.

METHODS OF COPPER SMELTING IN JAPAN.

A very interesting display, showing the former copper smelting practice of Japan by models of the furnaces used, was exhibited in the Japanese Pavilion of the World's Exposition, at Chicago. The argentiferous sulphide copper ores of Japan were formerly treated by the following process:

1. Calcination and fusion of the ore.
2. Calcination and fusion of the matte.
3. Leading.
4. Liquefaction of the copper lead alloy.
5. Fusion of the liquefaction residue.
6. Toughening of the copper.
7. Cupellation of the argentiferous lead.

The stall used for calcination is built of rough stone work, without any chimney, and is usually protected by rough sheds from snow or rain.

The fusion (reduction smelting) of the calcined ore is conducted in a simple circular brasqued hearth furnace. An excavation in the ground 6 ft. square and deep is lined with stone, upon which a thick layer of refractory clay is placed, leaving a depression 14 in. deep and 18 in. in diameter. A charge of roasted ore and charcoal melts in two or three hours, after which the slag is removed and a new charge added.

After the process has been repeated two or three times, until from one to three tons of ore have been melted down, the molten mass is cooled on the surface and is stripped away as a series of thin disks, by an iron hook. This matte is calcined in stalls similar to those used in ore roasting and is reduced down to black copper in a furnace like the previously described one, with the addition of a temporary cover for the hearth, built up from tiles and luted.

The black copper containing more than 30 ounces of silver per ton is usually subjected to the operation of leading, in which the copper is alloyed with about 40% of lead, in a simple hearth furnace.

After the liquefaction of the argentiferous copper alloy, the copper residue is subjected to oxidizing smelting. About 1,500 lbs. of the copper residue are worked in one day, producing 1,470 lbs. of rosette copper and 33 lbs. of slag, containing about 10% copper.

The toughening of the copper is performed in a clay crucible heated in a brasqued hearth. The rosette copper, broken into pieces, is charged into the crucible with charcoal. The molten bath is stirred with a long, hard stick of charcoal in order to reduce the cupreous oxide, dissolved in the molten metal. As soon as the metal reaches the required toughness, the crucible is taken out of the furnace and the metal cast in moulds under hot water, whose temperature is about 80° C.

The cupellation of the argentiferous lead is effected in a small hearth in the usual way.

The above described process, which is still employed at many primitive mines, was applied many centuries ago in Japan; some of the principles involved, however, have received re-application in the modern process of John Crook.

NATURAL GAS IN INDIANA.

By E. S. Gorby.

The first successful efforts to develop natural gas in Indiana were made in the last half of 1886. The pioneer well was drilled in Eaton, Delaware County, in September of that year, and since then the number of wells has increased rapidly and now is estimated at 1,500. The field covers about 5,000 square miles, in about half of which the wells are "gassers" of the first class. The producing wells are drilled to a depth varying from 800 to 1,000 ft., and in all cases the gas stratum is in the Trenton limestone.

In character Indiana gas resembles closely the Ohio gas at Findlay, and is drawn from the same horizon. The following table makes an analytical comparison from the two localities:

Description.	Ohio.			Indiana.			
	Fosteria.	Findlay.	St. Mary's.	Muncie.	Anderson.	Kokomo.	Marion.
Hydrogen.....	1.89	1.64	1.94	2.35	1.86	1.42	1.20
Marsh gas.....	92.84	93.35	93.85	92.67	93.07	94.16	93.57
Olefiat gas.....	.29	.35	.20	.25	.47	.30	.15
Carbon monoxide.....	.55	.41	.44	.45	.73	.55	.60
Carbon dioxide.....	.20	.25	.23	.25	.26	.29	.30
Oxygen.....	.35	.39	.35	.35	.42	.30	.55
Nitrogen.....	3.82	3.41	2.98	3.53	3.02	2.80	3.42
Hydrogen sulphide.....	.15	.20	.21	.15	.15	.18	.20

Approximately 30,000 cu. ft. of gas have the heating power and displacement of one ton of coal. In 1886 gas displaced in Indiana 150,000 tons of coal; in 1887, 300,000; in 1888, 660,000; in 1889, 1,001,281 tons of coal, valued at \$2,002,762, and wood valued at \$72,900. Since then the consumption has greatly increased.

Besides supplying the gas belt with the fuel needed by a rapidly increasing population for domestic uses, and numerous large industrial concerns for manufacturing purposes, gas has been piped to distant localities and now supplies more than 18 cities and towns, Chicago among them, outside the gas-belt.

From the beginning there has been a criminal waste of this fuel in two ways, by leakage and flambeaus, and by extravagant and unnecessary heating. The former source of waste has been greatly abated, the second will not be until customers are obliged to pay for their supplies by the foot.

The period of exhaustion has been clearly entered upon. The initial pressure of new wells has fallen from 325 lbs., which was in the beginning common over the best part of the area, to a point now below 300 lbs. The boundaries of the field are rapidly drawing in toward the center. From 10 to 15 years will probably witness the exhaustion of the present gas area as a source of fuel supply to large manufacturing concerns.

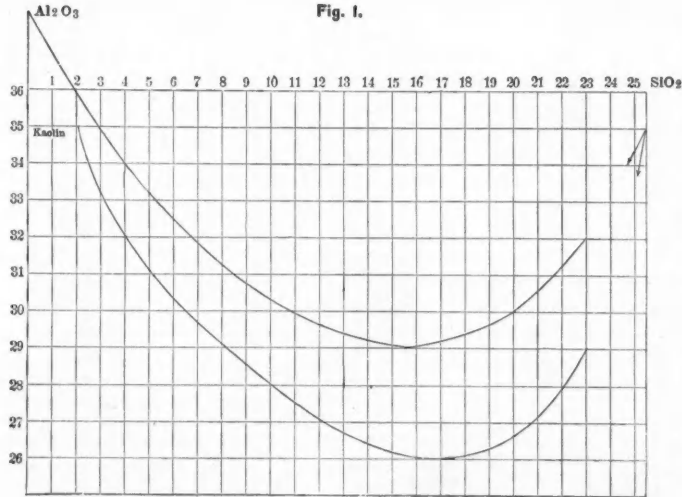
Electric Buoys in Mobile Bay.—Capt. W. S. Sholey and Lieut. C. H. West, U. S. N., with Mr. Ira W. Henry, are making a topographical survey of the shores of Mobile Bay to determine the practicability of lighting the Thirty-mile Channel with electric buoys.

DETERMINATION OF THE REFRACTORINESS OF FIRE-CLAYS.*

By H. O. Hofman and C. D. Demond.

There are two methods of determining the fusibility or refractoriness of fire-clay, the theoretical and experimental. In the former, conclusions are drawn from the chemical composition; in the latter from the changes which the clay undergoes when subjected to intense heat.

In the theoretical method, leaving out the hygroscopic and combined water and organic matter as not affecting the fire resisting property, the refractory constituents are alumina and silica, and the fluxing constituents



agents magnesia, lime, soda, potash and ferric oxide. According to Bischof, alumina is the least fusible component, and silica follows close upon it, though a mixture of the two has a much lower melting point. The manner in which silica affects the refractoriness of alumina is shown on the diagram Fig. 1, by Seger.

The abscissæ represent the milling point of Seger cones Nos. 26 to 36; the ordinates the relative amounts of alumina and silica in the mixture. The least fusible consists of one molecule of alumina and two of silica, and melts, as shown by the upper curve, at a temperature indicated by Seger cone No. 35. The fusibility is seen to increase with the amount of silica up to the proportion, 1Al₂O₃:17SiO₂, and then to decrease (on account of the preponderance of silica, which cannot combine to form a silicate),

tments and their relation to alumina and silica, and, secondly, on the relation of alumina and silica to one another. Bischof arrives at the refractory character of a clay by what he calls the refractory quotient, which he obtains by dividing the quotient of the oxygen of the fluxes into that of the alumina by the quotient of the oxygen of the alumina into that of the silica.

$$\frac{O \text{ in } Al_2O_3}{O \text{ in } RO} + \frac{O \text{ in } SiO_2}{O \text{ in } Al_2O_3}$$

Bischof's method has found pretty general acceptance within the necessary limitations. It is, however, questioned to some extent by Seger, who recommends adding the ratio of the fluxing constituent to the alumina with that to the silica, and multiplying this sum by the quotient obtained from dividing the latter into the former, thus:

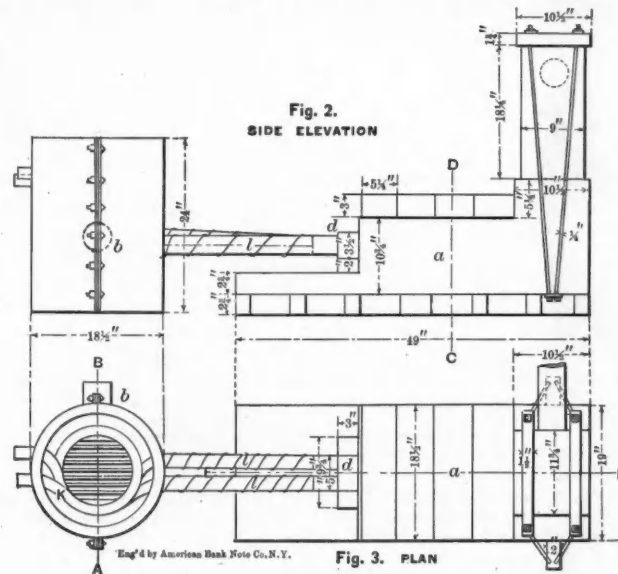
$$\left(\frac{O \text{ in } Al_2O_3}{O \text{ in } RO} + \frac{O \text{ in } SiO_2}{O \text{ in } RO} \right) \times \left(\frac{O \text{ in } Al_2O_3}{O \text{ in } RO} : \frac{O \text{ in } SiO_2}{O \text{ in } RO} \right)$$

No deduction, however, made from chemical analyses can have the force of a positive determination, because analysis necessarily ignores the physical constitution, whereas a coarse-grained clay is less fusible than a fine-grained, and a compact than a loose one.

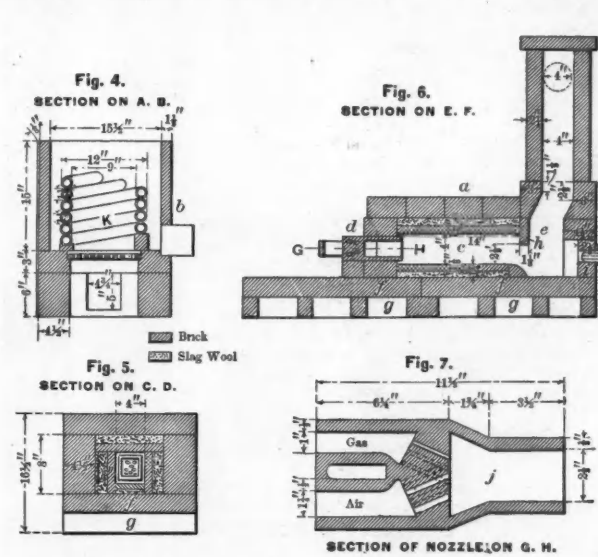
Experimental methods may be classed as direct and indirect. Until lately all the direct methods have given only what may be called qualitative results, that is, small samples of clay were exposed to an elevated temperature and the effect noted. Bischof coats a piece of oiled paper with a clay paste, and gets thin tablets off when the clay dries. Another test is to place a sample of the dry pulverent clay in a crucible and heat in a furnace. His effective tests to distinguish fritting from fusing are to draw a line with pen and ink over the fracture of the sample or touch it with the tongue. If it is fritted it will adhere, and the ink will spread as it would on blotting-paper; if it is fused it will not stick to the tongue, and the pen and ink line will be sharp and clear. The transition from qualitative to quantitative work is made by Otto who forms two small test-bricks (4½ by 2½ by 1½ in.) from a uniform mixture of half-raw and half-burnt clay, places them alternately with two other bricks of the same size and of known properties to form an oblong on a refractory pedestal in a crucible furnace, and then heats them with charcoal, coke, and forced draught for about two hours. The only quantitative direct method is that by Seger and Cramer, who form from the sample of clay to be tested a number of cones, inclose a test-cone with two different numbers of the standard cones in a magnesia crucible, and heat with gas-carbon in a Deville furnace lined with chromite.

In these experiments the sample has necessarily been excluded from view and the temperature of the furnace could not be controlled with any degree of nicety. To overcome these difficulties an attempt has been made to construct a furnace in which the temperature could be easily measured and the samples watched, and to devise a method of testing which did not require temperatures near that of the melting point of platinum.

The furnace finally adopted is shown in Figs. 2 to 7. It consists of two parts: the furnace proper, a, and the heating stove b. The former consists of a rectangular combustion-chamber, c, having a nozzle, d, at one



HOT-BLAST EXPERIMENTAL FURNACE, FIRED WITH ILLUMINATING GAS.



until, finally, the alumina has disappeared and the melting-point of silica, equal to that of Seger cone No. 35, has been reached. The lower curve shows in a similar way the effect of silica on the fusibility of the kaolin from Zettlitz, Bohemia. The practical deduction is that the refractoriness of a fire-clay increases with the amount of alumina it contains.

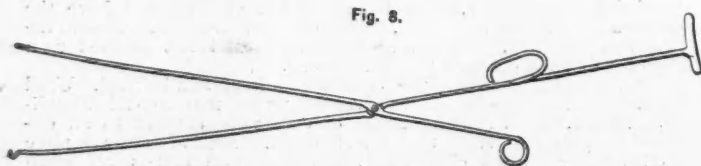
The effects of the fluxing constituents have been studied by Bischof and Richters. The latter, in 1868, propounded the law that their fluxing property is inversely proportional to their molecular weights; thus, 40 magnesia would have a slagging effect equivalent to that of 56 lime, 62 soda, 94 potash or 160 ferric oxide. While Bischof supports this view to-day, it is attacked by Seger, who maintains that ferric oxide has a stronger slagging effect than any other of the four bases. Whatever may be the precise order of these bases, it is a settled fact that if they exceed 6% of the ignited clay it cannot be classed as refractory.

To sum up, the fire resisting power of a clay, considered from a chemical point of view, depends first upon the character of the fluxing-consti-

end for the supply of gas and air. This is inclosed with thin fire-brick, figs. 5 and 6, surrounded by slag-wool. At the flue end there is a curtain-brick, h, which deflects the flame away from the roof. At the foot of the chimney is a working door, 4½ by 5 in., through which the samples are introduced with tongs, Fig. 8—one arm 45 in., the other 34 in. The stove (c, Figs. 2, 3, etc.), in which air and gas are heated before they come together in the nozzle, was proposed by Prof. R. H. Richards. It consists of a sheet-iron cylinder lined with fire-clay and closed at the top with a sheet-iron cover ¼ in. thick, not shown in the drawing having two peep-holes. Above the ash-pits is a circular cast-iron grate on which rests the two heating-coils, k, made of wrought-iron pipe wound together. The hot gases from the charcoal fire maintained on the grate pass up inside the coils, down on the outside, and then off through the flue, which is at the level of the grate. Two pieces of wrought-iron pipe, l, inclosed in slag-wool, which is held in place by asbestos paper and wire, are screwed onto the protruding ends of the heating coils; they abut against the clay nozzles, the joints being made airtight with a luting of clay and slag-wool.

* Abstract of a paper read at the Virginia Beach Meeting of the American Institute of Mining Engineers, February, 1894.

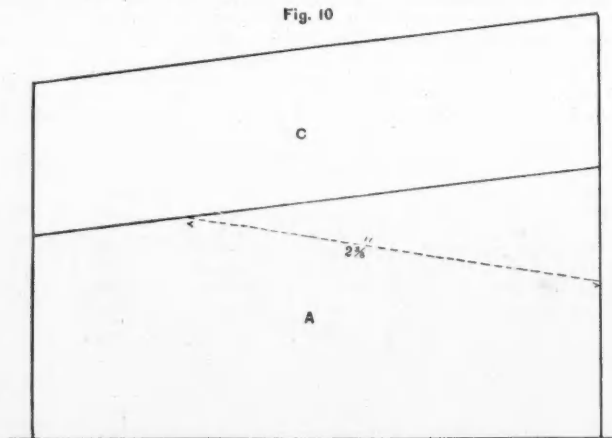
The form of cone adopted for test pieces was that of the large-sized Seger cone. As they are not absolutely uniform in size, the dimensions $\frac{3}{4}$ by $\frac{3}{4}$ by $\frac{3}{4}$ in. for base and 2 in. for sides were selected. The clay and other substances used in the experiments were all finer than 100-mesh and were first mixed dry, then moistened and worked with a spatula. When necessary, 5% of dextrine was added to give toughness. The molds used, Figs. 10 and 11, consist of three blocks of oiled wood held together by two 3-in. clamps. In making the cones, two parts, A and B, of the mold are clamped together, the clay mixture is pressed in with the spatula; the third part, C, is clamped on; the clay is pressed in firmly from the open base with a suitable piece of wood to insure a good edge and a sharp point, and the mold is then carefully taken apart. The samples were air-dried from 15 to 20 hours, then slowly heated on an iron plate over a Bunsen burner and placed in the furnace. When a sample bent over so that it was wholly below the flame it was considered to have been fused.



The method followed is based on the use of calcium carbonate as a flux. The amount of lime it is necessary to add to a weighed quantity of clay to form a fusible compound at a certain elevated temperature forms a criterion of its refractory value. The materials experimented on were the following:

Material.	Al ₂ O ₃		SiO ₂		RO		MgO.	CaO.	Na ₂ O.	K ₂ O.	Fe ₂ O ₃	Total.	Oxy-gen.	Igni-tion. Loss.	30 in Al ₂ O ₃ 30inRO	OinSiO ₂ 30inRO	Oin SiO ₂ 30 in Al ₂ O ₃	Refractory quotient.		
	Total.	Oxy-gen.	Com-bined.	Non-com-bined.	Total.	Oxy-gen.												Bischof R. Q.	Seger R. Q.	
Fire clay, Mt. Savage, Md.	29.10	13.56	28.35	31.84	60.19	32.08	Trace	Trace	0.03	0.03	0.89	0.92	0.18	9.90	25.11	59.41	2.36	10.64	35.81	
Kaolin, Blanford, Mass.	31.76	14.80	.....	.....	52.08	27.73	0.54	Trace	Trace	Trace	Trace	0.54	0.22	15.55	22.42	42.01	1.87	11.99	34.45	
Brick clay, Camb'dge, Mass.	28.90	13.46	18.04	30.95	48.99	26.11	3.66	7.10	4.73	0.13	0.20	4.32	19.81	5.57	2.98	0.80	1.56	1.93	0.41	1.22
Quartz, Berkshire, Mass.	.....	.....	.....	.....	99.88	53.42	.....	.....	.....	.....	.....	0.12	0.12	0.22	.....	.....	.....	.....	.....	.....
Alumina, Syracuse, N. Y.	98.46	45.88	.....	.....	0.25	0.13	.....	.....	0.50	.....	0.04	0.54	0.13	0.75	.....	.....	.....	.....	.....	.....
Calcium carbonate	.....	.....	.....	.....	.....	.....	.....	56	.....	.....	.....	.....	.....	41	.....	.....	.....	.....	.....	.....

Experiments Nos. 9 to 11, with silica to calcium carbonate as 3 to 1, make a decidedly better showing than those with silica and calcium carbonate in equal parts. The critical mixture contains between 20 and 30%



flux, and while the temperatures are higher than before, viz., 1,510° C. vs. 1,440° C., the difference is not great enough to invalidate the comparison.

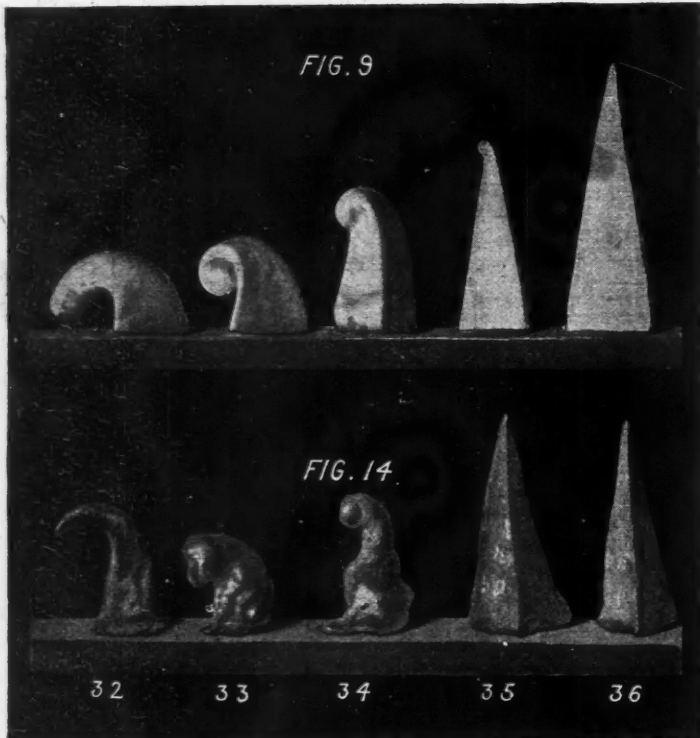


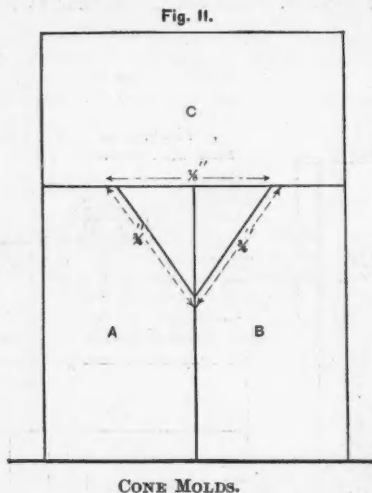
FIG. 9.—EXPERIMENTS WITH SEGER CONES. FIG. 14.—EXPERIMENTS WITH BRICK-CLAY FROM CAMBRIDGE, MASS.

Mount Savage, Md., clay belonging to the hard variety. It has a conchoidal fracture; color from gray to chocolate brown; disintegrates slowly in the air, and is plastic only when ground very fine. It is infusible before the blowpipe. The results of the experiments with the light variety are shown in Fig. 12.

Experiments Nos. 1 to 4, in which pure calcium carbonate was added to the clay, form a good series; for the fusibility increases regularly with the additions of the flux. Cones Nos. 1 and 2 are quite fused, No. 3 is just fused, while No. 4 is only glazed and not bent over. The critical mixture contains, however, only between 5 and 10% of the flux, which is a very small quantity of reagent to produce such a decided result.

Experiments Nos. 5 to 8, where equal parts of silica and calcium carbonate are used, show little improvement over those with calcium carbonate alone. The critical mixture contains from 10 to 20% of the flux. The temperatures were lower than might have been expected from the refractory quotient.

Experiments Nos. 12 to 15 represent the mixtures of clay with the flux, 5 silica to 1 calcium carbonate, which is a further step in advance. Cone No. 12 shows good fusion; No. 13 is less completely bent; No. 14 is just a little inclined; and No. 15 is only glazed, and beaded at the apex. The critical mixture contains from 30 to 40% of flux. The proportion of 5 silica to 1 calcium carbonate is the highest that was used.



The kaolin from Blanford, Mass., was soft, pinkish-white and slightly plastic. The experiments No. 16 to 29 were carried on in the same manner as those with the Mount Savage clay. The results are shown in Fig. 18.

The brick clay from Cambridge, Mass., shown in Fig. 14, is soft, light gray and plastic, and readily fusible. Trials Nos. 30 and 31 show how readily fusible the clay is; in fact, the specimens upon heating quickly swelled up into a spongy mass, even with 20% of stiffening ingredients, fusion occurred at 1,300° C., and it required 40 to 50% to enable it to resist high temperature.

In these experiments a definite standard temperature has not been sought. It seemed of greater importance to study, first, the behavior of several series of mixtures of clay, silica and lime at elevated temperatures and to measure them. Of the fluxes tested, the mixtures of three silica to one calcium carbonate, and five silica to one calcium carbonate, have proved valuable.

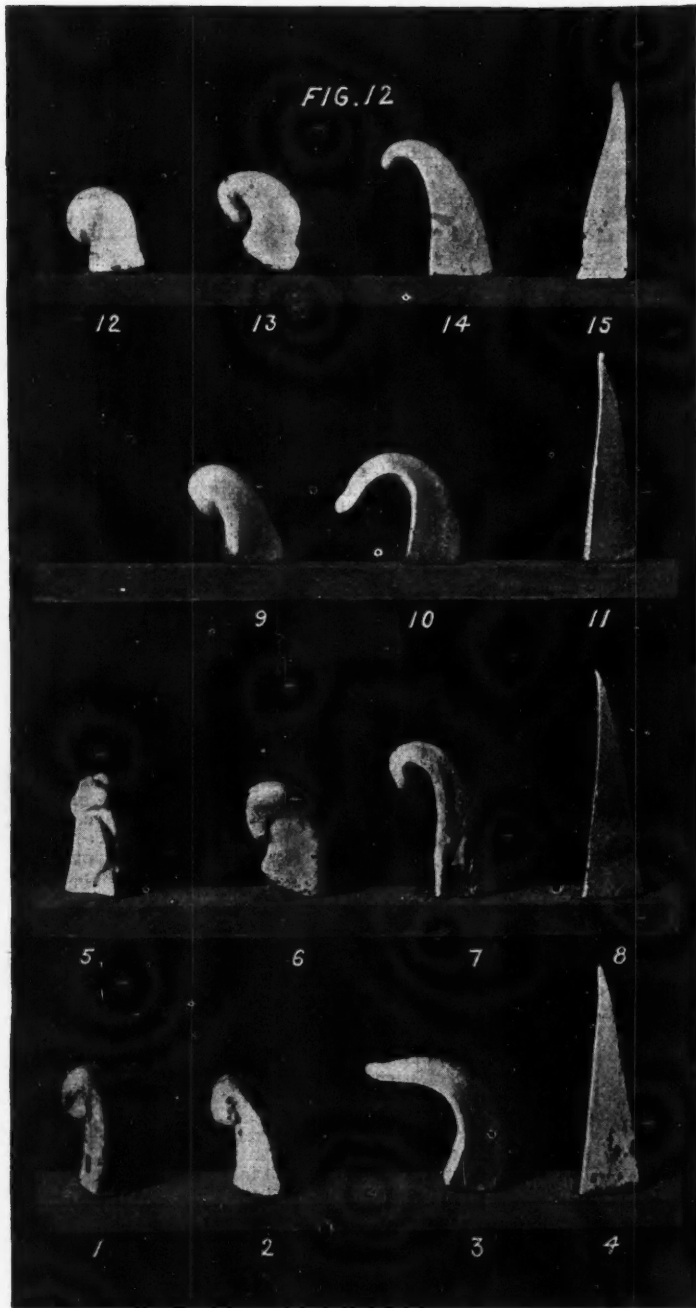
German Exports of Railroad Material.—In 1893 Germany exported 87,300 metric tons of rails, against 113,712 tons in 1892. The exports included also 37,548 tons of rail fastenings and steel ties last year, against 39,558 tons in 1892. There were 4,275 cars of various descriptions exported, and locomotives weighing 4,958 tons; the number of the latter is not given. The German manufacturers hope that last year's figures will be largely increased in 1894, chiefly on account of the new treaty with Russia.

GERMAN IRONMAKING AND ITS RESIDUAL PRODUCTS.

The advance of Germany as a great iron-producing country, and the strength of her competition in some of the markets of the world which British manufacturers have hitherto regarded as special fields of enterprise, have awakened surprise, if nothing more. Twenty years ago, for instance, Germany's total make of iron was 886,000 tons, and of steel 125,000 tons, together 1,011,000 tons; while last year the total was 3,878,000 tons. Of this total one-third is bar and section iron; blooms, billets and ingots making up 800,000 tons; plates, 425,100 tons; and rails, 891,400 tons. In recent years there have been cases of German iron and steel manufacturers quoting to British clients a lower price than home makers. It is assumed by some that the product is inferior, but where specific tests have to be met this is scarcely tenable. Labor may be slightly

subsidiary products, and half of these are of the Otto type. The oven more largely adopted in Belgium—the Semet-Solvay—is cheaper to construct, but requires a special mixture of fat and lean coal which is not always easy of arrangement, and while the coke made is of high and uniform quality, it gives less ammonia, tar and gas than the German oven.

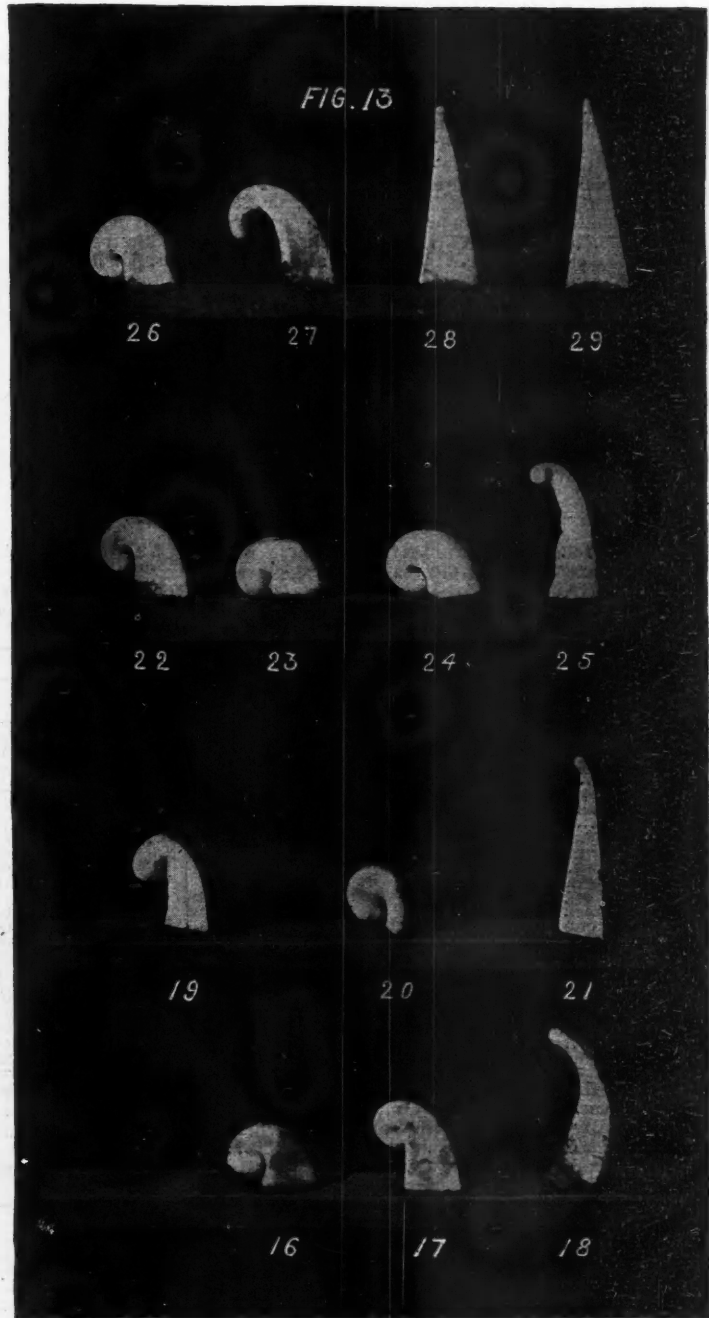
The Otto oven is 32 ft. long, 16 in. wide, and 5½ ft. high, combined with a Siemens regenerator in such manner that the air to be used for the combustion of gases is first heated to 1,800° Fahr. The most economical arrangement is to have a battery of 60 ovens, each alternate one being filled every 48 hours. The oven is charged from above, through three openings, with 6½ tons of air-dried coal, heat applied, and the gases subsequently generated drawn off through collecting pipes into coolers or scrubbers, where the tar and ammonia are deposited in water, and the gas conducted to the bottom of the oven to assist in the initial process of



EXPERIMENTS WITH FIRE-CLAY FROM MT. SAVAGE, MD.

cheaper, but even this is doubtful, and certainly wages, especially to coal miners, are on the increase, so that fuel is dearer. The attention of the Consul-General for the United States at Frankfort has been drawn to this problem, and in one of his reports he presents the case concisely.

The growing importance of the iron industry in Germany is said by him to be due to two fundamental facts—the introduction of the basic process, which enables cheap and abundant native ores to be used; and the application of chemical skill to the recovery and utilization of the by-products of coke manufacture. The latter point is of special interest, for while there is a growing tendency to construct ammonia recovery works for the recovery of the products from the blast furnaces, little has been done in the case of coke-making. The difficulty formerly urged was the possibility of injuring the quality of the coke. The type of furnace used in Germany, however, has overcome this. The most largely adopted oven in Germany is said to be the Otto-Hoffmann, but there are several in use. There are in all about 3,000 coke ovens which save the



EXPERIMENTS WITH KAOLIN FROM BLANFORD, MASS.

heating the coal. With German coal the heat remaining after depositing the tar and ammonia is sufficient to roast the coal and provide, in addition, steam and light, or it may be of service in some other direction. The product from good coal containing from 15 to 17% of water is about 76% of coke, 1.15 to 1.25% of sulphate of ammonia, and from 2.5 to 4% of tar. Batteries of 60 ovens in three districts gave the following results in pounds per ton of coal:

	Coke.	Tar.	Sulphate of ammonia.
Ruhr.....	1,672	60.5	25.3
Silesia.....	1,496	93.5	25.4
Saar.....	1,540	91.3	18.7

These 180 ovens produce per annum 139,800 tons of coke, Ruhr making 51,300 tons, Silesia 48,000 tons and Saar 40,500 tons. The aggregate sulphate of ammonia recovered weighed 2,112 tons and the tar 7,260 tons. Moreover, the waste heat, after the recovery of these by-products, was

sufficient to work the ovens and give a large surplus for other purposes. This surplus, in the case of Ruhr, was 12,800 cu. ft. per oven per day, Silesia 16,000 and Saar 12,800 cu. ft. In other words, a battery of 60 ovens, in addition to providing the coke and the residual products, is self-heating, and gives off per day heat which is equivalent to from 45,600 lbs. to 57,000 lbs. of coal—sufficient to run machinery indicating from 1,200 to 1,600 indicated horse power. Of course, a special plant is necessary to work the process, so that in making comparison with the ordinary coking establishment, allowance must be made for this extra first cost.

The approximate gross value of the process is easily obtained. Taking the case of Silesia, we find that in producing 48,000 tons of coke in 60 ovens, 3,000 tons of tar are recovered each year, which at 2s. per cwt. yields £6,000, and 840 tons of sulphate of ammonia, at 11s. per cwt., equals £9,240—together, £15,240. To this amount must be added the fuel saved. In Silesia the total production of gas is 36,800 cubic feet per oven per day, and after consuming 20,800 cu. ft. in roasting the coal in the production of the coke, a surplus of 16,000 cu. ft. remains for other purposes, equal, as we have already indicated, to 57,000 lbs. of coal for the 60 ovens, sufficient for 1,600 I. H. P. during 18 hours per day at 2 lbs. per I. H. P. per hour. The value of this coal—about 9,000 tons per annum—should be added to the £15,240 received for tar and sulphate of ammonia, in determining the gross value of the residual products. This does not include the value of the heat utilized in the oven, which is equivalent to an additional 12,000 tons per annum. Sixty ovens in Westphalia cost in construction £34,580, or £576 each, and the tar and sulphate of ammonia produced in one year's working provided a revenue of £8,375, or about 25 per cent. on the capital invested in the plant.

The other instances given might also be worked out, but it is probably sufficient to show that Germany can afford to credit actual cost of production with a large sum, the result of the recovery and sale of by-products. Of course this effects the selling price of their iron and steel, and offers at least a partial explanation for the low quotations made by German makers in competition with British manufacturers. The influence on the price of tar and ammonia of the 3,000 ovens in use in Germany and Austria is pronounced. In 1883 sulphate of ammonia was worth 16s. per hundredweight, but now sells at 11s., and tar has dropped in price from 3s. to 2s. per hundredweight. The decline in prices is not alarming, however, as in Westphalia four years' revenue suffices to pay the plant.

THE MINERAL PRODUCTION OF GERMANY.

The following figures for the mineral production of Germany, including Luxemburg, for the year 1893 are given by the "Kohlen Zeitung" and have been prepared from the reports made by the various mines and works. The production is given in metric tons; the values we have reduced to dollars.

	Quantities.		Values.	
	1892. Metric tons.	1893. Metric tons.	1892.	1893.
Coal.....	71,372,193	73,908,999	\$131,744,794	\$124,616,605
Brown coal (lignite).....	21,171,857	21,567,218	14,626,475	13,750,754
Graphite.....	4,036	3,140	63,240	52,000
Asphalt.....	53,279	47,238	104,713	89,245
Petroleum.....	14,527	13,974	219,941	195,733
Rock salt.....	662,577	669,042	708,046	736,029
Kainit.....	548,445	604,866	1,385,717	2,397,776
Other potash salts.....	862,630	861,162	2,532,169	2,762,660
Glauber salts.....	19,207	8,818	22,356	17,057
Boracic.....	179	184	13,614	11,289
Iron ore.....	11,539,013	11,457,491	10,319,713	9,950,141
Zinc ores.....	80,237	788,394	5,305,324	3,574,163
Lead ores.....	163,372	168,411	3,671,881	3,536,042
Copper ores.....	567,738	584,875	5,128,386	4,530,683
Gold and silver ores.....	17,536	18,778	910,500	773,931
Tin ores.....	63	69	23,001	1,888
Cobalt, nickel and bismuth ores.....	3,185	4,370	198,208	186,410
Uranium and wolfram ores.....	48	44	11,557	10,778
Antimony and quicksilver ores.....	16	16	100	100
Manganese ores.....	32,561	40,788	128,924	122,988
Arsenic ores.....	2,146	2,756	19,491	25,363
Pyrites.....	115,243	121,334	215,887	219,427
Other sulphur and alum ores.....	2,973	791	2,016	1,250

The fuel production, it will be noted, showed only a moderate increase last year. The important minerals, iron, zinc and lead ores, were substantially the same in both years. Prices generally showed a slight decline; coal, for instance, was valued at \$1.68 in 1893, against \$1.84 in 1892.

The products of the German salt works, an important item in the mineral industry of that country, were as follows:

	Quantities.		Values.	
	1892. Metric tons.	1893. Metric tons.	1892.	1893.
Salt.....	594,647	595,023	\$3,469,865	\$3,494,194
Potassium chloride.....	123,962	137,216	4,106,589	4,326,283
Magnesium chloride.....	14,386	12,764	50,878	44,443
Glauber salts.....	73,998	75,965	502,788	486,354
Potassium sulphate.....	22,968	23,555	931,861	956,469
Double sulphate of potassium and magnesium.....	11,593	14,199	118,172	280,792
Magnesium sulphate.....	23,879	27,548	84,008	79,240
Alumina sulphates.....	20,218	17,859	400,735	345,166
Alum.....	3,620	3,412	97,464	87,576

The chemical manufacture, as well as the mining industry, appears to have last year just about held its own, the average prices showing little variation.

The Cement Industry in Japan.—The half-yearly general meeting of the Japan Cement Company, Tokio, was recently held. The net profits during the last half-year amounted to 10,179,102 yen, of which 1,000,000 yen was added to the reserve fund, 1,000 yen deducted for payment of preliminary establishment debts, 1,000,000 yen voted as remuneration to officers, and 6,750,000 yen declared as a dividend at the rate of 5% per annum, 429,102 yen being carried forward.

ABSTRACTS OF OFFICIAL REPORTS.

DURBAN-ROODEPOORT GOLD MINING COMPANY, TRANSVAAL.

The report of this South African company for the year ending December 31st, 1893, as presented at the recent annual meeting in London, says that during the year 78,650 tons of quartz were milled, producing 37,883 oz. of gold, of the value of £144,059. The average yield in 1893 was 9.63 dwt. per ton. The cost of mining, milling and maintenance was 19s. 2d. per ton, against 18s. 3d. in the previous year. The cost of mining was higher owing to increased depths of working, but the costs of milling and maintenance were considerably lower. During 11 months of the year 79,765 tons of tailings were treated, producing 22,751 oz. of gold, which realized £71,518. Roughly speaking, the tailings added 33% to the total revenue. The cost of treating the tailings, including the royalty paid, amounted to 6s. 4d. per ton, and the profit was shown as 11s. 6d. per ton. The percentage of extraction ranged from 67% up to 85%. These combined results reached £215,577. The dividends have exceeded the contemplated maximum, 55% having been distributed during 1893, and for the first quarter of the current year another 15% has been paid. The monthly returns of output and profit since the end of the year have continued on the same satisfactory scale. As to the future policy, the board intends to erect a new reduction plant upon Block No. 2, which contain the Deep Level claims. The expenditure contemplated will be about £34,000, which will be spread, as far as possible, over two years. The whole will form a plant on a most advantageous site for working the deeper levels, in conjunction with the cyanide works and the valuable claims on Block No. 1.

ATLANTIC MINING COMPANY, MICHIGAN.

This company's report for the year ending December 31st, 1893, shows the following results: Copper sold, 1,180,040 lbs., at an average of 10.42c., \$122,947; interest received, \$2,266; total, \$125,213. The working expenses at mine were \$152,838 (12.95c. per lb.); smelting, freight, etc., \$21,768 (1.85c. per lb.); total, \$174,606 (14.80c. per lb.), showing a loss of \$49,393, or 4.38c. per lb. produced. The surplus from 1892 was \$174,037, to which is to be added \$3,194 for real estate sold and stampage, making \$177,231. Deducting the loss for the year, leaves a balance of \$127,838 carried forward to the current year.

During the year the work done on the mine was as follows: Sinking in winzes, 223 ft.; drifting and cross-cutting, 2,869 ft.; stoping ore vein, 2,786 fathoms. The average cost was for winzes, \$14.49 per ft.; drifting, \$6.58 per ft.; stoping, \$11.70 per fathom. The product of mineral was, 1,116,700 lbs. stamp copper, 212,640 lbs. barrel copper, 275,250 lbs. mass copper; total, 1,604,590 lbs., the average yield of which was 73.54%, or 1,180,040 lbs. refined copper. The average product per fathom of ground broken was 460 lbs. mineral, or 338 lbs. copper.

The directors' report says: "The loss on the year's operations has been caused by the large decrease in the yield of the mine, as well as in the average price obtained for copper. The portion of the mine below the 'slide' mentioned in previous reports—which we now call the 'West Vein'—has added nothing of any consequence to the production. Explorations have been vigorously prosecuted, both in the vein and by crosscutting under the slide, in order to make it certain that nothing of value had been passed by, and that the west vein was the true central vein. The bottom level (32d) has been extended about 1,100 ft. south of the slide; the vein, although well defined and with regular walls, has been small and practically barren. For the entire distance this level has passed through belts of hard trap, but is now approaching softer and more congenial ground, where we hope that the vein will be larger and more productive. The east vein above the slide, on which are the old workings, has been unusually poor during most of the year, as is shown in the small production, although a larger amount of work was done in the mine than in the previous year.

"It is impossible at this time to make any estimate of the results during the coming year; we can only use the means at our command to thoroughly prove the ground. It is not unlikely that the east vein will improve in the productiveness again, and that the levels in the west vein may soon enter copper ground, and contribute to the general production to such an extent as to make the aggregate business profitable."

FRANKLIN MINING COMPANY, MICHIGAN.

The report for the year ending December 31st, 1893, says that the mine produced during the year 4,225,188 lbs. of mineral, which yielded 82.94%, or 3,504,244 lbs. of refined copper. The total amount of rock hoisted from the mine was 153,778 tons; rock stamped, 124,890 tons; yield in mineral 33.83 lbs. per ton, or 1.69%. The product of copper gave an average of 413 lbs. per fathom of stoping. The work done in the mine included 3,350 ft. sinking and drifting and 8,581 fathoms stoping; the average cost being \$8.54 per foot drifting and \$9.45 per fathom stoping.

The receipts for the year were: From 3,504,244 lbs. copper produced (9.91c. per lb.), \$347,348; silver, \$820; interest, \$4,500; total, \$352,668. The payments were: Mine expenses (7.15c. per lb.), \$250,570; smelting, freight, etc. (1.38c. per lb.), \$48,229; exploration and new work (1.25c. per lb.), \$44,029; total (9.78c. per lb.), \$342,768. The mining profit for the year was therefore \$9,900. To this is to be added \$334,120, balance from 1892, making a total of \$344,020, balance of assets at the close of the year. From this a dividend of \$2 per share (\$80,000 in all) was paid in January.

The report of Mr. Graham Pope, manager of the mine, says that last year the copper was distributed through a larger amount of rock than in the levels above, diminishing the amount hoisted. The work of reconstruction, begun in 1892, was continued throughout the year, and is now practically completed. It included rebuilding the engine-shaft, and necessary repairs caused by the breakdown in the month of May, which was a very expensive work; building a new hoisting drum for No. 3 shaft; extensive repairs to the boilers; new cylinders for the large compressor; the erection of a steam hammer-house, and the setting up of a large steam hammer for breaking large rock and cleaning mass copper; an unusual amount of repairs to the shafts, and additions under ground; the rebuilding of the stamps at the west end of the mill; the relaying of a great part of the railroad with new ties and new steel rails; extensive repairs to the trestle work, both at the mine and the mill. The repairs cost approximately \$18,000, and are included in the yearly account. The work of exploration has been pushed vigorously, and about \$22,000. A

trial slope in one of the levels opened has given good results. The steam hammer has been in operation for some months, and has given satisfaction. Work was interrupted by these repairs by the breaking of the engine shaft in May and by the heavy storms early in the year, which stopped hauling to the mill.

ROBINSON GOLD MINING COMPANY, TRANSVAAL.

The report of this company for the year ending December 31st, 1893, shows that 94,842 tons of ore were mined and milled; 2,714 tons of concentrates were treated by chlorination, and 55,200 tons of tailings by the cyanide process. The total production of gold was 132,804 oz., of which 104,233 oz. were from the mill, 10,660 oz. from concentrates, and 17,921 oz. from the cyanide process. The average yield was 1 oz. 8 dwt. 0.13 gr. per ton worked. The development work on the mine included 356 ft. of shafts sunk, and 12,160 ft. drifting, the latter costing an average of \$16.98 per foot.

The total revenue from sales of bullion was £599,134. Charges were for mining and milling £102,926; re-treatment works, £124,554; redemption (or depreciation) fund for ore taken out, £37,937; a total of £265,417, leaving a net balance of £333,717. Against this are charged £1,425 for general expenses; £30,922 for depreciation of machinery and plant, and £217,500 for dividends paid, leaving a balance for the year of £83,870. The balance brought forward from 1892 was £188,475, making the balance forward to the current year £272,345.

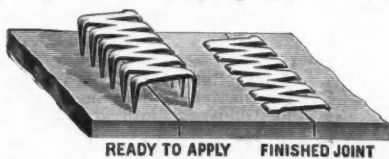
The cost of working is reported as follows, per ton of ore: Mine maintenance, \$3.4338; mill maintenance \$0.9332; general maintenance, \$0.1098; general expenses, \$0.6840; removal and storage of slimes, \$0.0482; total, \$5.2090 per ton worked. The mill cost in detail was: Rockbreakers, 6.56c.; transporting ore to mill, 0.84c.; milling, 21.68c.; supplies, 13.20c.; fuel, 14.54c.; water, 12.72c.; maintenance of machinery, 7.22c.; concentrating, 12.00c.; maintenance, 2.12c.; assaying, etc., 2.48c.; total mill costs, 93.32c. per ton.

The cost of the cyanide works is given as follows, per ton of tailings treated: Wages, 29.62c.; supplies, 12.24c.; fuel, 10.48c.; cyanide, 48.38c.; zinc, 2.26c.; filling and discharging vats, 37.62c.; royalty, 16.38c.; total cost, 173.36c. per ton. Omitting royalty the actual cost per ton was 156.98c. The average extraction by this process was 68.7% of the assay value of the tailings.

The mill of 60 stamps was kept at work steadily. The quantity crushed decreased, however, owing to the greater hardness of the ore obtained from the lower levels. The amount of sulphurets in the ore is also increasing rapidly with depth. Since 1891 the proportion of pyritic to free-milling ore has increased from 12.5% to 85%. The mill is now being enlarged; when the new work is finished it will have 70 stamps and 42 Frue vanners. The manager's estimate of milling ore in sight at the close of the year is 231,000 tons, and a sufficient amount to keep the mill running steadily can be taken out without difficulty for some three years to come if no new developments should be made.

STEEL BELT LACING.

An essential feature about any plant where belts are in use is to have a good lacing, one which is strong and at the same time easily applied. The lacing shown in the accompanying illustration is made of tough cold rolled steel cut into a continuous zig-zag form, and so proportioned as to give maximum strength with a minimum amount of material. The wedge shaped points when driven through the belt, force the fibers aside without cutting them, hence the ends of the belt are not weakened, as when holes are punched. The lacing makes a smooth and elastic joint and is easily and quickly applied, without any special tools, the spurs being driven through upon a piece of soft wood after the ends of the belt to be joined have been brought evenly together. The belt is then turned



over upon the pulley or any convenient piece of iron and the spurs clinched by bending them toward the joint.

They are furnished in lengths varying from one to three inches, it being always possible, from a box of assorted lengths to find two or more pieces of lacing which, together, may be used for a belt wider than three inches. For rubber, cotton and woven belts the space between the spurs is a trifle greater than in the corresponding sizes designed for leather belts, thus a better grip is obtained on the fibrous ends of such belts. They are manufactured by the Bristol Company, Waterbury, Conn., and received a medal at the World's Fair.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

Supreme Court of the United States.
Liability for Unguarded Slack of Coal Mine.

Failure of a company operating a coal mine to fence its slack pile as required by a statute, primarily intended for the protection of cattle, being a breach of duty to the public, is evidence of negligence, for which the company is liable, where personal injuries are, in a substantial sense, the result of such violation of duty.—Union Pacific Railroad Company vs. McDonald, 14 Supreme Court Reports, 618.

Supreme Court of California.
Valid Location of Mines.

A mining claim perfected under the law is "property" in the highest sense of that term, which may be bought, sold and conveyed, and will pass by descent. The language of the act is that the locators shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations, which is to continue until there shall be a failure to do the requisite amount of work within the prescribed time. The right of location upon the mineral lands of the United States is a privilege granted by Congress, but it can only be

exercised within the limits prescribed by the grant. An attempt to go beyond that will be of no avail. Hence, a re-location on lands actually covered at the time by another valid and subsisting location is void; and this, not only against the prior locator, but all the world, because the law allows no such thing to be done.—Quigley vs. Gillette, 35 Pacific Reporter, 1040.

Use of Electricity in Metallurgical Work.—In a recent issue of the "Comptes Rendus," M. Jules Garnier states that he has carried out in the workshops of M. Hillairet some experiments with a view to utilizing electricity for the purpose of observing the various phases of certain metallurgical operations, and, thinking his method might be generally applicable, he gave the following account of it to the Académie des Sciences: "I placed in a tube of refractory earth some powdered oxide of nickel mixed with charcoal; two soft steel rods penetrated into the tube at either end, pressing the mixture, the thickness of which was a few centimeters, between them. This arrangement was placed horizontally in a small reverberatory furnace heated by coke, while the two steel rods formed part of an electric circuit. At first the resistance offered was perfect, the current being zero with the voltmeters 50; but after 15 minutes' heating, the needles began to move, the current gradually rising, and the voltage diminishing so that at one time there were nearly 50 amperes passing, and hence next to no resistance. After remaining steady for an instant in this position, the needles of the ammeter and voltmeter slowly returned toward their original position, finally becoming steady at one or two amperes, at about 45 volts. These variations of the current first in one direction and then in another exhibited the reactions which went on in the mixture of oxide of nickel and charcoal. To begin with, the mixture stopped the passage of any current; at the moment when the oxide was beginning to be reduced to the metallic state, the current flowed at first feebly, then more and more freely, so that at the precise moment when the reduced nickel formed a sort of interrupted chain from anode to cathode, the voltage was zero. It was then that the carburization of the metal began, a phenomenon which was exhibited on the voltmeter and ammeter by the reverse movement of their needles. The resistance, indeed, became considerable at the moment when the particles of carbureted nickel, which are easily fusible, united together in globules. In another experiment, in which I operated on a mixture of oxide of copper and nickel of iron, in spite of the complexity of the mixture, the variations in the current only showed the successive phases in the reduction of the three metals. One of the conclusions to be drawn from these experiments is that we can follow electrically the progress of a certain number of metallurgical operations, especially the refining of metals, the conducting powers of which vary as their composition is altered."

PATENTS PUBLISHED IN GREAT BRITAIN.

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

WEEK ENDING APRIL 7th, 1894.

- 9,778 of 1893. Ore Pulverisers. B. J. Atterbury, London.
- 17,463 of 1893. Percussive Rock Drills. C. Bernet, Paris.
- 25,071 of 1893. Centrifugal Amalgamators. A. Trug, Hungary.
- 2,756 of 1894. Mine Cages. W. J. Davies & D. E. Davie, Dowlais.

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

The following is a list of the patents relating to mining, metallurgy and kindred subjects issued by the United States Patent Office:

TUESDAY, APRIL 10th, 1894.

- 517,850, 517,852. Lagging for Boilers and Pipes. Charles Ehrlicher, Watertown, N. Y.
- 517,859. Hoisting and Conveying Apparatus. Seth M. Hewett, Minneapolis, Minn.
- 517,863. Valve for Engine. William H. Jenks, Brookville, Pa.
- 517,881. Portable Pumping Apparatus. Donald Noble, Leeds, Eng.
- 517,883. Brick and Tile Kiln. George N. Phares, Sheridan, Ind.
- 517,885. Device for Fastening Hand-Hole Plates. Nat. W. Pratt, Brooklyn, N. Y.
- 517,890. Gas or Hydrocarbon Motor. Willy Sec, Ober-Ursel, Germany.
- 517,893. Kiln for Burning Brick, Pottery, etc. Samuel K. Smith, New Brighton, Pa.
- 517,910. Steam Engine. Nikola Tesla, New York, N. Y.
- 517,902. Pump. Joseph C. Tom and Edward A. Tom, Pontotoc, Tex.
- 517,933. Compressor or Vacuum Pump. Edward N. Trump and John E. Sweet, Syracuse, N. Y.
- 517,909. Wooden Pipe. Edgar T. Wheeler, Los Angeles, Cal. Assignor to Fred J. Harrington, same place.
- 517,910. Gas Apparatus. Charles E. White, Kansas City, Mo. Assignor of seven-twentieths to Richard X. De Grau, same place.
- 517,939. Converter. Charles W. Stickney, Butte, Mont.
- 517,949. Steam Generating Appliance. Charles W. Hicks, Ashburn, Ga.
- 517,974. Ore Separator. Geo. Doerflinger, Brooklyn, N. Y.
- 517,975. Method of Testing Metal Bars. Plimmon H. Dudley, New York, N. Y.
- 517,991. Regenerative Furnace. Martin Wanner, Denver, Colo. Assignor of eleven-twentieths to William B. Crittenden and John M. Millman, Bucyrus, O.
- 518,000. Pressure Reducing Valve. Geo. M. Davis, Chicago, Ill.
- 518,009. Automatic Boiler Feed. Lorin C. Springer, Chicago, Ill.
- 518,010, 518,011. Disintegrator. Nathan Stedman, Aurora, Ind., Assignor to the Stedman Foundry and Machine Works, same place.
- 518,012. Downdraft Muffle Kiln. Anders M. Strusholm, Woodbridge, N. J., Assignor to Robert W. Lyle, New York, N. Y.
- 518,019. Feed Water Heater. James G. Calvert, Gothenburg, Sweden.
- 518,032. Percussion Tool. William E. Gibbs, New York, N. Y.
- 518,040. Electrolytic Cell. Ernest A. Le Sueur, Ottawa, Canada.
- 518,048. Apparatus for Galvanizing Wire. Geo. M. Wright, Worcester, Mass., Assignor of one-half to the Wright & Colton Wire Cloth Co., same place.
- 518,065. Electrolytic Apparatus. Carl Hoepfner, Giessen, Germany.
- 518,076. Appliance for Molding Concrete. Albert Rau, Pforzheim, Germany.
- 518,082. Apparatus for the Concentration or Separation of Ores. Mortimer Stuckey and Henry Arthur, Adelaide, South Australia.
- 518,117. Process of Refining Nickel and Copper Mattes. Charles G. Richardson, Toronto, Can.
- 518,135. Electrolytic Apparatus. Hamilton Y. Castner, London, England.
- 518,149. Controlling-Valve for Hydraulic Pressure. August Kampf, Magdeburg. Assignor to the Grusonwerk, Magdeburg-Buckau, Germany.
- 518,151. Vaporizer for Hydrocarbon Motors. John H. Knight, Farnham, England.
- 518,153. Kiln for Baking or Burning Bricks. Fred Macarthy, Sayreville, N. J. Assignor of one-half to the Sayre & Fisher Company, same place.
- 518,169. Machine for Forming Tuyeres and Pipes. Morgan L. Williams, Johnstown, Pa.
- 518,177, 518,178. Gas Engine. John B. Carse, Chicago, Ill. Assignor to Thomas Kane, same place.
- 518,181. Gas Apparatus. Thomas Curley, Wilmington, Del. Assignor of one-half to John McIlhenny, Philadelphia, Pa.
- 518,202. Gas Generator. DeWitte Stearns, Chicago, Ill.
- 518,203. Miner's Flask. John Zweig, Bellaire, O. Assignor of one-half to Harry Venison, same place.

PERSONALS.

Mr. George Berliner, of Seattle, Wash., is examining some mining properties in Alaska.

Mr. Winthrop W. Fisk, mining engineer, has gone to Cooney, New Mexico, to take charge of the mine and mill of the Silver Creek Mining Company.

Mr. H. Stansfield, superintendent of the chlorination works of the Alaska-Treadwell Mining Company, has returned to his post after a visit to California.

Mr. George Odell has left Butte, Montana, for North Carolina, where he will examine and report on some mining property in the interest of Butte parties.

Mr. Walter Mercer, formerly connected with the Colby mines, in the Lake Superior region, is now superintendent of the Monte Cristo mine, near Everett, Wash.

Mr. E. Hedburg, mining engineer of Joplin, Mo., has gone to Burlington, Ia., to examine and report on a new lead and zinc mining district in the interest of Iowa capitalists.

Mr. John C. Trautwine, Jr., of Philadelphia, secretary of the Association of Engineering Societies, has removed his office from the Franklin Institute to 419 Locust street.

Mr. J. S. Turner, formerly master mechanic of the Mexican International, has been appointed superintendent motive power and machinery of the West Virginia Central & Pittsburg Railroad, with headquarters at Elkins, W. Va.

Mr. B. J. Williams, who has been the secretary and treasurer of the Shelby Steel Tube Company, of Shelby, O., from its inception to the present time, has tendered his resignation as such, and Mr. J. C. Pattison has been elected his successor.

Mr. S. W. McMunn has been appointed sales agent of the Otis Steel Company (Limited), with headquarters in Chicago, succeeding W. M. Wilson, resigned. Mr. McMunn was for a long time the representative of the Carnegie Steel Company, and is well known in the railroad and general supply trade.

OBITUARY.

The will of the late Sir George Elliot, Bart., M. P., who started life as a pit-boy, has been proved. The gross value of the personal estate and effects amounts to \$2,761,000, and the net value to about \$2,325,000.

SOCIETIES AND TECHNICAL SCHOOLS.

American Railway Master Mechanics' Association.—The twenty-seventh annual convention will meet at Saratoga, N. Y., June 18th.

Central Railway Club.—A circular has been issued asking members to send in any suggestions they have to make relative to changes of or additions to the M. C. B. Rules of Interchange, to enable the committee to prepare a report to be presented at the next meeting in Buffalo, April 25th.

American Society of Mechanical Engineers.—At the monthly meeting in New York on April 11th, the subject of testing machines and methods of testing was discussed. At the next meeting, to be held May 9, it is expected that the subject of "Marine Tubular Boilers" will be discussed, the opening paper being by Mr. W. M. McFarland, U. S. N.

Harvard University.—The Lawrence Scientific School of Harvard University has established courses in mining engineering and architecture, which it expects to make equal to any in the country. For architecture it has the valuable connection with the University, from which it can draw for much instruction by the professors there. The course in mining engineering will be so arranged as to be a thorough training school for those who expect to teach this science.

Engineering Association of the South.—At the regular meeting in Nashville, April 13th, Tyler Calhoun and A. H. Wood were elected members. Dr. J. M. Safford read a valuable paper on the Phosphate Beds of Tennessee, an abstract of which is given in another column. This was followed by a general discussion, in which many interesting points were brought out.

Arrangements have been set on foot to hold the May meeting somewhere on the Muscle Shoals Canal. The party will meet at Decatur early on the morning of May 12th. The trip will be made through the canal by steamer, returning to Decatur the same night. Each member will bear his own expenses, can bring or represent one lady, and must bring sufficient lunch for dinner and supper on the river. There will be no expense for the trip from Decatur through the canal and back. A paper descriptive of the work will be read.

Engineers' Club of St. Louis.—At the regular meeting, April 11th, C. D. Mitchell and W. G. Brennecke were elected to membership. Several gifts to the library of the club were announced. The paper of the evening was read by Mr. J. A. Laird, mechanical engineer of the water-works extension, upon the "New Machinery Now Being Installed." Mr.

Laird gave a general description of the four different types of pumping engines under contract, with cost of each. The main shaft of high-service engine No. 6 is of nickel steel, 92,000 lbs. tensile strength and 22% elongation in four diameters. The capacity and duty tests on Chain-of-Rocks engines are to be for 720 consecutive hours. There is a 15-ton electric traveling crane in the engine house at the Chain-of-Rocks; vertical hoist, 80 ft. There are separate steam mains for each pair of engines. All feed water will be metered. The running of the entire plant will be made as near as possible a perpetual duty trial. The specifications for the Baden 10,000,000 gallon engines call for 125,000,000 ft.-lbs. duty, and offer a bonus of \$1,000 per million of duty developed above 125,000,000; and provide a forfeit of \$2,500 per each million that the duty falls below 125,000,000. The Baden engine house will be provided with a 20-ton electric traveling crane. When the stations at Baden and Chain-of-Rocks are completed the engines and boilers will be put on regular running watches, and will be overhauled at regular intervals. It is expected that the new machinery will be able to do the same work at half the cost of the present plants, and save on a 15,000,000-gallon high-service engine running two-thirds of the time \$7,150 per year, which is 5% interest on \$143,000. The discussion was opened by Mr. Flad and continued by Messrs. Seddon, Ferguson and Professor Kinealy.

INDUSTRIAL NOTES.

The Wheeling Steel and Iron Company, Wheeling, W. Va., has put its Belmont furnace in blast.

The North Reading Foundry, at Reading, Pa., resumed work last week, after some four months' stoppage.

The New Philadelphia Iron and Steel Company is running its plant at New Philadelphia, O., to its full capacity.

The Edgar Thomson Steel Works, at Bessemer, Pa., on April 16th started making billets, after a two-weeks run on rails.

The Newton Rubber Company has removed its offices from the Haverick Building, Boston, to its factory at Newton Upper Falls.

The Pittsburg Bridge Company is rebuilding the draw span of the Ashley River bridge at Charleston, S. C., which was destroyed by a cyclone last fall.

The plant of the Logan Iron and Steel Company, Lewiston, Pa., was almost entirely destroyed by fire on April 17th. Over 100 men are thrown out of employment.

The McNeal Pipe Foundry Company, of Burlington, N. J., has placed the contract for two cleaning sheds with the Berlin Iron Bridge Company, of East Berlin, Conn.

The Watts steel and iron works, of Middlesborough, Ky., will start up within 60 days, and give employment to 600 men. It is said that \$60,000 will be expended on improvements at once.

The Lambert & Bishop Wire Mill, a branch of the Consolidated Steel and Wire Company, at Joliet, Ill., has issued notice of an advance in the wire drawers' pay of 10%. The blast furnace of the Illinois Steel Mill, of the same place, that has been closed for a year, started this week.

At the annual meeting of the stockholders of the King Bridge Company, recently held in Cleveland, O., the following were elected directors: James A. King, Dan P. Eells, H. W. King, Harley B. Gibbs and H. W. Osborn. The directors elected James A. King, president; H. W. King, vice-president; Harley B. Gibbs, secretary and treasurer.

The General Manufacturing Company, of Bound Brook, N. J., has issued an interesting catalogue of the various pumping engines which it manufactures. The list includes ordinary pumping engines, several classes of condensing engines, belt pumps, hydraulics, motors, and others of this kind. It also shows its rail mill engines and forging and shearing machines. The catalogue contains 63 pages, and is handsomely illustrated.

The stockholders of the Joseph Dixon Crucible Company held a meeting in Jersey City, N. J., April 16. Out of 7,345 shares 7,215 votes were cast for the same board of managers, which consists of E. F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Joseph D. Bedle, Jerome D. Gillett. In the organization of the board Mr. E. F. C. Young was elected president, John A. Walker, vice-president and treasurer; George E. Long, secretary.

The Totten & Hogg Iron and Steel Foundry Company, Pittsburg, Pa., manufacturers of rolls and rolling mills machinery, is operating the plant night and day. This firm is furnishing all the mills, shears, engines and boilers for the Emly Steel and Tin Plate Company, of Summitville, Ind., and has just received an order from the Cumberland Steel and Tin Plate Company, of Cumberland, Md., for three 24-in. hot mills complete, and an order from the Whitaker Iron Company, Wheeling, W. Va., for a large double shear and engine; an order from the Morewood Company, of Gas City, Ind., for a large muck shear, and an order from the Ohio Falls Iron Company, of New Albany, Ind., for 22 rolls.

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.

The Bureau of Statistics, Treasury Department, reports the total exports of mineral oils for March at 70,395,600 gals., a decrease of 2,457,815 gals., or 3 1/4% from March, 1893. For the nine months of the fiscal year from July 1st to March 30th, the total exports were 683,182,215 gals., an increase of 100,966,603 gals., or 17 3/4% over the corresponding period last year. The exports for March of this year included 12,450,893 gals. crude, 519,423 gals. naphtha, 54,542,080 gals. illuminating oil, 2,881,613 gals. lubricating and paraffine, and 1,592 gals. residuum.

The following order was issued from the headquarters of the United Mine Workers of America, Columbus, O., on April 18th: "As ordered by the National Convention coal must not be loaded at any price or for any purpose; but where companies want engines run, water handled, timbering or any other kind of repair work done, it will be permitted, provided wages paid are according to the scale demanded by the convention.

ALABAMA.

Cleburne County.

(From Our Traveling Correspondent.)

Arbacochee Mining and Milling Company.—The organization of this company is the result of a recent visit of Cincinnati parties, who were brought to this section by Col. S. Fehr.

Work will be commenced at once on the Lee property which was purchased by the Cincinnati syndicate, and referred to recently in the columns of the "Engineering and Mining Journal." The property will be thoroughly tested before a permanent plant for treatment is erected, but Col. Fehr will at once erect an experimental plant; the machinery having already been purchased for that purpose. This plant will be on the same principles as a Spanish arrastra, except that steam will be the motive power. Some modern improvements have been added, so that while the pulverizing and amalgamating are similar to the arrastra treatment, yet the principles of pan amalgamation have been incorporated in the construction. It is understood that Mr. Fleischmann, the yeast manufacturer, is a heavy stockholder in the new corporation.

Jefferson County.

A general strike of coal miners was inaugurated in the Birmingham district, on April 14th, over a matter of wages. It is said to be the intention of the Tennessee Coal, Iron and Railroad Company to start the Blue Creek mines with negroes this week. If this is done race trouble may result.

Randolph County.

(From our Traveling Correspondent.)

I am reliably informed that some Western mining capitalists have purchased a two-fifth interest in the Goldberg Mining Company's property on Crooked Creek in the southwestern corner of this county; the purchase price, \$20,000, to be devoted to developing the property and erecting a plant for treatment of the ore. Undoubtedly a chlorination plant after the style advocated by Mr. John E. Rutwell will be adopted. This property really shows better prospects as to grade and extent than the majority of the gold properties in either of the Alabama belts. A section cut through 16 ft. of the stratified ore body, which is apparently not the extreme thickness of the body, by pan amalgamation of an average sample of 1 1/2 lbs. yielded \$10.16 per ton, and a sample from the same average assayed \$22 per ton by fire assay. The ore body has the structure of a stratified deposit, but none of the workings is sufficiently deep to encounter the solid formation. From actual measurement at one point where a cross-cut has been driven the ore body is nearly 100 ft. in width, dipping at an angle of about 30° toward the southeast. This ore body occurs on two parallel ridges, having a course from northeast to southwest, with an average elevation of 75 ft. above the valley of Crooked Creek, which cuts the ridges at their southwestern extremities. The more southerly of the two measures in length on this property 1,650 ft., with an extreme width of 300 ft. at the point where the cross-cut has been driven. The openings exposing the ore on this ridge are on the northwestern side, with the ore body dipping to the southeast, and consequently into the ridge. The openings exposing ore on the ridge to the north or rather west of north are on the southeast side of the ridge, and show the ore body dipping at a more nearly vertical angle than on the opposite ridge, thereby denoting, if the ore body maintains its continuity across the trough which divides the ridges, which is 285 ft. in width, that either a second contact will be encountered on the southern ridge, or else that the stratification

may continue into this second contact. At present the nature is undetermined, as well as the continuity below the surface of the trough; but if it should prove to be maintained, then the thickness of the ore body will be great; and as prospecting has determined its continuity in length, beyond the north-eastern boundary lines of this property and across the adjacent 40-acre tract, the extent is sufficient to pay for mining on a large scale. The country rock is that variety of slate classified by State Geologist Dr. Eugene A. Smith as "Talladega," but both to the southwest and northeast at distances of about one mile the porphyry is exposed; it is not improbable, therefore, that as depth is attained the country rock will change to porphyry at an undetermined depth, and the ore body change from the structure it now possesses, of a stratified deposit, to a segregated vein with porphyry walls. Deep mining is needed on the Alabama belts to determine fully the permanency in depth of the ore bodies; at present 122 ft. is the deepest shaft on any of them. This is in Cleburne County on the Wise property, and at the bottom of that shaft the ore is much richer, though more highly sulphureted than above water level. This field will probably prove a desirable one for chlorination, as the character of the ore throughout is very similar; except in some few mines where it has the appearance of mineralized sand rock and quartzite, carrying a heavy percentage of garnets, it is generally a somewhat decomposed quartz carrying sulphurets and some arsenic, with occasionally traces of antimony and copper.

ARIZONA.

Pima County.

Mohawk.—At this mine, says the Tucson "Enterprise," the double compartment shaft is down 269 ft. As soon as the steam hoist arrives two levels will be run, one on the 100 and the other on the 200 level. In the meantime work is going on rather slowly on account of hoisting at the depth. From the first shaft that was sunk four drifts have been run. The northwest is in 145 ft. with two cross cuts showing 14 and 15 ft. of ore. The southeast drift is run 210 ft. and lacks 60 ft. of connection with the double compartment shaft. A cross cut was made at 110 ft., showing 18 ft. of ore. In the northeast drift of 70 ft., three veins of ore were encountered, passing through 40 ft. of ore. The southwest drift was run 215 ft. and connected with a shaft.

CALIFORNIA.

Mono County.

Bodie Consolidated Mining Company.—The latest weekly official letter from the superintendent says: The south drift from the Burgess winze, 50 ft. below the 200 level, was extended 8 ft. The seam of quartz in the face is small, but is fair milling ore.

Bulwer Consolidated Mining Company.—At the annual meeting of the company held in San Francisco last week, 50,000 shares were represented and the following directors and officers elected: H. Zadig, president; Charles H. Fish, vice-president, and E. B. Holmes, W. R. Sherwood, John Landers, J. E. Jacobus and H. L. Shippy, directors. L. Osborn was re-elected secretary, and John W. Kelly superintendent. The latest weekly official letter states that there is a small seam of fair grade ore in the face of the south drift from No. 2 crosscut south on the 100 level. They are getting some milling ore from the slope above the north drift on the 200 level.

Nevada County.

Maryland Mining Company.—Hoisting has been resumed at the Maryland mine. There will be 190 men at work and there will be ore enough in the bin to keep the 40 stamps going. The mill has also started.

COLORADO.

The Colorado State Coal Mine Inspector says that every coal mine in Colorado will close on May 1st because of the refusal of the miners to work longer at the present rates. The miners are a unit on a general walkout on that date.

Boulder County.

Prussian.—The construction of the new ditch which is to supply the new Prussian mine mill with water for power has commenced. The ditch is to be 2,530 ft. long. A Pelton water motor of 100 H. P. will be used. The purchasers of the Prussian intend erecting a 100-ton mill, instead of a 50-ton mill, as at first proposed.

Clear Creek County.

Alice Mining and Milling Company.—The erection of the new 200-ton mill by this company at Yankee Hill has commenced. The mill will be completed by the middle of June, and will treat the ores from the 300-ft. vein of the Alice company.

Jessie.—Work will be resumed on this property and the shaft will be sunk 100 ft. deeper.

Whale Mining Company.—This company has encountered a good looking body of ore in drifting on the Whale claim.

Eagle County.

Belden.—Another good strike is reported at this Red Cliff property. In the McKenzie drift, 160 ft. from the head of the great fault, the ore was struck standing in its natural condition, with hard lime footwall. A few shifts work have shown the body to be merely a vein separated by force from the main channel, and it is already 15 ft.

thick. To the extreme right of this another large channel has been opened, which is even nearer the main channel, and shows a broken country with double pay streak from 3 to 7 ft. thick, showing strength and continuity. Less than 100 ft. will bring both workings to a common point, and until that time work will be continued on ore varying from 7 to 15 ft. thick and improving.

Ben Butler.—This mine, which was started up recently by the owner, F. A. Reynolds, of Canon City, is developing steadily with a view to produce this summer. The mine is a gold producer.

Eagle Bird.—The shipments from this lease are at present heavier than any mine on the hill.

Ground Hog.—The Nottingham leasers on the Ground Hog have put on a night shift. The ore body is increasing in size and value.

Lancaster.—A 2-ft. body of contact matter has been opened on this mine. The body is thickly interspersed with float of the chloride and sulphuret ore so frequently found in the veins of East Battle Mountain. The contact is only 30 ft. from the surface and is heavily mineralized. The mine is the property of J. T. Hart and is operated under lease.

El Paso County.

The Little Crissey-Rhinoceros suit involving title to two valuable claims was begun in the District Court at Colorado Springs on April 12th.

Gold Dollar Mining Company.—The Gold Dollar claim of this company has been leased to Anthony Cyle for six months.

Portland Gold Mining Company.—Ever since the organization of this company at Cripple Creek, the Queen of the Hills, a claim owned by W. S. Montgomery, W. R. Fyfee and C. J. Cover, has been worked under bond and leased by the Portland people. Recently the owners claim to have discovered that the lessees had not complied with all the requirements of their bond and they made arrangements to regain possession of the property. It appears that the owners set up that the violation of the lease consisted in the Portland not turning over royalty on ore sold. Manager Moore, of the Portland, says that on examination of his books he found that one lot of the Queen of the Hills ore returned a loss to the company of about \$70, and that another lot brought a profit of 40c. The Portland company is still in possession of the Queen of the Hills.

Raven Gold Mining Company.—The owners of the Raven claim and the Matoa Mining Company have settled their differences, and the long litigation between these companies is at an end. A company has been formed called the Raven Gold Mining Company. Into this the Matoa people put the Snowy Range, Maid of Erin and Gregory claims, and the Raven people put in the Raven and Princess E. Messrs. Stark, De La Vergne and others, owners of the Raven, secure $\frac{1}{3}$ of the stock and the Matoa people the remaining $\frac{2}{3}$. A rich strike is now made public which has been made in the Raven. It is in the tunnel at a depth of 200 ft. below the surface, and is known as the sylvanite ore chute.

Gunnison County.

Shipments of coal and coke from Grested Butte for the week ending April 5th, were: Bituminous coal, 351 tons; anthracite coal, 550 tons; coke, 340 tons.

Lake County.

(From our Special Correspondent.)

Granite Section.—This district is filling up rapidly with prospectors. Considerable new territory has been taken up and will be developed during the coming season. The last car of ore shipped from the Belle of Granite ran \$160 a ton. Work is being carried on the west end of the property, and another shipment is to be made. The lessees of the Mayflower made their first shipment this week, and some of the ore ran \$250 a ton. The Magenta people are now ready to ship and are hauling to the cars. They have a 2-ft. vein of ore that samples \$100 a ton. The Snow Drop has been retimbered and a hoister put in, and some rich ore is being loaded on the cars to-day. The King Solomon has been leased and bonded to New York parties. They have some fine gold ore in sight. The Bonanza people commence shipments this week. They have three veins opened on this property.

Maid.—The new pumping plant is in position and sinking has been resumed.

Stars.—These big iron producers which have been idle for the past six weeks, will, it is definitely stated, resume work and shipments during the coming week.

St. Kevin Section.—A few men are at work on the Berdella, St. Kevin, Griffin, Huckleberry and Dinero mines. These are the only properties at work in that section of the camp and no ore is being shipped.

Union Smelter.—Surveyors are at work and preparations are being made for the laying of additional railway tracks, and the building of new roasters and sampling works in addition to the present plant.

Wolcott.—Some 100 tons of good lead ore are being hoisted daily through the Esther shaft of this property. Some of the best of this ore comes from that small leased corner known as the S. Small mill site.

Montrose County.

Montrose Coal Mining and Toll Road Company.—This company has been incorporated by F. D. Catlin, Joseph Conley and J. C. Frees to operate in Montrose County with \$10,000 capital stock.

Ouray County.

Ouray Mining and Milling Company.—Thomas D. Price and Edward Price, as officers of this company, have been sued by Hendrie & Bolthoff, Denver, for \$1,500 on a promissory note, given in payment for machinery and supplies.

Saguache County.

The producing mines at Creede have gained control of the surface water inflow and are again outputting from 10 to 16 cars a day.

Antlers Park Regent.—This property is in much the same position as the United Mines Company in its 400 ft. shaft, which recently cut the vein on the dip and found ore of the low grade character of that in the Happy Thought.

Ridge.—The Ridge mill is kept in ore and runs steadily, concentrating the galena and separating it from the zinc.

Schuylkill Mining Company.—All the additional work on this company's property exacted by the deputy surveyor general has been completed, and drifting on the galena seam resumed. The seam is getting wider, and the drift shows four additional galena streaks, all running to a common center. The hanging wall is also changing its position, indicating that the vein will eventually dip into the hill in conformity with the general dip of all the producing veins in Creede. In the same pitch the lessees of the Ethel have resumed work digging the dump, and are making as good returns in lead concentrates as last fall. A car a week will be shipped.

United Mines Company.—The shaft of this company at Creede is now down 500 ft. and is going down at the rate of 4 ft. a day. A station for a drift is being cut for a 500 ft. level, and drifting either way will be resorted to in the hope of showing an ore chute. The vein mass in the shaft is considerably mineralized, but is not yet of a shipping grade. The working is thought to be between ore chutes and the drift from that depth is expected to find them. Sinking will be continued.

FLORIDA.

Alachua County.

Standard Phosphate Company.—This company has nearly completed a new office building and storehouse at its mines near Archer.

Marion County.

York Phosphate Company.—This company is at work on its new mine, near Leroy, which it intends to work on a large scale.

Polk County.

Virginia-Florida Phosphate Company.—On this company's property near Fort Meade, a new deposit of pebble phosphate has been discovered. It is from 3 to 4 ft. thick, with very little overburden, but its extent is not yet determined.

GEORGIA.

Lumpkin County.

Lockhart.—A crosscut is being run on the vein from the 60 ft. shaft, and this has so far furnished ore enough to keep the mill at work. As soon as a larger pump can be put in the shaft will be sunk to 90 ft., and a new crosscut will be started at that depth.

Silvam.—At this mine the 10-stamp mill lately bought by Mr. F. G. Benham, is running on ore taken from several test shafts which have been sunk on the property. The result will decide in which direction the development work is to be pushed.

White County.

Nichols Mine.—Arrangements are being made to put a "giant" for hydraulic working on this property.

Yonah Gold Mining Company.—It is stated that this company has decided to put in a Theis chlorination plant and concentrating machinery.

IDAHO.

Alturas County.

Croesus-Hope Group.—This group of claims near Hailey, says the "Wood River Times," has been bonded for one year by Milwaukee parties who are represented by J. J. Smith. The option is for one year and the price is said to be about \$60,000.

Jay Gould.—The lessees at work in this mine are doing well and are taking out a considerable quantity of ore. A small force is employed on development work.

Red Cloud Mining Company.—The contractors have finished their work on the tunnel near Hailey. Further extension and cross cutting on the vein will be carried on by the company.

Fergus County.

Spotted Horse Mine.—This well known mine is the property of the Double Eagle Consolidated Gold Mining Company, of Chicago. Mr. J. W. Provand, the manager, is now at the mine superintending some repairs at the mill and putting a cage in the shaft. He reports the mine in good condition with large amounts of high grade ore exposed. A run of 30 days in November and December last yielded

\$42,000 in gold. Mr. Provard expects to start the mill so soon as the weather will permit, and keep it in constant operation during the summer.

Idaho County.

Little Giant.—A new drift in this mine, near Warren, which was started last Winter, has reached an ore body which is reported to be very rich. The drift has uncovered the vein for 118 ft.

Seven Devil's District.—Placer mining has already been begun on Squaw Creek, and a number of men are ready to start in as soon as the weather permits.

Owyhee County.

De Lamar Mining Company.—Manager J. W. Plummer's report for February gives a detailed statement of the development work done in the mine during the month. The milling operations for the month was of the usual description, the only stoppage being 10 hours for the customary clean-up. The table of work performed for February shows as follows: Wet tons crushed, 3,166 tons; dry tons crushed, 2,844 tons. Assay value of the pulp: Gold, 1.06 oz.; silver, 11.43 oz.; assay value of the tailings: gold, 0.182 oz.; silver, 1.39 oz.; total percentage saved, 84.21%; of gold, 82.91%; of silver, 87.83%. The pure gold produced was 2,310.033 oz.; fine silver produced, 38,490.22 oz. The value of gold produced was \$46,201, and of silver, \$23,340, making a total of \$70,041. The miscellaneous revenue was \$297, and the value of ore shipped during the month was \$12,000, making a total of \$82,338. Deducting costs and expenses for the month a total of \$36,197, leaves the estimated profit for the month \$46,141. Nothing has been done on the surface but the usual routine work, the heavy snows preventing. The weather was exceedingly variable.

Shoshone County.

Last Chance vs. Tyler Mining Company.—A press dispatch from San Francisco says that the United States Circuit Court of Appeals affirmed the decision of the lower court in the suit between these companies on the appeal from Idaho. The dispute is as to boundary lines over which the companies have been fighting for years. Two years ago a jury in the Idaho Circuit Court decided that the overlapping territory belonged to the Last Chance. On appeal the decision was reversed and a new trial ordered. In the second trial a verdict was secured for the Tyler Company. Then the Last Chance appealed, but is now defeated.

KANSAS.

Crawford County.

Santa Fe Coal Company.—The miners employed by this company at the Frontenac mines, the largest in the district, held a meeting on April 16th and decided not to go out on strike April 21, as they are requested to do by the national organization.

KENTUCKY.

Bell County.

It is reported that negotiations are in progress for a consolidation of the interests of all the coal operators in the Mingo district, putting the mines under one management.

MARYLAND.

Allegany County.

Borden Mining Company.—A cave occurred last week in this company's Bowery Mine, when 12 men were at work drawing pillars. All escaped but one man, who was crushed to death.

MICHIGAN.

Copper.

Arnold Mining Company.—At a special meeting, held April 16th, the stockholders voted unanimously to extend the charter, which will expire in May, for 30 years.

Calumet & Hecla Mining Company.—Orders have been received from the headquarters of the Calumet & Hecla Mining Company by its officials at the mine to stop all the construction work and improvements that have been planned for this spring at the mine and stamp mills at Lake Linden, says the Marquette "Mining Journal." The new chimney, 250 ft. high, for which the foundation was built last summer, will not be started on May 1, as was expected. Neither will the boiler house and electric light house be built at present.

Centennial Mining Company.—The drift on the Osceola amygdaloid is reported to be showing a promising amount of copper.

Wolverine Mining Company.—Indications in this mine are reported as better than they have been.

Iron—Marquette Range.

Champion.—A force is at work on the stockpiles preparing for shipments of ore.

Pittsburg & Lake Angeline Mining Company.—A force is at work repairing C shaft in the Lake Angeline mine, so that it will be in readiness for work.

Queen Iron Mining Company.—This new company will operate the Buffalo, South Buffalo, Prince of Wales and Queen mines, formerly worked by the Buffalo Mining Company.

Republic.—This company began last week loading ore for shipment from the mine.

Volunteer.—This mine was closed down last week, the working force of 160 men discharged and the pumps taken out. The company has about 100,000 tons of ore on the stock piles ready to ship, and will mine no more at present.

Iron—Menominee Range.

Chapin.—The pumps in this mine have been kept running and the mine is dry and in good condition, but only 22 men are employed and nothing has been done toward taking out ore for shipment.

York Iron Company.—This company's Dunn mine is to be sold to satisfy judgment liens for labor. It is expected that it will be bought in.

MINNESOTA.

Duluth County.

(From our Special Correspondent.)

Ore hauling on the Duluth & Iron Range road began last week, and 10 trains are now at work. Cargoes may be loaded this week. The Duluth, Missabe & Northern has begun work in completing its dock, having 180 pockets to finish. Ore hauling begins next week. The company is surveying for proposed extensions to the Rainy River country and the pine of the Lake of the Woods. By reason of the breaking up of ice in the streams the alleged gold region of Rainy Lake is now inaccessible, and will be for a month.

Iron—Mesaba Range.

(From our Special Correspondent.)

Biwabik.—Recent additions to the stockholders of this company will be shown by the names of A. M. Byers, John Tod and others, which will be added to the list of directors in a few days.

Canton.—This mine has begun shipping from its stock pile of about 150,000 tons.

Franklin.—This mine has sold 50,000 tons at \$2.75, and has offers of the same price for 40,000 additional tons.

Ohio.—The fee of this mine is under negotiation, the Minnesota Iron Company being the supposed buyers.

Oliver.—Drake, Stratton & Co. begin work next week with 150 men.

Iron—Vermilion Range.

(From our Special Correspondent.)

Chandler.—This company has 278,000 tons on the stock-pile. A new incline shaft 6 by 16 ft. is being sunk at this property, and has been put down 110 ft. in the last month.

MONTANA.

Lewis & Clarke County.

Armstrong.—At this mine in Saw Mill Gulch, the shaft is now down 128 ft., and the vein is improving with depth.

Piegan and Golden Leaf.—A very important mining deal has been consummated, says the Marysville "Mountaineer," whereby Sam Word, of Helena, becomes owner of the Piegan mine at Gloster, and all the property of the Golden Leaf company at Empire. As soon as the snow disappears sufficiently active operations will be commenced on both properties.

Madison County.

Messrs. Reed, Elling & McCay have bonded their group of five claims in the Mammoth district to Gelder & Bailey, mining brokers of Denver, who are making preparations for work. A small force of men have been put to work.

Atlantic & Pacific.—Mr. C. H. Hand, of Butte, has a bond on these claims, owned by Elling & Morris. Developing is being done with a tunnel along the foot wall, now in over 480 ft. Two cross-cuts have been made, disclosing a vein of good concentrating ore from 60 to 70 ft. wide. The value of the ore is said to be uniform.

Bozeman Mine.—This mine was recently bonded to David N. Upton, who represents, it is said, a syndicate of mining men in Butte. This mine is located on the summit of Mineral Hill, and is a free gold property. The vein is from 12 to 20 ft. in width, and according to mill runs made in the past, runs from \$8 up. A tunnel is now being driven that will tap the ledge considerably deeper and also drain the upper workings of water.

Golden Star Gold Mining Company.—This company has developed a body of free gold ore on its claims near South Willow Creek that is considered of sufficient value to justify the erection of reduction works. A Tremain stamp mill now on the ground is expected to be in operation very soon. The company consists of Chicago and Deer Lodge men.

Iron.—Mr. R. E. McCarthy has struck a bunch of shipping ore in the mine, and is taking it out as rapidly as possible.

Mountain Meadow.—Messrs. Milligan & Stock have been working this mine under a lease during the past three months. They have now several cars of \$100 ore on the dump, besides the second class, as the results of their labor.

Revenue.—This mine at Richmond Flat, which has for years been a producer of gold, was recently bonded to C. H. Hand, of Butte. The ore has heretofore been treated by the cyanide process. It is the intention to remodel the mill and change the crushing from stamps to rollers. The latter mode is expected to obtain better and quicker results with the cyanide.

Valley View Gold Mining Company.—This company was lately organized by Capt. Thomas Couch, Edward Couch, J. H. Vivion, of Butte, and W. C. McKaskle. The property is located immediately south of the town, between North and South Willow creeks, and consists of about 17 claims in a compact body, besides mill sites and water rights. The

surface showing is good in several places, the ore being low grade and free-milling gold. Under the management of Mr. McKaskle two tunnels are being driven that will crosscut several veins. One of these veins, about 400 ft. on the surface and a 600 ft. tunnel, is expected to crosscut it about 400 ft. deep.

Missoula County.

Missoula Placer Company.—Two large flumes and a giant hydraulic are working with a force of 10 men at the mouth of Quartz Creek. Sluicing will be commenced shortly and the labor force increased.

Silver Bow County.

Alice Mining Company.—About 75 men are at work on tribute in this mine and are reported to be doing well. The mill is running 30 stamps on ore taken out by them.

Anaconda Mining Company.—A diamond drill is operating on the side hill, southeast of the main shaft. Since the fire, nearly four years ago, smoke has been issuing through the fissures of the hill. All that part of the mine east of the shaft, in the direction of the fire, was tightly sealed up and it was hoped the fire would be smothered. It is the intention now to reach the smoldering spot with the diamond drill and water will be poured down the bore. It is believed the sulphur in the copper ore is what is burning, as the timbers must have been burned out long ago. No persons can get near the fire, but that it still burns is evident from the smoke, the smell of which is easily detected on the hill and the smoke is frequently visible. It is believed the fire is down on the 600.

Buffalo.—This mine is showing considerable water. Last month about eighteen cars of ore were shipped to Anaconda from this property. A new ore house and chute have been built and a spur of the Butte, Anaconda & Pacific track has been extended within reach of the ore chute.

Butte Reduction Works.—The capacity of the smelter is being doubled, and the new building is now almost completed. It is understood that the old furnaces are to be replaced by new and large ones and new calciners will be added. Many improvements are being made to bring the plant up to the latest standard.

Montana Mining Company, Limited.—The total output for March was Gold, 2,420 oz.; silver, 16,700 oz.; the estimated realizable value of the same was \$57,400. The ore milled during the month was 6,905 tons, 105 stamps having been in operation. The expenditure was as follows: Working expenses on revenue account, \$33,400; outlay on developments, \$13,000; extraneous expenses including insurance, \$1,150; permanent improvements account, \$100; total \$47,650. This leaves a balance of \$9,750 for the month.

Southern Cross.—It is reported that the Longmaid brothers have secured a two years' option on this property.

NEVADA.

Esmeralda County.

Silver Star District.—In this district the Hard-scrabble mine, owned by Edward Brown, is said to be the best property so far. In a distance of 35 ft. he has a ledge 4 ft. wide, the ore from which will average \$50 per ton. The Orphan Boy, owned by Douglass & Co., has a tunnel in about 60 ft. and an incline 40 ft. There is on the dump about 20 tons of \$40 ore. The Julia at a depth of 30 ft. is showing \$25 ore, and the Dollie, at 20 ft., \$20 ore.

Lincoln County.

Hiko.—A load of castings, consisting of shoes, dies and tappets, has arrived at the Hiko mill, and another load of general mill supplies will arrive shortly. The company intends making a steady run when next starting. About 200 tons of ore are now on the dump, and arrangements are being made for a large quantity of low-grade ore from the Ferguson district and Irish mountain.

Jim Crow.—A three-weeks run at the Condor mill on Jim Crow ore gave about \$15,000 worth of amalgam.

Story County—Comstock Lode.

Following are extracts from the latest weekly official letters of superintendents of Comstock mining companies:

Alta Mining Company.—The south drift from the north raise was extended to a total length of 95 ft.; face in clay and quartz, the latter yielding fair assays. The south upraise is improving as we advance; the face is showing about 2 ft. of good ore. The drift running north from the bottom of the south winze is looking better, the assays averaging about \$30 per ton.

Best & Belcher Mining Company.—On the 800-ft. level we have cleaned out and retimbered 30 ft. of the main north drift, making its total length 335 ft. from the shaft. Twenty-five tons of fair grade ore were hoisted during the week.

Chollar Mining Company.—The north drift, 100 level, is now out 117 ft.; face is in hard porphyry with streaks of low grade quartz through it. The west cross-cut on this level 300 ft. south of the north line, was extended to a total length of 100 ft.; face in a mixture of porphyry and quartz of low assay value.

Crown Point Mining Company.—The south drift on the 600-ft. level from the top of the 700-ft. level raise has been advanced to a total length of 48 ft. The face continues in porphyry. The south drift on

the 7th floor of the 700-ft. level raise is out 35 ft. The face is in quartz of about the same character and value as last week. Have stopped the north drift on the 700-ft. level and started a south drift from the shaft station on the 500 level. The drift is out 13 ft., the face being in a mixture of porphyry and low-grade quartz.

Kentuck Mining Company.—From the south drift from the top of No. 1 upraise 1,100 level we are extracting a few tons of pay ore. On the 1,200 level the joint south drift from the Jacket incline has been extended to a total length of 36 ft.; face in low-grade gold ore.

Occidental Mining Company.—From the west ledge above the 400 level we have extracted about 8 tons of ore of the average assay value of \$14 per ton. Resumed the milling of ore on April 2d.

Ophir Mining Company.—Connection between the north drift from the Central tunnel and the old Mexican shaft in Ophir ground will be made in a few days. In cleaning out the old drift some ore assaying well in gold is being found in spots and bunches.

Potosi Mining Company.—The south drift from the up-raise, 50 ft. above the 450 level is getting into material which shows steady improvement. The drift is still on the east side of the heavy bank of clay encountered on the 450-ft. level just before the rich ore was struck, and it is the upward continuation of this ore that we are now looking for and expecting to find.

Savage Mining Company.—"On the 1,050 level, the north drift started from the east drift at a point 85 ft. south of the shaft is advanced 53 ft.; face in quartz giving low assays. We have resumed work in the north drift from the station and have advanced 30 ft. The west cross cut from the southeast drift, started at a point 225 ft. from the shaft, was advanced to a total length of 41 ft.; face is in quartz and porphyry. The south drift was advanced to a total distance of 155 ft. from the shaft. On the 1,100 level the north drift from the shaft was advanced to a total length of 147 ft.; face is in quartz and porphyry. On the 12th floor we are extracting some pay ore."

Segregated Belcher & Midas Mining Company.—The north drift from the 1,200 level raise on the 1,150 level is out 59 ft. The face is in a mixture of porphyry and low-grade quartz. We continue to save a few tons of fair grade ore per week from the south raise on the 1150 level.

(From our Special Correspondent.)

The following is the weekly tabulated statement of ore hoisted from Comstock mines and milled, with the average car sample and battery assays, bullion, shipments, etc.:

Mines.	Ore Hoist'd	Car Sample Assay.	Ore Mill'd	Av. Bat'y Assay.	Bullion for Week.	Total.
Belcher.....	25	17	.....	.....	.....	.....
Kentuck.....	1	.....	.....	.....	.....	.....
Occidental..	8	14	.....	.....	.....	.....
Savage.....	2	.....	.....	.....	.....	.....

¹ Saving a few tons daily for pay. ² Small quantities being saved.

NEW MEXICO.

Grant County.

Humboldt Mining Company.—This property has been purchased recently by J. C. Neely, H. M. Neely, M. Gavin and Heber Jones, all of Memphis, Tenn. Among the mining claims on the property is the Superior mine, which is said to be quite a good one. There is a 10-stamp mill and a valuable water power plant on the property.

Manhattan Gold Mining and Milling Company.—This company, which owns 11 mines in the Pinos Altos district, has completed its tunnel to the main vein on the property, and work will be resumed soon in the mines and mill.

Socorro County.

It is now settled that operations in the mines at Mogollon will be continued for the next few months at least, the miners having agreed to the reduction in wages which the low price of silver made necessary. This has been done with the understanding that the old rate of wages will be restored as soon as silver reaches 70c. an ounce.

OREGON.

Baker County.

Baker City Sampling Works.—These works were started up last week, and can reduce 10 tons of ore a day. The first run was made on ore from the Gorman & Reynolds mine in the Virtue district.

PENNSYLVANIA.

Anthracite Coal.

The Coroner's Jury investigating the Gaylord mine accident has returned the following verdict: We find that the 13 men who were killed in the Gaylord mine, at Plymouth, on Feb. 13, came to their deaths through an error of judgment on the part of the person or persons in charge of the party at the time. The men were allowed to remain in a place that appears, to the jury, must have been plainly dangerous, for some hours prior to the cave-in. The cause of the cave-in was, in our judgment, due to the insufficient size of the pillars left in the Red Ash vein, which were further reduced in size by the chipping of the pillars due to atmospheric causes, and the shocks due to the shots or blasts fired in the overlying veins, and the jury recom-

mends that the next Legislature so amend the present mine laws as to prevent miners and laborers from going, or being sent, into such places as make possible such catastrophes as that under consideration."

About 1,800 miners in the Lehigh region will return to work on May 1, after an idleness of 10 weeks. The work of stripping will be begun by J. W. Crelin & Co., Dick & Wentz and Coyle Bros.

A dispatch from Tower City, in the western end of Schuylkill County, says that the officials of the Summit Branch collieries have received orders to run on full time until further notice. The collieries had worked but three and a half days during the past three weeks.

Advices from Pittsburg state that the coal operators of the Pittsburg district have refused to meet the miners in conjunction with the Ohio operators, who offered to do so. President John A. Cairns, of the Pittsburg miners, said that he expected a complete cessation of mining operations throughout the country, and that the struggle would be short and decisive. He said that the strike would have begun April 16 had it not been for the decision of the miners to give the manufacturers and railroads a chance to get a supply of coal.

The Monongahela River operators claim that a shutdown will not hurt them much, as the Southern coal trade is in poor condition.

Bell, Lewis & Yates Coal Mining Company.—About 1,000 men, employes of this company, struck on April 18th. They are members of the United Mine Workers, and were under orders to quit on the 21st, but chose to stop increasing the supply that is being produced, in anticipation of the general strike.

Bituminous Coal.

A dispatch from Sharon says that the miners of the Jackson Center bituminous coal mines along the Lake Shore and the Western New York & Pennsylvania railroads have succeeded in making a compromise with the operators and resumed work April 16th on a 5% reduction. Six hundred striking miners along the Pittsburg, Shenango & Lake Erie, who have been out three months, remain firm and refuse to accept a reduction.

Advices from Pittsburg state that about 3,000 miners in the Jefferson and Clearfield counties' bituminous district are prepared to strike on April 21st. This will result in a tie up of the Buffalo, Rochester & Pittsburg Railroad Company's coal trains, throwing 350 men out of work.

The miners at Hooversville, Somerset County, have decided to join in the general strike which is scheduled in Clearfield, Blair, Westmoreland, Indiana, Cambria and Fayette counties on April 21st. There is a belief that more than half the miners in Somerset County will quit work at the appointed hour. In Cambria County there is great uneasiness, but the opinion prevails that the strike will be a go, except perhaps in Johnstown, where the men are not discussing the situation to any considerable extent.

SOUTH DAKOTA.

Lawrence County.

The boycott declared last winter by the Miners' Union and Knights of Labor on the merchants of Deadwood, and all Deadwood institutions, because of the stand taken by the Deadwood people in the labor troubles at the Annie Creek mines has been declared off.

Black Hills Gold and Silver Extraction and Mining Company.—About 1,000 lbs. of ore in sacks were shipped to some of the New York stockholders last week. The shipment was a sample of a general average of the ore body opened up in the company's mines on Blacktail, known as the Lewis and Flickinger groups.

Cæsar Group.—This group, situated on Squaw Creek, in Carbonate district, has been developed by many hundred feet of tunnels, drifts, open cuts and shafts, in all of which the ore body is exposed to view. Near the surface the rock ranges in value from \$15 to \$18 gold per ton, says the Deadwood "Times." The main tunnel is now in 150 ft., and a cross-cut to the northeast from its face has recently been driven 75 ft. At this point the drift shows a 6 ft. face of solid ore at a depth of 400 ft. from the surface, and an average sample of this ore is said to have returned assays of \$30 gold per ton. This drift will be continued in the same course, and will cross-cut the formation in the Cleopatra lode (adjoining), one of the locations comprising the group. The property is owned by Wendell Koerner, Thomas Sutton, John Adams, Jos. Schaller and the Peter Hann estate. The Bohama, and adjoining property on the east, owned by Peter Smith and W. W. Parker, has two vertical crevices of good grade ore in sight in its workings. A drift has been started in a northeasterly direction to cross-cut the formation and intersect all ore shoots or crevices that may exist in the property. The general course of all the veins and shoots of ore in the vicinity so far opened has been northwesterly.

Cleopatra Group.—This property consists of 12 claims situated on Squaw Creek. It embraces the Jay Bird, Blue Bird, Black Bird, Little Ellen, Surion, Bahla, Cleopatra, Ceaser, Buffalo, Gopher, Pocahontas and Red Cross lodes. All these claims lie parallel, the ore formation crossing them at right angles. The greater portion of development has been done on the Buffalo, Cleopatra and Ceaser, although on each of the other claims prospect work-

ings have been made to the ore bodies, says the Deadwood "Pioneer." On the Buffalo there is a 120-ft. working tunnel to the ore body, and two crescent drifts, one 90 ft. and the other 40 ft. long. The 40-ft. drift has penetrated 7 ft. into the ore body. The assay of the ore when first struck gave \$12 per ton gold, with ½ oz. of silver; 8 ft. further it gave an assay of \$20 in gold per ton. The ore is of the same character (brown oxidized) as that of the Golden Reward Company's Bald Mountain properties, and are good chlorinating ores. The formation of these properties is the same as that of Bald Mountain.

TEXAS.

Dallas County.

Texas-Rock Island Coal and Stone Company.—This company has been incorporated, with office at Dallas, by Barnett Gibbs, C. L. Frost and John H. Gaston. The capital stock is \$100,000.

UTAH.

Salt Lake County.

The shipments of ore and bullion from Salt Lake City during the week ending April 7th were: Bullion, 572,131 lbs.; silver and lead ores, 1,222,000 lbs. The receipts of ore and bullion in Salt Lake City for the week ending April 11th were to the aggregate of \$114,624, of which \$79,586 was in bullion and \$35,030 was in ore. The receipts of Pennsylvania bullion were \$17,098; Hanauer bullion, \$13,050; base bullion, \$16,900; Daly bullion, \$10,323; Ontario bullion, \$15,420; bullion, \$4,395; gold bars, \$2,400.

Stewart Mining Company.—The March product of these mines at Bingham was one gold bar weighing 39 lbs. and valued at \$10,480, being 900 fine. On April 27th the mines which have been producing similar bars monthly will be sold under a bond secured nearly six years ago. The present owner is the Stewart Mining Company and the purchaser will be the Bingham Development Company.

Summit County.

Ontario Mining Company.—At the present rate of progress it is estimated that it will require another year at least to complete the great drain tunnel at the Ontario mine, says the Salt Lake "Tribune." The face of the tunnel is now 1,300 ft. from the mine workings, and it is impossible to drive it more than 25 ft. per week. The work at present is in a peculiar formation that slacks and "swells" on exposure to the air, and crushes the 12 x 12 timbers like pasteboard. This "swelling" is simply an expansion of not only the side and top walls, but of the bottom as well, and steel beams could not withstand the pressure. This makes it necessary to "rim" out the tunnel a second time and replace the crushed timbers. The Park City "Record" says the attempt will again be made to drive the Ontario tunnel from No. 2 shaft. The drift started has recently been thoroughly examined, and it is thought the water can be safely handled provided it grows no worse than it now is.

Tooele County.

Sunshine.—At this property, says the Mercur "Mercury," there are now over 1,000 tons on the dump, running from \$2 to \$14, and averaging \$8 to the ton. The owners are now prospecting for water close to the mine, and if it is secured will erect a mill there this summer.

WEST VIRGINIA.

Logan County.

Pearl Mining Company.—This company's coal mine at Dingess is running on full time, with a full force.

Union Mining Company.—This company is pushing work on the opening of its mine near Dingess. The tippie is nearly finished.

WISCONSIN.

Iron—Gogebic Range.

In consequence of the trouble with the laborers on the ore docks at Ashland orders have been given to take all iron ore from Gogebic mines to Escanaba for the present. The order is only temporary.

WYOMING.

Carbon County.

A number of new placer claims have been taken up along Rock Creek, and most of them will soon show some work done. Negotiations are in progress for the sale of a group of claims to a Denver company.

FOREIGN MINING NEWS.

AUSTRALIA.

The gold-mining boom is becoming more and more pronounced every week and is extending to pretty well all the colonies. West Australia is, of course, the great center of attraction, but in various parts of Victoria, New South Wales, and Queensland discoveries are being made and developments taking place which are calculated to divide with the golden West the attention of those afflicted with the gold fever. Perhaps the most important rush in the eastern colonies is that reported from Wyalong, in New South Wales, where what promises to be an extensive and highly payable field is now being opened up; and as there is also a very good prospect of a great revival on the old Hill End field, the gold-mining industry may be said to have made an exceptionally good start for the new year in the

mother colony. In Victoria, the recently reported discoveries have been both numerous and important and there is every reason for looking forward to a highly prosperous year. In Queensland the gold-mining industry continues in a healthy condition, with advancing returns from some of the principal fields, and with good reports from new finds; while the news from New Zealand, Tasmania and South Australia is not by any means destitute of encouraging features. Notwithstanding, therefore, and the vast numbers of men who are going out west, and the large amount of attention being devoted to the Coolgardie and other west Australian mines, things are looking up for gold all round.

SOUTH AUSTRALIA.

The new find on the old Waukaringa goldfield has aroused a good deal of interest, says the "Mining Standard," among the inhabitants of the Barrier, owing to the fact that it was made by a Broken Hill syndicate. As a consequence quite a number of syndicates have been promoted to undertake work on the field, and a large area of ground has been taken up. The specimens brought to the Hill by the discoverers are very rich, and show the gold to be coarse and free. As these were obtained at small depth there was quite a rush to inspect the find. Some alluvial gold has also been found, but nothing of the character of a lead has yet been traced. If Waukaringa turns out well Broken-Hill, having the biggest say in the matter, ought to rake in considerable profit. It is quite refreshing to hear of New South Wales mining men having an interest in South Australian ventures; generally the position is reversed.

GERMANY.

At a meeting of the Rhenish-Westphalian Coal Syndicate in Essen, March 30th, the total sales of coal to that date were reported at 12,304,103 tons. Instructions were given to restrict production 20% in April.

GREAT BRITAIN.

For the three months ending March 31st the output of the Cleveland district was 683,972 tons of pig iron, against 678,587 tons for the corresponding quarter of 1893. Of the production this year 318,802 tons were forge and foundry iron, and 365,170 tons Bessemer pig. On April 1st there were 92 furnaces in blast in the Cleveland district, against 89 on March 1st.

HUNGARY.

The "Deutsche Kohlen Zeitung" says that the total coal production, including both coal and lignite (brown coal), was about 4,000,000 tons in 1893, against 3,700,000 tons in 1892 and 3,447,000 tons in 1891. Imports in 1893 were 1,300,000 tons, making the total coal consumption 5,300,000 tons.

INDIA.

Balaghat-Mysore Gold Mining Company.—For the quarter ending March 31st there were 1,020 tons of ore crushed, with a total output of 1,061 oz. gold.

Mysore Gold Mining Company.—In the three months ending March 31st this company's mill crushed 14,099 tons of ore, from which 11,710 oz. of gold were obtained. In addition 2,044 oz. were obtained from reworked tailings, making the total output 13,754 oz.

Nundydroog Gold Mining Company.—For the quarter ending March 31st this company worked 7,100 tons of ore. The total production was 5,594 oz. gold, of which 5,178 oz. were from amalgamation and 416 oz. from tailings reworked.

Ooregum Gold Mining Company.—For the three months ending March 31st there was 9,787 tons ore worked. The total output was 18,806 oz. gold, of which 16,740 oz. were obtained in the mill and 2,156 oz. from reworking tailings.

The company's report for the year ended December 31st states that the total quantity of gold produced was 75,092 oz., which realized £280,040. The result of the year's working was a profit of £156,436, being £40,695 in excess of that made during the preceding year. In April last a dividend of 3s. per share was paid on both ordinary and preferred shares, being the balance dividend for the year 1892. Since that date two dividends have been paid, one on August 10th of 3s. per share on the ordinary shares and 5s. per share on the preferred shares, and the other on December 11th, of 3s. 6d. per share on both ordinary and preferred shares. The profit and loss account shows that after payment of these dividends, together with income tax on profits, amounting to £2,080, and writing off £3,500 for depreciation of machinery, buildings and plant, there remains a balance of £53,625. This will admit of a dividend of 4s. per share, leaving £625 to be carried forward. The dividends thus paid will amount to 10s. 6d. per share, or 52½%, on the ordinary shares, and 12s. 6d. per share, or 62½%, on the preference shares.

MEXICO.

Don Enrique Mining Company.—Advices from Boston, Mass., state that this company has called for a voluntary assessment of 9c. a share in order to raise \$100,000 to pay off its debts and give it a working capital of about \$30,000. The company owes \$214,180 on notes and \$23,155 in Mexico, and the Mexican creditors are threatening to take the property for the Mexican debt.

NEW BRUNSWICK.

Grand Lake District.

The Newcastle coal field, which is the best of the Grand Lake coal areas, is 32 square miles in extent,

and is estimated to contain 51,200,000 tons of good coal. There are two seams of coal, the upper, which is the best, varying from 20 to 32 in., and the lower, from 8 to 9 in. in thickness. These are separated by a vein of black shale. Mining the lower seam with the upper has been the means of giving the Newcastle coal any bad name it may have got. The coal lies from 5 to 40 ft. from the surface, and can be mined and delivered on surface at \$1.30 per ton. The difficulty in working is the inadequate means of transportation, as all the coal has to be hauled three or four miles at a cost of 75c. per ton. When the Central Railway reaches Newcastle the coal will be 50c. per ton cheaper than at present.

NEW SOUTH WALES.

The receipts of gold at the Sidney mint in 1893 were 171,097 oz., against 144,259 oz. in 1892, and 142,470 oz. in 1891.

Block 14 Mine, Broken Hill.—Smelting operations were last month suspended at this mine, and this has been followed by an almost complete stoppage of underground work, only a few men being retained to keep the mine in good condition. It is stated that nothing will be done until the new sulphide plant is completed.

NORWAY.

The vast deposits of iron ore in the northern part of Norway are beginning to attract considerable attention. In the Dunderland Valley new deposits of iron ore have been found. Representations have been made to the Norwegian Government that the portion of the Nordland Railway which refers to this district should be proceeded with. There are larger deposits of ore some 20 miles from the sea at Helgeland.

The Sulitjelma and Bosmo copper and sulphur ore findings are also being worked with much energy by a company.

NOVA SCOTIA.

A scheme is proposed to run coal barges from Portland, Me., to Minas Basin in the Bay of Fundy to bring coal direct to the former port from Nova Scotia. It is expected that Canada would call for 100 carloads daily, and the change would greatly reduce the cost of transportation and cheapen coal in Canada.

Old Bridgeport Mine.—Work is being pushed rapidly forward at Dominion No. 1. Temporary pulleys and headgear are erected, the shaft is being put in order for hoisting, levels and headings are being driven forward as fast as possible, and by the time that navigation opens this new mine will be in a position to add materially to the output of the company.

Country Harbor.

Antigonish Gold Mining Company.—In a letter written by the manager of this company it is stated that in the thirty two months in which the mine has been in operation, about \$100,000 gold has been mined. The work carried on in the Starport district by the North Star, Richardson, St. John and Antigonish companies has increased the output of gold from 616 ounces in 1890 to 5,000 ounces in 1893.

ONTARIO.

Sudbury District.

(From our Special Correspondent.)

There is a regular chorus of rejoicing all over the mining districts of Northern Ontario this week. A bill has been introduced in the Legislature, and which will certainly be passed, exempting from government royalty forever all mining claims that may be taken up in the province within the next five years. This is a long step in the right direction, and it will undoubtedly have the effect of reviving public interest in our mines. The abolition of the royalty by the Ontario Government and of the duty on coke by the Dominion Government will doubly benefit the nickel mining industry of this district. Even already numerous parties are making arrangements to go out prospecting, and others are preparing to open up their properties, as they have better prospects of making sales now.

The owners of the Tam O'Shanter and North Star claims are going to commence work on two test shafts next week.

A syndicate of white men and Indians are doing some preliminary work on a newly discovered property in the township of Trill, in which the nickel ore occurs in a large quartz vein.

The Pellequin gold location in the Wahnapiatae section is reported to have been sold last week to Ottawa parties for \$16,000.

Some Minnesota capitalists were here lately and bonded a number of gold claims, on which they intend to begin work as soon as the snow is off in the green bush.

Copper Cliff Mine.—The new shaft from the third to the seventh level has been completed and works well.

Duluth Mine.—The development work on this mine, in Trill, is going ahead satisfactorily. The prospecting shaft is down nearly 50 ft., and some very rich ore has been taken out, assaying up to 20% of nickel.

RUSSIA.

Work has been suspended in the Tochiaturi manganese mines on account of the unusually heavy snowstorms, which caused a suspension of traffic on the railroad from Kurvili for nearly all of March.

Finland.

At a recent meeting of the Helsingfors Chemiker Verein Mr. Tigerstedt, engineer, read a paper on "Examination of a Copper-ore Deposit in North Finland." The ore is found with limestone and diorite, and is very clean. The extent of the deposit is not yet determined.

SOUTH AFRICA.

Transvaal.

Crown Reef Mines.—A complete electrical plant has been put in operation here. The "South African Mining Journal" says: Electric pumping is being carried on, and the electric light is in full working order. Electric locomotives have been run experimentally, with very satisfactory results. There are three 90-unit shunt-wound Elwell-Parker generators for power purposes, and two alternators, and two exciters for lighting. In the lighting eight 2,000-c. p. arcs are used, and 28 200-c. p. and 500 16-c. p. incandescents. Two sets of electric pumps are ultimately to be fixed at the dam pumping station to supply water to the mill. One of the pumps is at work supplying 60,000 gallons per hour through more than 3,000 ft. of piping, under a vertical head of about 250 ft. Trial runs have been made over the electric tramway, which is worked on the over head system. The total weight of the locomotives, of which there are two, is about 10,000 lbs., and they will be capable of moving about 25 empty trucks from the mill to the mine at one run. This is the first instance in which electrical haulage has been adopted on the Rand, and is on a large scale.

SOUTH AMERICA.

Venezuela.

(Special Correspondence.)

El Callao Company.—One of the coming mines of the old Yumani District is La Colombia, now under the management of this company. In 1893 a narrow-gauge railroad was built, and the mine and machinery put in condition to furnish ore for 30 or 40 stamps of the El Callao mill. Up to January, 1894, La Colombia had milled 32,382 tons of ore, which yielded 40,003 oz. of gold; a yield of 1.24 oz. per ton; in January, 1894, milled 2,550 tons, yield 2,820 oz. February run will produce over 3,000 oz. from about 2,000 tons. The lode is large and is being worked at a total cost of 46 fr. per ton, i. e., 33 fr. mining, 7 fr. milling and 6 fr. railroad transportation. The bottom of the mine shows heavy gold.

TURKEY.

The owners of several pits at the Heraklea coal mines lately approached the Turkish Government with a request for a reduction in the taxes imposed on the coal extracted, alleging that these are too heavy and render it impossible for them to compete advantageously with foreign coal. The request was submitted by the Grand Vizierate to the Ministry of Marine, which has jurisdiction over the matter. This department has not, however, found it advisable to grant the demanded reduction, but it has informed the petitioners that it is prepared to grant them certain other facilities which will reduce their expenses, and thus enable them to sell their coal at easier prices.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 20.

Statement of shipments of anthracite coal (approximated) for week ending April 14th, 1894, compared with the corresponding period last year:

	1894.		Difference.
	Tons.	Tons.	
Wyoming region.....	312,328	393,703	Dec. 81,375
Lehigh region.....	96,580	150,577	" 53,997
Schuykill region.....	191,645	246,014	" 54,369
Totals.....	600,553	790,294	Dec. 189,741

Total for year to date.. 8,552,006 11,592,409 Dec. 3,040,403

PRODUCTION OF BITUMINOUS COAL, in tons of 2,240 lbs., for week ending April 14th and year from January 1st:

	1894.		1893.
	Week.	Year.	
Shipped East and North:			
Phila. & Erie R. R.....	753	18,281	36,594
Cumberland, Md.....	75,918	882,827	1,076,906
Barclay, Pa.....	478	7,198	21,112
Broad Top, Pa.....	9,632	101,238	235,847
Clearfield, Pa.....	88,511	996,154	1,231,912
Allegheny, Pa.....	32,321	416,363	381,637
Beech Creek, Pa.....	143,723	689,765	562,201
Pocahontas Flat Top.....	155,628	745,050	808,194
Kanawha, W. Va.....	47,540	686,960	935,397
Totals.....	355,504	4,543,836	5,288,850

† Week ending April 7th. † Estimated.

	1894.		1893.
	Week.	Year.	
Shipped West:			
Pittsburg, Pa.....	31,968	383,077	385,753
Westmoreland, Pa.....	40,434	430,886	619,743
Monongahela, Pa.....	11,337	139,549	200,846
Totals.....	83,739	953,532	1,214,302

Grand totals..... 439,243 5,497,368 6,493,152

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending April 14th, 1894, and year from January 1st, in tons of 2,000 lbs.: Week, 61,205 tons; year, 953,307 tons; to corresponding date in 1892, 1,659,521 tons.

Anthracite.

The slight improvement noted in our last week's review of the market has continued, and altogether, when everything is taken into consideration, the

anthracite coal trade is not in a bad condition. Of course the demand cannot be expected to become active at one bound, and therefore the efforts of the producers must continue to be directed toward enforcing a restriction in the output. This they have been doing for the past few months, are doing now, must continue to do until trade conditions warrant differently.

There is, on the part of dealers here, rather more inclination to buy than was the case a fortnight ago, and producers report a fairly satisfactory movement of coal during the past week. Prices are unchanged. There is the usual amount of "cutting" by some sellers, but it is rather owing to the grade of the coal sold than to "concessions" made in order to capture business.

The retail fight in Brooklyn continues and some low prices, even below \$4 a ton delivered, are heard of. In this city, the "World" newspaper continues its self-styled philanthropic sales of coal at \$4.50 delivered. The idea was stolen from the similar effort of the Philadelphia "Record," begun some years ago. So far, the bulk of the reports of its successful operation come from the "World's" own columns.

The Bureau of Anthracite Coal Statistics reports the production for March and the three months to March 31st as follows, from the returns furnished by the mine operators:

	March.		Three months.	
	1893.	1894.	1893.	1894.
Wyoming region...	2,080,009	1,275,130	5,727,779	3,890,918
Lehigh region.....	592,417	446,250	1,455,290	1,246,288
Schuykill region....	1,089,639	774,283	2,733,101	2,272,752
Total.....	3,761,744	2,495,653	9,915,480	7,409,938

For March the decrease in production was 1,266,686 tons, or 33 7%; for the three months it was 2,505,542 tons, or 25 3%, showing the effect of the restriction of production which has been carried out from the opening of the year. The stocks of coal on hand at tidewater points on March 31st amounted to 934,396 tons, an increase of 74,854 tons during the month.

The Reading Railroad reports that its coal shipment (estimated) for last week, ending April 14th, was 230,000 tons, of which 12,000 tons were sent to Port Richmond and 30,000 were sent to New York waters.

Bituminous.

A great number of orders have been placed in the hands of shippers by consumers, who fear the strikes on the 21st; more, indeed, than the producers can get coal on the way for before the date named. This has naturally produced a firmness in the market, which will increase or diminish in proportion as to how general the proposed strike will be carried out. Most of the producers at present are refusing orders from outside parties for prompt delivery, and all contracts are being made with a "subject to strikes" clause. There is a general discussion in the trade in regard to the proposed strike and a variety of opinions are expressed on the subject. It is believed by some that a general strike will occur, and by others that it will not. The opinion of the conservative men of the trade is that some of the regions will have a strike, but that it will prove abortive and last but a short time. And by them it is rather welcome than otherwise. It will strengthen the market.

All the mines are being operated to the heaviest possible capacity and are even working overtime. A number of contracts have been taken during the week, but there is still a large quantity of season supplies to be contracted for. The great quantity of coal being mined is giving the railroads all they can attend to and the trade is beginning to feel this in the slowness of transportation from mines to tidewater. There is no blockade reported on any of the various through lines, but one may occur at any time now from the large quantity of coal en route and coming into transportation daily. All the surplus stock of empty cars is being used now. Up to the present, however, all demands for "empties" have been supplied.

The regular meeting of the Seaboard Steam Coal Association took place in Philadelphia last Thursday, but nothing took place excepting a general discussion of the trade.

All-rail business is following the tidewater trade in making larger shipments, as a precautionary measure against any scarcity which may be produced by the strike. Contracts in this branch of the trade also show a proportionate increase in number.

Last week's storm caused the loss of several vessels engaged in the coal trade. This removes them from the market altogether, for there are no vessels to take their place and none is building.

Vessels are not in as good supply as they have been of late, and freight rates are accordingly firmer than last week.

We quote current rates as follows from Philadelphia: To Boston, Salem, Portland, 65c.; Providence, New Bedford, New Haven and Bridgeport, 60c.; Portsmouth and Bath, 65c. to 70c.; Wareham, 80c.; Newburyport and Lynn, 75c. to 80c.; Gardner, 70c. and towages; Bangor, 70c.; Saco, 8c. alongside and towages; Dover, \$1 alongside and towages. From Norfolk, Newport News, Baltimore and Georgetown, 5c. to 10c. above these rates. Barges for New York harbor trade are also in poor supply; rates remain at 18c. alongside.

By Telegraph.—Latest advices are to the effect that all the main line roads are blocked from one end to the other, due to the excessive shipments of

coal during the past week. It is estimated that the shipments over most of the roads were about as heavy as the total of the preceding three weeks. The price of coal has advanced about 10c. a ton.

It now seems an assured fact that the miners will strike in the Clearfield, Broad Top and Beech Creek regions, in the gas coal and Pittsburg districts and some in West Virginia. In the Cumberland region only a portion of the miners will go out of work.

NOTES OF THE WEEK.

Advices from Philipsburg, Pa., state that the current week's output of coal from the Clearfield and Beech Creek regions is likely to surpass any previous week's output, and is the result of the determination of the miners throughout Central Pennsylvania to strike on Saturday. The duration of the strike in these regions depends on whether or not the miners in the Maryland and Virginia and other competing regions obey the call to suspend work.

The Pennsylvania Railroad company made return in the United States Circuit Court at Philadelphia on April 16th to the writ of alternative mandamus in the proceedings brought by R. B. Wigton & Sons, in which the company was charged with discrimination in carrying rates for bituminous coal. The railroad company contends that the court has no jurisdiction, as the State courts of Pennsylvania and New Jersey should determine the dispute. It denies that the plaintiffs have been charged more than other shippers, or that by means of device of rebates, drawbacks or allowance such result is attained.

Chicago.

(From our Special Correspondent) April 19.

Anthracite.—Anthracite coal in Chicago continues to drag along in the same old rut, and it appears totally unable to extricate itself. It is seeking new vigor, but what little animation it now possesses receives no reinforcements, for as the weeks go rolling by, and summer is rapidly approaching the chances appear to be growing less for any increased traffic on its line. It is now very apparent that in Chicago the spring and summer trade will be very slow, and that less coal will be sold than for the same period in a good many years past. The weather at the present time is very changeable, a day may open with every promise of summer weather, but before night overcoats are an actual necessity. Prices remain as last week, which are: Grate, \$5; egg, stove and chestnut, \$5.25.

Bituminous.—Bituminous tonnage for the week shows no gain to speak of, despite the fact that there has been an extensive strike ordered to begin on the 19th of this month. It is said that some companies are loading all empty cars available, believing that the strike will be extended throughout the summer. There are those who say that such a move is foolish, as they are positive the strike will be a huge fizzle. A shipment of lignite coal was made recently to the Wood Harvester Company's works at St. Paul. The coal came from North Dakota, and was sent as an experiment. In five hours the Wood's company used 14,000 lbs., against 11,000 lbs. of the screenings which they commonly use at the works. Its principal feature is that no smoke arises from its use. The coal is said to exist in large quantities in the Dakotas, and it costs one dollar per ton by the carload at the mines. If the present experiment proves a success a company will undoubtedly be formed to exploit the mines. Quotations are per ton of 2,000 lbs. f.o.b. Chicago: Youghiogheny, \$3.00; Pittsburg, \$3.25; Hocking Valley, \$2.80; Brazil block, \$2.70; Raymond, \$3.65; Shawnee, \$2.80; Cumberland smithing, \$3.50; Mt. Olivet, \$1.75 Cannel coal quotations are: Pinkney, \$4; Birdseye, \$5; Kentucky, \$5.

Coal has been quiet during the week, sales for small lots are frequent but in the aggregate are not large. Prices are: Connellsville \$4 for crushed and \$3.90 for furnace. Ellsworth is selling at \$3.75 and West Virginia \$3.75.

Pittsburg.

(From our Special Correspondent) April 19.

Coal.—The good boating stage in the Ohio River, noted last week, continues. The result was another small run of coal to the lower ports, viz.: To Cincinnati, 914,000 bushels; Louisville, 1,013,000 bushels; total, 1,927,000 bushels. This ends the shipments for the present. The general supervision of all mines in the bituminous coal districts, as contemplated by the United Mine Workers of America, is not viewed with great alarm by the operators, in view of the reigning trade conditions.

W. De Armitt, of the New York & Cleveland Gas Coal Company, is inclined to view the matter lightly, as he could see reason against a movement of this kind, which must cause the most unenlightened mind to hesitate before attempting such a thing at the present time. The Southern river markets are thoroughly glutted with coal, on account of uninterrupted shipments during the entire winter. The Lake trade for the rail shippers this year will be materially lessened from that of last year.

President John A. Cairns, of Pittsburgh district, returned from the Columbus convention. He said the men would be brought out next Saturday. The National Board of Mine Workers would issue a circular to the operators that no coal would be mined after April 21st unless there is a restoration of rates.

Connellsville Coke.—The strike is dead. A dispatch from Unionton says: There has been a rush

among the men to get back to work at almost any price. It has been a day of general resumption and very little move toward violence. Meetings were held at various points. The men from the southern end agreed to go back at the Frick scale, providing the Wheeler and Moorell men would do likewise; the latter, however, decided to stay out, but notwithstanding this nearly all the men went back to work. The men are thoroughly disgusted and are making efforts to get back their old places.

The output of this region showed a large falling off. The total for the week amounted to 72,425 tons, against 105,025 tons the week previous. Orders are increasing for furnace coke; shipments reached 78,516 tons; falling off 31,224 tons.

The shipment in cars for the week amounted to 4,367 cars, distributed as follows: To Pittsburg, 1,550 cars; to points east, 718 cars; to points west, 2,099.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 20, 1894.

Pig Iron Production and Furnaces in Blast.

Fuel used.	Week ending		From Jan., '93		From Jan., '94.	
	Apr 21, 1893.	Apr 20, 1894.	Tons.	Tons.	Tons.	Tons.
Anthracite.	74	34,362	34	17,987	529,613	248,115
Coke.....	146	137,095	92	107,561	2,138,887	1,445,414
Charcoal...	37	9,056	18	4,010	149,813	63,203
Totals....	257	180,513	144	119,558	2,818,343	1,756,767

Pig Iron.—In this market it is difficult to see any sign of improvement in the iron trade, although reports from other sections indicate that a better business is doing, and consequently a better feeling prevails. In this locality consumers are taking about the same quantity of pig iron as they have been for the past few weeks and continue their policy of a hand-to-mouth buying. Prices here are unchanged, but in New England, where the thick of the fight is, some very low figures are being made. Southern makers are pressing their iron for sale and the Eastern furnaces are endeavoring to keep their trade. The orders are not sufficient to "go around," and as a result we see furnace agents underbidding each other for orders, which two years ago would have been considered very small. In our Philadelphia letter a further decline in prices of some grades is noted.

The first intimation that the coal strike in Alabama is likely to prove really serious to the iron trade came from the president of one of the most prominent companies in the Birmingham district, who has telegraphed that if the miners carry out their intentions some of the furnaces would have to go out of blast. Agents of Southern companies are not now eager to make contracts, as there is some uncertainty as to the duration of the labor troubles. Quotations at tidewater are as follows: Northern brands, No 1, \$12.50 @ \$13.50; No. 2, \$11.50 @ \$12.50; gray forge, \$11.25 @ \$12. Southern irons, No. 1, \$12 @ \$13; No. 2, \$11 @ \$11.50; No. 1 soft F., \$11 @ \$11.50; No. 2 soft F., \$10.50 @ \$11.25. Scotch irons are quoted: Coltress, \$21.50 @ \$22; Eglinton, \$19.50 @ \$20; Summerlee, \$20.50 @ \$21.50.

Billets and Rods.—No sales of consequence are reported here this week. From Philadelphia and Pittsburg reports indicate a better feeling. We quote: Domestic billets, \$17.25 @ \$18; wire rods, domestic, \$27 @ \$27.50; foreign rods, \$39 @ \$40.

Manufactured Iron and Steel.—Business continues fairly active and several fair sized orders for structural material are reported. More will be placed shortly. Prices continue unsatisfactorily low. We quote: Angles, 1 1/2 @ 1 1/4c.; axes, scrap, 1 1/4 @ 1 1/2c. delivered; steel, 1 1/4 @ 1 1/2c.; bars, common, 1 1/2 @ 1 3/4c.; refined, 1 1/2 @ 1 3/4c. on dock; beams, up to 15 in., 1 3/4 @ 1 5/8c.; channels, 1 3/4 @ 1 5/8c. on dock; steelhoops, 1 5/8 @ 1 1/2c., delivered; links and pins, 1 1/4 @ 1 1/2c.; plates, flange, 1 1/2c. @ 1 3/4c.; fire-box, 1 1/2 @ 2 1/4c.; flange, 1 1/2 @ 2c.; marine, 2 1/4 @ 2 7/8c.; sheared, 1 1/2c.; shell, 1 1/4 @ 1 3/4c.; tank, 1 1/2 @ 1 3/4c.; universal mill, 1 1/2 @ 1 5/8c.; tees, 1 5/8 @ 1 6/8c., all on dock.

Merchant Steel.—A fair amount of business has been done in this market at unchanged prices. Quotations continue as follows: Tool steel, 5 7/8 @ 6 2/8c.; steel, 1 7/8 @ 1 8/8c.; toe calk, 1 8/8 @ 2c.; Bessemer machinery, 1 1/2 @ 1 5/8c.; open hearth machinery, 1 9/8 @ 2c.; open hearth carriage spring, 1 9/8 @ 2c.; crucible spring, 3 5/8 @ 3 7/8c.

Old Material.—This market has been rather more active during the past week. Among the sales reported were 2,000 tons of old steel tees at private terms, and 1,000 tons of old iron rails at \$11.25, both of these orders for shipment to Europe. We quote nominally as follows: Old steel rails, \$9 @ \$9.75; old iron tees, \$11.50 @ \$12 per ton New York; railroad scrap, \$12 per ton delivered at mill and yard scrap at \$10 vessel New York; old iron T rails, standard sections, \$11.75 @ \$12.00, New York delivery; wrought turnings, delivered at mill, \$9; railroad scrap, also delivered at mill, \$12; No. 1 wrought scrap at \$9.50 @ \$10.50 and No. 1 machinery cast scrap, \$9.50 @ \$10.50, old wrought tubes and pipe, \$6.50 @ \$7; wrought turnings at \$8.50 @ \$9.50 delivered at mill; old car wheel, \$10 @ \$11 New York; cast borings, \$5.50 @ \$6 delivered at mill.

Rail Fastenings.—We do not hear of any business in this market. Quotations are as follows:

Fish and angle plates, 1 25@1.35c. at mill; spikes, 1.60@1.90c.; bolts and square nuts, 2@2.25c.; hexagonal nuts, 2.20@2.40c., delivered.

Spiegeleisen and Ferromanganese.—We do not hear of any sales of importance in this market. Both ferro and spiegel are very quiet. Quotations remain nominally: Spiegeleisen, 10@12%, \$21@22, 20%, \$25@26. Ferromanganese, \$51.50@53.

Steel Rails.—We do not hear of any sales of standard sections this week. The price remains \$24 at mill or \$24.80 tidewater. There has been some activity in girder rails, and it is reported that prices have been from \$24 to as low as \$20, at mill.

NOTES OF THE WEEK.

Advices from Pittsburgh state that the Edgar Thomson Steel Works will resume the manufacture of rails next week, several large orders having been received. The rail mill is undergoing some changes for facilitating the rolling of 33-ft. rails, for which the firm has made contracts. At present only half of the converting department is in operation, owing to the limited capacity for rolling billets.

The iron mills on the South Side are enjoying a slight revival in trade. A number of them are increasing their force, particularly at Jones & Laughlin's mills, where they are putting on new men every day.

We understand that a deal has been effected between the assignees of Robert H. Coleman and Jacob M. Shenk and Thomas Evans, of Lebanon, Pa. by which the anthracite furnaces at Cornwall, Pa. will be leased to them. Extensive repairs are now in progress and the capacity of the furnaces will be doubled to insure an output of 100 tons of iron a day. Mr. Coleman will manage the works.

According to advices from Philadelphia, it is reported there that opposition among the stockholders of the Pennsylvania Steel Company to the new plan for arranging the debts of the company as published last week in this column, has developed. It is said that the stockholders object to contributing stock and assessments, but it is understood that the plan is generally acceptable to the creditors, who are now carrying the floating debt of the company. If nothing is done the creditors will probably carry the debt along as at present, at high interest rates, until other arrangements are made. Much of the debt matured on April 16th, and is thus overdue.

Buffalo. April 19.

(Special Report of Rogers, Brown & Co.)

Prices have become a little more steady, and the better demand continues to be sustained. The situation may, however, be said to remain practically unchanged, as consumers of pig iron are only operating a small percentage of their capacity and better demand still means a light demand. Business as a rule is confined to meeting these requirements, with occasional exceptional transactions which look to the future, and consider iron at present prices a good purchase. The figures given below represent the nominal market f. o. b. Buffalo: No. 1 Foundry strong coke iron, Lake Superior ore, \$11.75; No. 2 Foundry strong coke iron, Lake Superior ore, \$11.35; Ohio strong softener, No. 1, \$11.75; Ohio strong softener, No. 2, \$11.25; Jackson County silvery, No. 1, \$15.50@17.00; Lake Superior charcoal, \$14.75; Tennessee charcoal, \$15.50; Southern soft, No. 1, \$11.20; Southern soft, No. 2, \$10.70; Alabama car wheel, \$16.00@17.50; Hanging Rock charcoal, \$18.50.

Boston. April 21.

(Special Report of Rogers, Brown & Co.)

There is, apparently, an increasing demand for pig iron, due largely to the fact that most of the Southern furnaces have recently withdrawn their irons from the market, owing to the recent strike of the Southern miners. It has always been the case that the harder it is to obtain iron, the more anxious consumers are to purchase, and it seems now as though some of them will find out that they held off a little too long. Should the strike become general throughout the iron district, even though of only a few weeks' duration, there is no telling where prices will go.

We quote for cash delivered Boston, although the prices on Southern are only nominal: Alabama, No. 1 foundry, \$13@13.50; Alabama, No. 2 foundry and No. 1 soft, \$12@12.50; Alabama, No. 3 foundry and No. 2 soft, \$11.50@12; Alabama, C. C. car wheel, \$18.75@19.25; Strong L. S. coke iron No. 1 foundry, \$14.25@14.75; Lake Superior charcoal car wheel, \$17.25@17.75; American Scotch (northern) No. 1, \$14.25@14.75.

Chicago. April 19.

(From our Special Correspondent.)

The Chicago iron market for the week just past has been one of extreme dullness. In all branches of iron, business has apparently been slower than any week since the beginning of the year. This condition was not expected, for everybody appeared positive that with the approach of summer, trade would greatly improve, and now that it shows signs of becoming even worse people are again manifesting their displeasure at Congress's slowness with the tariff measure. Predictions are being made that business this summer will be slower than it has been for years, and everything at the present time certainly justifies such assertions.

Pig Iron.—The pig iron market for the week has shown a considerable falling off in tonnage over

previous one. Sales are confined wholly to small lots, no sale amounting to over 500 tons, purchasers continuing to buy only for immediate use. Northern iron has evidently surpassed the Southern in the aggregate sales. This is a matter for comment as the large reduction in Southern freight rates made the impression that Southern iron would immediately jump far ahead of the Northern, but consumers are waiting and buying just as little as possible, the low prices not even effecting them to any extent so far as buying is concerned. Prices are, per gross ton f. o. b. Chicago: Southern coke, foundry No. 1, \$11@11.50; No. 2, \$10.50@10.75; No. 3, \$10.25@10.50; Southern coke foundry soft, No. 1, \$10.50@10.75; No. 2, \$10.25@10.50; Southern car-wheel, \$17.50@18; Tennessee charcoal No. 1, \$15@15.50; Southern silveries No. 1, \$11.75@12; No. 2, \$11@11.50; Bessemer, \$12; Ohio Scotch softeners No. 1, \$13.50@14; Lake Superior charcoal, \$15@15.50; Lake Superior coke No. 1, \$11.75@12; No. 2, \$11.00@11.25; No. 3, \$10.50@10.75; Jackson County silveries, \$14.50@15.

Structural Iron and Steel.—Business is limited to small lots, with no signs tending toward improvement in sight. Quotations are as follows, Chicago delivery: Angles, 1.30@1.40c.; tees, 1.50@1.60c.; universal plates, 1.35@1.45c.; beams and channels, 1.40@1.50c.

Plates.—Sales continue few and for small quantities. Inquiry has not improved any. Prices are, Chicago delivery: Flange steel, 1.65@1.75c.; best firebox steel, 3.75@4.00c.; tank steel, 1.35@1.45c.; iron and steel sheets No. 10 to 14, 2.00@2.15c.

Merchant Steel.—The market for merchant steel has been a quiet one during the week. Sales of small lots are quite numerous, but the aggregate for the week is less than last. Quotations are, carload lots: Smooth finished machinery, 1.80@1.90c.; tire steel, 1.60@1.70c.; ordinary Bessemer bars, 1.40@1.50c.; toe calks, 2.05@2.15c.; special brand tool steel, 12@20c.; crucible spring, 3.40@3.55c.; tool steel, 6 1/2c. and upward.

Galvanized Sheet Iron.—Sales are few and prospects are not encouraging. Prices are 75, 10 and 5% off on mill shipments. Jobbing quantities are selling at 7% discount.

Black Sheet Iron.—The prevailing low prices have not encouraged buyers for the market, if anything has been poorer than previous week. Prices are f. o. b. Chicago, carload lots: No. 24, 2.15c.; No. 25 and 26, 2.25c.; No. 27, 2.35c.; with an advance of 5 to 10c. for steel over corresponding gauges in iron.

Bar Iron.—Bar iron has not met with any increased demand and prospects are rather against early improvements. Prices are f. o. b. Chicago, 1.10@1.15c., according to specification.

Billets.—Billets have had a considerable attention during the week and several very good sales have been made. Prices of billets in this market remain at \$17.50.

Steel Rails.—A few sales of light rails are reported, but there is little inquiry for standard sections. Quotation remains at \$25@27.

Nails.—Wire nails have somewhat increased in sales, while steel cut show no improvement. Prices are, per keg, \$1.12 1/2@1.20 for wire, and \$1.10@1.20 for steel cut nails.

Old Rails and Wheels.—Market remains quiet, with prices the same, which are, old iron rails, \$10.50@11. Car wheels, \$10.50.

Scrap.—Some slight activity is observed in scrap, small quantities though creating some. Forge, \$8.50@9. Cast borings, \$4@4.50; wrought turnings, \$6.00; axle turnings, \$6@6.50; mixed steel, \$6@6.50; tires, \$13@13.50; iron axles, \$12@12.50.

Philadelphia. April 20.

(From our Special Correspondent.)

Pig Iron.—Large consumers claim they have either bought or have had the opportunity of buying large lots of No. 1 Foundry at \$12.50 of as good quality as they need. No. 2 has been offered unsuccessfully at \$12. There is an abundance of good forge iron offered for immediate delivery at \$10.50. A larger amount of business has been done this week. Bessemer has been bought in a small way.

Steel Billets.—The selling price is \$17 but even at this price it is surprising how little business is done. Consumers are picking up more business, hence larger billet orders will be placed soon, possibly by Saturday.

Merchant Iron.—All bar mills are getting some business on a basis of 1.25@1.30 for refined. There is no rush, because at the best much capacity cannot be employed. The mills in the interior of the State are asking better prices, where competition for strictly local trade permits.

Skelp.—Good orders have been placed since Monday for grooved and sheared ground, 1.15. New work is opening up very well.

Pipes and Tubes.—The new orders this week for wrought pipe show that work is generally opening up, and that the manufacturers are entering on whatever activity they are to have. In tubes there is more business than since last fall.

Sheet Iron.—The interesting point this week is that inquiries are in for large lots for delivery during the summer months.

Merchant Steel.—Larger orders and more of them are helping us out. The country trade is good and shipments to New England are on the increase.

Plate and Tank.—Inquiries for the past week or two have been good enough and business would be all right if these resulted in orders, but so little is purchased at a time that millowners see nothing to encourage them. Some very low prices have prevailed on steel tank, 1.10 being named and taken in one case. Heavy plates go at 1.25. Shell, 1.35; flange, 1.50.

Structural Material.—All manufacturers appear to be on the warpath for business, even for little building orders. Two or three orders have just been taken for New York delivery. A better condition exists; railroad bridgework is an important feature. Municipal and country public work is also coming in. Angles are 1.10@1.25; beams and channels, 1.30@1.50.

Steel Rails.—There is no information regarding sales of standard sections, and none to be had giving figures for orders of girder rails, but rail-makers say they are doing a big business in girder rails at prices as low as \$20 in exceptional cases and as high as \$24.

Old Rails.—Offered at \$12.

Scrap Iron.—Heavy steel, \$10; light, \$8; No. 1 wrought scrap, \$10.

Pittsburg. April 19.

(From our Special Correspondent.)

Raw Iron and Steel.—Trade last week showed up well, the volume of sales was the largest of any week since the advent of the present year. For some time the transactions in Bessemer pig and soft steel billets have been large and the demand shows no signs of falling off. The Edgar Thomson Works, that have been employed making steel rails for some time, are now engaged making steel billets; this shows pretty conclusively that the demand is on the increase. Last week billet sales reached 35,650 tons, for delivery the next three months; it seems to be a well known fact that there is no place in the country that can compete with Pittsburgh. Prices have been fairly maintained. In regard to sales Bessemer pig came next to billets, last week's sales aggregating 24,000 tons. Pittsburgh furnaces are running to their full capacity, turning out daily a large amount of material. As we stated in our last the coke strike proved a failure; the men are thoroughly disgusted and are making efforts to get back their old places. Many of them will not be taken back.

What little changes have taken place in the general condition of the market for iron and steel products is in the direction of improvement, although the changes for the better have been light on most descriptions. About freight—A reduction in Southern pig iron freight rates, extending to 60c. from Virginia furnaces and 90c. from Alabama furnaces, was to go into effect on the 13th, and rumors of a coming reduction in the rates from Pittsburgh to the East, have completely unsettled the Eastern trade. It is a gratifying sign, however, that the volume of business is large despite the demoralization in prices for certain descriptions. The production of pig iron April 1st, shows an increase of 16,556 tons. The demand is improving. Producers appear to regard the outlook very promising for a heavy demand in the near future. The market is in a very healthy condition and the undertone strong all the way along the line. The sale of Bessemer continues large; within the past two weeks the sales in the Ohio Valley reached 60,000 tons, the average price at the furnace being \$10 per ton. Most of this iron was purchased on Eastern account. The general outlook is bright.

Coke Smelted Lake and Native Ore.

6,000 Bessemer, May, June, July, Valley furnace	..... \$10.00
5,000 Bessemer, April, May, June	..... 10.50
3,000 Bessemer, April, May	..... 10.60
2,000 Bessemer, April, May	..... 10.50
1,500 Bessemer, May, June	..... 10.50
1,500 Bessemer, May, June	..... 10.45
1,000 Bessemer, April, May	..... 10.50
1,000 Bessemer, prompt	..... 10.50
1,000 Mill City Furnace	..... 9.50
200 Bessemer, April, May	..... 10.50
500 Bessemer	..... 10.50
500 Gray Forge	..... 9.40
200 Mill	..... 9.50
200 Bessemer	..... 10.50
150 No. 1 Foundry	..... 11.75
150 No. 2 Foundry	..... 10.75
150 No. 3 Foundry	..... 9.60
50 No. 1 Silvery	..... 14.50
50 No. 2 Silvery	..... 13.50
50 White Iron	..... 9.90

500 Billets, prompt, at mill 15.75
150 Billets, spot, at mill 16.00
Charcoal.
 100 Cold Blast 25.00
 50 Cold Blast 24.50
 50 Warm Blast 17.00
 50 No. 2 Foundry 17.50
Skelp Iron.
 680 Sheared 1.35 4 m.
 420 Wide gr'v'd 1.20 4 m.
 350 Nar. gr'v'd 1.20 4 m.
Skelp Steel.
 1,000 Sheared 1.10 4 m.
 1,000 Wide grooved 1.00 4 m.
 500 Narrow gr'v'd 1.00 4 m.
Muck Bar.
 200 Neutral, April, del. 19.60
 150 Neutral, spot 19.75
Billets, Blasts, Bar Ends.
 300 April, May, del'v'd 10.60
Ferro-Manganese.
 200 80% delivered 52.00
Steel Wire Rods.
 700 5-gauge at mill 23.75
 300 5-gauge at mill 24.00
Sheet Bars.
 800 Delivered 20.20
Spelter.
 200 Spelter 5.40
Old Rails.
 600 Iron rails 12.00
 400 Steel rails, various lengths 9.25
 100 Steel rails 9.00

METAL MARKET.

NEW YORK, Friday Evening, April 20, 1894.
Prices of Silver per Ounce Troy.

April.	St. Ex.	London Pence.	N. Y. Cts.	Value of sil. in \$1.	April.	St. Ex.	London Pence.	N. Y. Cts.	Value of sil. in \$1.
14	4.88½	29	63½	.188	18	4.88½	28½	63	.187
16	4.88½	29½	63½	.191	19	4.88½	28½	63	.187
17	4.88½	28½	63½	.188	20	4.88½	28½	63	.187

The market has been quiet. Demand has kept pace with the supplies, but the output has been considerably contracted; consequently the trading has been limited. China not being in the market at current rates, prices have had rather a declining tendency, but no material change is expected.

The United States Assay Office at New York reports the total receipts of silver for the week to be 121,000 oz.

Gold and Silver Exports and Imports at New York, Week Ending April 14th, 1894, and for Years from January 1st, 1894, 1893, 1892

Week	Gold.		Silver.		Excess of Ex. or Imp.
	Exports.	Imports.	Exports.	Imports.	
1894...	\$3,939,586	\$526,391	\$511,547	\$22,581	E \$3,932,171
1893...	10,635,235	3,898,629	11,865,192	472,219	E 18,129,609
1892...	41,856,372	3,732,504	9,391,344	885,916	E 41,911,288
1892...	13,072,400	5,941,151	7,440,887	421,080	E 11,551,036

Of the gold exported for the week \$500,000 went to London, \$250,000 to Holland, and nearly all the rest to France; the silver went to London. The gold imports were chiefly coin from the West Indies; the silver was from Central America.

During the five days ending April 19th the exports and imports of gold and silver were as follows: Exports: gold, \$1,132,426; silver, \$477,145. Imports: gold, \$596,525; silver, \$19,148. Of the gold exported \$1,041,000 was in American coin and bullion, \$1,000,000 of which went to France and \$41,000 to South America. The remaining \$91,426 was Spanish coin and went to the West Indies. Of the silver exported \$456,095 was American coin, \$424,220 of which went to London and \$31,875 to South America; \$16,050 was Mexican coin, \$3,550 of which went to the West Indies and \$12,500 to London. The remainder, \$5,000, was in Peruvian soles and went to South America.

The Bureau of Statistics, Treasury Department, makes the following statement of the United States imports and exports of gold and silver for March and the nine months of the fiscal year from July 1st to March 31st:

	March.		1893.	1894.
	1893.	1894.		
Gold:				
Exports.....	\$3,113,428	\$4,020,633		
Imports.....	6,908,437	1,091,392		
Excess of exp. or imp.....	E. \$1,504,991	E. \$2,929,241		
Silver:				
Exports.....	\$3,005,265	\$3,494,511		
Imports.....	1,750,985	652,191		
Excess of exports.....	\$1,254,280	\$2,842,320		
Total excess, exp. or imp.	E. \$3,260,191	E. \$5,771,560		
Gold:	—Nine months—		1893.	1894.
Exports.....	\$89,906,337	\$11,537,269		
Imports.....	17,932,157	61,941,367		
Excess of exp. or imp.....	E. \$52,254,180	I. \$50,371,098		
Silver:				
Exports.....	\$31,322,539	\$39,208,229		
Imports.....	18,928,803	11,129,024		
Excess of exports.....	\$12,393,736	\$28,079,205		
Total excess, exp. or imp.	E. \$64,617,916	I. \$22,294,893		

The net exports of silver show this year an increase over last of \$15,685,460. The net imports of gold this year contrast with the net exports last year, the total difference in favor of the current year being \$102,628,278.

NOTES OF THE WEEK.

The business situation shows a fair amount of improvement this week, and a steady growth of confidence is apparent. The tariff debate still drags slowly along, with but little prospect of an early conclusion, and there is great dissatisfaction with the Senate on this account, the outspoken expression of which, it is hoped, will bring it to an early decision.

A weak spot in the situation is the apprehension felt in relation to the general strike of Western coal miners, which is expected next week. To this reference will be found elsewhere.

On Thursday, April 19th, the engagements of gold for shipment by Saturday's steamers amounted to some \$2,500,000. On Friday \$500,000 more were taken, making \$3,000,000 in all; in addition \$500,000 will go from Boston. Of the New York shipments \$2,500,000 were taken from the Subtreasury in exchange for legal tenders.

It is to be noted that last week's and this week's shipments of gold have been nearly all on French account. The explanation of this is found in the placing of the new French refunding loan of \$40,000,000 in 3% rentes, the subscription to which closed April 21st. This makes a demand for money in Paris.

The statement of the New York banks for the week ending April 14th shows increases of \$33,025 in reserve, \$476,600 in specie, \$1,808,800 in legal tenders, \$9,009,500 in deposits and \$6,512,800 in loans; a decrease of \$102,600 in circulation. The total reserve was \$221,707,600, being \$81,081,000 above the legal requirements. While the accumulation of money still continues, the large increase in loans is an encouraging feature of the statement.

The statement of the United States Treasury on Thursday, April 19th, showed balances in excess of outstanding certificates amounting to \$123,830,648, made up as follows: Gold, \$103,473,528; silver, \$9,424,856; legal tenders, \$4,000,608, treasury notes, etc., \$11,931,656. Changes during the week were decreases of \$6,780,771 in the total balance, and of \$2,491,011 in the gold balance.

Custom House receipts at New York continue light, as might be expected. From July 1st, 1893, up to April 14th, 1894, a period of 9½ months, they were \$72,708,573, showing a decrease of \$41,224,363, or 36.2%, as compared with the corresponding period last year.

For the nine months of the fiscal year from July 1st to March 31st, the Treasury Department reports our exports and imports as follows:

	1893-94.	1894-95.
Exports:		
Merchandise.....	\$53,389,931	\$79,370,755
Gold and silver.....	101,228,876	53,775,498
Total exports.....	\$754,618,807	\$763,346,253
Imports:		
Merchandise.....	\$643,737,443	\$486,266,870
Gold and silver.....	36,580,960	76,070,391
Total imports.....	\$680,318,403	\$562,337,261
Excess of exports.....	\$74,300,404	\$301,008,992

This year the merchandise exports exceeded the imports by \$223,303,885, while the imports of the precious metals were \$22,204,800 greater than the exports. Last year the excess of merchandise exports was \$9,652,483 and of precious metals \$64,647,916. In other words, as is pointed out elsewhere, the merchandise account is this year in our favor, while last year it nearly balanced; leaving other payments to be made in gold.

London reports are that the new Prime Minister, Lord Rosebery, is willing to assent to a new international monetary conference. It is not expected that Great Britain will propose a conference, but if, as now seems probable, Germany should take the initiative, the English Government will consent, but will, it is said, be represented only by delegates from India. Our government should decline to go into any conference unless the delegates are not only empowered but are instructed to arrive at and adopt a solution of the whole question, the adoption of a universal standard and of a ratio between gold and silver good everywhere.

On Wednesday, April 13th, 50 lakhs of India Council bills were offered in London. The tenders were large and all the bills were allotted at 13½d. per rupee, the same price as last week.

Shipments of silver from London to the East up to April 5th are reported by Messrs. Pixley & Abell's circular as follows:

	1893.	1894.	Changes.
India.....	\$2,118,380	\$1,926,860	D. \$191,520
China.....	141,203	821,896	I. 680,693
The Straits.....	740,940	217,500	D. 523,440
Total.....	\$3,000,523	\$2,966,256	D. \$34,267

Shipments for the week this year included \$18,450 to India, and \$160,894 to China and \$30,200 to the Straits; a total of \$209,544, as compared with \$238,283 for the corresponding week in 1893. The shipments to the Straits included \$10,000 in transit to Japan. London receipts for the week included \$12,000 from the West Indies, and \$95,000 from New York.

The Bank of England, on Thursday, 19th, reported its total gold holdings at \$31,396,075, an increase of \$5,520,285 as compared with the corresponding date last year.

On Thursday, April 19th, the Bank of France reported its specie holdings, in sterling, at \$66,619,000 gold and \$50,594,000 silver; a decrease of \$197,018 gold and \$99,310 silver, as compared with the corresponding date in 1893. Changes for the week were increases of \$105,000 gold and \$3,000 silver.

San Domingo, as noted last week, proposes to adopt the gold standard. The present currency, which consists chiefly of Mexican silver dollars, will be replaced by gold coins of \$3, \$10 and \$20, of the same weight and fineness as United States coins. The subsidiary coinage will consist of silver dollars containing each 380 grs. of pure silver, or a ratio of 1 to 16 36, and of 50 cent, 25-cent and 10-cent pieces of corresponding value. The silver coins will be redeemable in gold when presented in sums of not less than \$5.

Tenders for the coinage of 15,000,000 fr. of gold and silver coins for Bulgaria were recently opened in Sofia. The lowest and accepted bid was from the Hungarian Bank of Commerce and Industry at Buda-Pesth.

A recent dispatch from London, says: The committee appointed by the Chambers of Agriculture to consider the question of bi-metallism has reported its action. The committee find that the silver systems of the United States and India have depressed the value of silver until it is now reduced to one-third of the price of gold under the system of bi-metallism prior to 1875. The committee recommended the appointment of a royal commission on the currency. Several members of the Chambers objected to the report of the committee, claiming that the present depression, particularly in agriculture, was not due so much to the silver conditions as to other causes.

The Treasury statement shows that the coinage executed at the mints of the United States during the month of March, 1894, was as follows:

Denominations.	Pieces.	Value.
Double eagles.....	585,277	\$11,705,540.00
Eagles.....	25,007	250,070.00
Half eagles.....	9,611	48,055.00
Quarter eagles.....	13	32.50
Total gold.....	619,908	\$12,003,697.50
Silver dollars.....	252	\$252.00
Half dollars.....	668,252	334,126.00
Quarter dollars.....	920,252	230,063.00
Dimes.....	252	25.20
Total silver.....	1,590,018	\$64,486.20
Five cent.....	612,762	\$30,638.10
One cent.....	70,262	702.62
Total minor.....	683,024	\$31,340.72
Total coinage.....	2,892,940	\$12,599,504.42

The total estimated amount of money in the United States on March 1st, was as follows, the circulation per capita being \$24.90, an increase of \$7.83 over the corresponding date last year:

	In circulation.	In the Treasury.
Gold coin.....	\$498,830,383	\$107,629,805
Standard silver dollars.....	54,574,546	351,758,231
Subsidiary silver.....	58,921,912	16,594,888
Gold certificates.....	70,935,723	
Silver certificates.....	331,119,247	
Treasury notes.....	141,038,765	11,962,418
United States notes.....	295,610,528	54,077,488
Currency certificates.....	47,805,000	
National bank notes.....	194,839,041	12,640,479
Total.....	\$1,690,675,152	\$566,056,309

In addition to the coin, notes, etc., given there was in the Treasury \$70,432,992 gold bullion and \$127,216,957 silver bullion.

The abstract of the reports of the condition of national banks in the United States on February 28th last was made public by Controller Eckels April 4th. As compared with a similar report made December 19th, 1893, it shows an improved condition of the banks in nearly all respects. On February 28th national banks had in loans and discounts \$1,853,763,803, as against \$1,853,827,179 on December 19th, 1893; United States bonds to secure circulation, \$200,808,000, as against \$204,809,000; stocks, securities, etc., \$174,305,000, as against \$159,749,000; due from approved agents, \$246,891,000, as against \$212,630,000; lawful money reserve, \$433,890,000, of which \$256,166,000 was in specie, and of the specie \$191,000,000 was in gold and gold certificates, as against \$414,135,000, of which \$251,253,000 was in specie, and of the specie \$196,000,000 was in gold and gold certificates; surplus fund was \$246,504,000, as against \$246,739,000; due to other national banks, \$343,143,000, as against \$298,805,000; individual deposits, \$1,586,800,000, as against \$1,539,000,000; notes and bills rediscounted, \$7,729,000, as against \$11,465,000,000; bills payable, \$9,234,000, as against \$14,388,000; and liabilities other than stated, \$2,265,000, as against \$2,973,000. The item which shows that the banks have only lost \$5,000,000 in gold since the December call is particularly significant in view of the fact that the \$58,000,000 in gold paid out for the new bonds nearly all came out of the banks.

"Bradstreet's" statement of its compilation of business failures for the first quarter of the current year shows that there have been 3,969 failures throughout the United States, in which best available estimates of actual assets, where actual assets had not been obtained, are in every instance smaller than corresponding totals of liabilities, which characterization, by the way, is made an essential in determining a business failure as contrasted with a business embarrassment in which no actual failure takes place; that is, in which creditors lose nothing by the embarrassment, all of the latter being excluded from the compilation. The total of 3,969 business failures in the United States within three months as contrasted with 3,069 in the first three months of 1893, points to an increase of 29%, which was to be expected. A favorable feature in the report of the number of failures in the last three months is that the 3,969 embarrassments may be contrasted with 4,050 business failures in the first quarter of 1893, the year following the panic year 1894. For the four years 1889-92, inclusive, the average number of business failures during the first quarter was about 3,350, or 18% less than in the past three months, so that the increase in the number of business embarrassments since January 1st is seen to have been not quite one-fifth as contrasted with the preceding periods of comparative prosperity, or,

even as compared with the first quarter of 1884. The liabilities of the 3,969 failing individuals, firms and corporations during the past quarter amounted to \$49,085,080, an increase of 26% relatively smaller than the increase in number of business embarrassments; the total liabilities for the last quarter are the largest recorded for any similar period, the next largest total having been \$44,348,783, in the first quarter of 1891. Last year the first quarter's liabilities amounted to only \$39,424,144, and in the year before the like total was \$35,861,749. Assets of the 3,969 failing individuals, firms and corporations amounted to \$26,748,770, also the largest like aggregate on record, the corresponding total in the preceding year being \$20,000,000 and in 1891 for the first quarter \$22,861,883. The increase of 33% in total assets of failing traders, while the gain in liabilities was only 26%, is also to be expected. The ratio of total assets to total liabilities during the past quarter is about 55%, as compared with about 50% in ordinary years.

The statements of the Boston and the Philadelphia banks for the week point in the same direction, to an increase in the demand for money for legitimate trade operations, and a renewed tendency to put the reserves of unemployed money into active use. There is every prospect that this tendency will continue, and bank reserves will soon begin to fall back to their normal proportions.

A table showing the aggregate bank clearings of 74 cities in the United States for March and the three months ending March 31st has been prepared by the "Financial Chronicle." For March the total decrease, as compared with March, 1893, was 30.8%; for the three months it was 33.1%. For New York City alone the decrease was 37.0% for March, and 39.9% for the three months. For the cities outside of New York the falling off was 21.0% for March, and 22.9% for the three months. This shows again the gradual improvement in business to which we have referred above. The total amount of clearings for March in New York was \$2,043,811,551; for the cities outside of New York it was \$1,711,540,293, the daily average being \$75,881,909 for New York, and \$63,390,381 for the outside cities.

It is announced that a commission on the Indian coinage question is to be appointed, which will include several experts of high authority on coinage and monetary questions. This is an admission that the decision of the former commission may be revised, and that the government has realized its mistake in abruptly closing the mints.

Mr. Sperry, of Connecticut, has introduced in the House a bill to recognize the National bank system. Its main features are the extension of the system, and the provision of a wider basis of security for banknote issues.

A new bill has been introduced in the House of Representatives to provide for coining the seigniorage on the silver in the treasury. It is intended to meet some of the objections made in the President's veto of the former bill, and contains provisions authorizing the issue of bonds to maintain the gold reserve. It has been referred to committee.

Special agent Ira Ayer on April 7th reported to the Treasury Department that during the quarter ending December 31st, 1893, there was manufactured 27,351,241 lbs. of tin and terne plates proper by 39 firms, against an output of 27,145,480 lbs. by 35 firms during the previous quarter. Of the output 15,907,600 lbs., or more than 58%, were made from sheets rolled in the United States, and of this amount 15,309,009 lbs., or more than 96%, consisted of the class of plates weighing less than 63 lbs. to the 100 square feet. The quantity of American sheet iron and steel made into articles and wares turned or tin-plated was 1,244,707 lbs. This makes the aggregate output of tin and terne plate for the quarter 28,593,948 lbs., against 28,198,293 lbs. for the previous quarter. Three new companies made their first sworn returns. The production of black plates in the United States was 19,679,910 lbs.: Of the 39 firms 21 used wholly American plates; 12 both American and foreign plates and six used only foreign plates.

The issues of new capital in London for the three months this year to March 31st amounted to £10,264,592, of which £4,114,050 were in government and municipal securities. The total amount compares with £7,770,000 in the corresponding quarter of 1893 and £31,124,000 in 1892. Of the total capital applications this year £473,500 were presented by mining companies. The increase shown over last year was entirely in March.

Domestic and Foreign Coins.

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

	Bid.	Asked.
Mexican dollars.....	\$1.50 1/4	\$1.52
Peruvian soles and Chilean pesos....	.50	.52
Victoria sovereigns.....	4.57	4.89
Twenty francs.....	3.90	3.93
Twenty marks.....	4.75	4.78
Spanish 25 pectas.....	4.85	4.90

Other Metals.

Copper has, within the past week, displayed a little more activity than for some time past. The

demand from manufacturers at home has been of a more satisfactory nature, and although business has not as yet returned to its former condition, more confidence is shown. The demand has, it is true, been freely met, since one of the more prominent lake companies has been ready sellers for as far ahead as the end of July at 9 1/2 c. Others have been following their lead, and there was therefore an abundance of this description of copper offered for sale at 9 1/2 c. The supplies of electrolytic copper are not as plentiful as they have been, and prices have, in consequence, rather stiffened and must be quoted 9 1/2 to 9 3/4 c., while that for casting copper is 9 c. @ 9 1/4 c.

From abroad the reports continue very unfavorable indeed. Manufacturers are doing very little, and few orders have in consequence been placed in this market. There are apparently as yet plenty of supplies resulting from purchases made some time ago, and sufficient to meet all requirements. G. M. B.'s, which closed last week at £40 7s. 6d. for spot, opened this week at £40 5s., and closed to-day at £40 2s. 6d. for spot and £40 12s. 6d. for three months.

Refined and manufactured we quote as follows: English Tough, £42@£43 15s.; best selected, £43@£43 15s.; strong sheets, £49 15s.@£50; India sheets, £48@£48 5s.; yellow metal, 4 1/2 d.

The half-monthly statistics have increased 135 tons. The following figures give the production (in tons of 2,240 lbs.) of copper in the United States, and also by the chief foreign mines, and the exports from the United States for March and the three months ending March 31st:

Production, fine copper, long tons:	March,	Three mos.
Reporting mines in the United States.....	13,759	34,836
Pyrites and outside sources, United States.....	1,349	4,920
Reporting foreign mines.....	6,922	20,284
Total production, long tons.....	22,031	59,140
Exports from United States, fine copper.....	7,137	20,444

The exports of copper from the port of New York during the week ending April 20th, as reported by the New York Metal Exchange, were as follows:

Hamburg—Russia.....	Pigs	20 tons
Rotterdam—Rotterdam.....	Plates	150 "
Liverpool—Cevic.....	Ingot	69 "
	Pigs	201 "
Havre—Las Gascogne.....	Ingot	25 "
Antwerp—Waesland.....	Ingots	25 "
	Plates	20 "
Liverpool—Britannic.....	Pigs	103 "
Bristol—Massasoit.....	Bars	105 "
Rotterdam—Ondam.....	Ingot	35 "
	Pigs	75 "
Hamburg—Essen.....	Ingot	44 "
	Cakes	24 "
	Bars	20 "
Stettin—Slavonia.....	Bars	50 "
	Cakes	3 "
Hamburg—Moravia.....	Cakes	10 "
	Ingot	20 "
	Pigs	12 "
	Taomina.....	25 "
	Bars	20 "
Liverpool—Umbria.....	Pigs	37 "
London—Manitoba.....	Ingot	40 "
Swansea—Monomoy.....	Bars	100 "
Matte:		
Liverpool—Cevic.....		90 tons
Euskuro.....		91

Exports of copper from Baltimore for the week ending April 18th are reported by our special correspondents as follows:

April 11. Bremen—Farmstadt.....	127 bars	22,412 lbs.
" " Liverpool—Templemore.....	2,465 ingots	112,110 "
" " " " Hamburg—Wandnahm.....	1,698 cakes	248,233 "
	3,955 ingots	55,000 "

Tin is not quite so firm as it was last week since there have been a number of arrivals with fresh supplies, thus disposing of the scarcity of spot metal, and the price for this is now 19 7/8.

The London market opened early this week at £70 7s. 6d. for spot, and closes to-day at £69 12s. 6d. for spot, and £70 10s. for three months.

Lead continues quiet but steady; there is no change in values, which remain 3 1/4 for desilverized and 3 5/8 for chemical, the official quotation for the former being 3 20.

Foreign lead has been weak, the offerings having been very large, and the quotation has been reduced from £9 5s. to £9 2s. 6d. for Spanish and £9 5s. for English.

St. Louis Lead Market.—The John Wahl Commission Company telegraph us as follows: "Lead firm and fairly active; about 800 tons were sold at from 3 20c. to 3 22 1/2 c. and a few round lots of corrding for May delivery at 3 25c. Sellers are not displaying any great amount of anxiety to sell futures and appear to look upon the undercurrent to lead as very healthy.

Spelter.—The lower prices have brought out a very good demand, considerable business having been done on the basis of 3 30@3 35 East St. Louis, equal to 3 55@3 60 New York. There are now no sellers below the latter figure.

The foreign market remains unchanged at £15 7s. 6d. for good ordinaries, and £15 10s. for special brands.

Magnesium.—The Aluminum und Magnesium Fabrik, Hemelingen, Germany, quotes prices as follows: Ingots and cubes, \$6.48 per kilogram; bars, \$6.24; powder, \$8.64; ribbon and wire, \$9.12 per kilo. These prices are at the works and for orders of over 10 kilos; for less than 10 kilos, 24c. per kilo. must be added for ingots and bars, and 48c. for powder or wire.

Quicksilver.—Quotations are: New York, \$34; London, £5 11s. 6d@£5 12s. 6d.

The receipts of quicksilver at San Francisco, Cal., for March and for the first three months of the year compares are follows:

	For	Jan. 1 to
	March.	Mar. 31.
1892, flasks.....	1,663	4,910
1893.....	1,520	5,923
1894.....	2,586	7,312

Exports from that port by sea last month included 1,000 flasks to New York, 104 to Central America, 550 to Mexico, 6 to British Columbia and 200 to Canada via Victoria, or a grand total of 1860 flasks, valued at \$54,569, against 1859 flasks, valued at \$74,268, for the same month last year. Exports for the first three months of the year were as follows:

	Flasks.	Value.
New York.....	2,000	\$60,000
Hongkong.....	2,000	53,973
New Zealand.....	10	300
Central America.....	304	9,120
Mexico.....	1,215	35,938
British Columbia.....	37	1,185
Canada.....	20	5,366
Total.....	5,766	\$165,882
In 1893.....	6,302	253,207

The value per flask this year has been nearly 25% less than last year.

Antimony.—Business therein is very much of a retail character and at the following prices: Hallett's, 8 1/2 c.; L. X., 9 1/2 c.; Cookson's, 10 1/2 c.; U. S. French Star 10c.

Aluminum.—The makers quote No. 1, over 98% pure, 65c. per lb. for large lots, 75c. for small quantities; No. 2, from 94% to 96% pure, 60c. for large quantities, 73c. for small lots. Wire from \$1.25 to \$2.58 per lb. according to size. Plates and sheets, 90c.@\$1.50, according to width and thickness. The Neuhausen Company quotes \$1 per kilo. (45c. per lb.) at the works at Neuhausen, in Switzerland for ingots or bars.

Nickel.—Quotations are 45@55c. per lb., according to grade.

Platinum.—Messrs. Eimer & Amend, New York, quote platinum crucibles and dishes, hammered ware, French make, at 45c. per gram for smaller quantities, 43c. per gram for lots of not less than 100 grams, and 41c. for lots of not less than 250 grams. Wire and foil at 42c., 41c. and 40c. respectively for the quantities named. Current retail price for crucibles is 50c. per gram.

Sodium.—Prices as quoted by the manufacturers in Germany and England are 90c.@\$1 per lb. at works.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, April 20.

Heavy Chemicals.—No improvement has taken place in the heavy chemical market since our last report. The trade continues quiet and without interesting features. There is no demand to speak of for carbonated soda, ash or alkali. For caustic soda there has been a fair inquiry; but new business has not been large enough to stiffen prices. Bleaching powder continues fairly active at unchanged figures. Spot prices for the various articles on the last are practically unchanged from last week. We quote: Caustic soda, 60%, 2 82 1/2 @ 2 97 1/2 c.; 70%, 2 60 to 2 70c.; 74%, 2 62 1/2 @ 2 72 1/2 c.; 76%, 2 70 to 2 80c. Carbonated soda ash, 48%, 1 05@1 25c.; 53%, 1 05@1 15c. Alkali, 48%, 1 05@1 15c.; 58%, 1@1 1c.; according to package. Sal soda, English, 95@1c.; American, 80@90c. Bleaching powder, 2 05@2 50c.

Acids.—There has been a steady consumptive demand for the various acids, which, while not heavy enough to enable the acid plants to work on full capacity, is encouraging as showing an improvement in business conditions. Consumers continue to buy in small lots, and prices are therefore not subject to much fluctuation. This week we quote: Acids, per 100 lbs. in New York and vicinity, in lots of 50 carboys or more: Acetic, in barrels, \$1.62 1/2 @ \$1 75; muriatic, 18°, 80c.@\$1; 20°, 90c.@\$1.10; 22°, \$1@1.25; nitric, 40°, \$4; 42°, \$4.50@4.75; sulphuric, 75c.@\$1. Mixed acids according to mixture, oxalic, \$6.75@7.25. Blue vitriol is quoted all the way from \$3.37 1/2 to \$3.75; glycerine for nitro-glycerine, 11 1/2 @ 12 1/2 c., according to quality and quantity.

Brimstone.—There is nothing of interest to report of the brimstone market. It continues very dull. Quotations are as follows: Best unmined seconds, on the spot, \$16.75@17; shipments, \$16.50@16.75. Best thirds are \$1 less.

Fertilizing Chemicals.—The remarks made in this column during the last two or three weeks apply equally well to-day to the fertilizer market. There is a fair demand from manufacturers. The great majority of the orders are small, but in the aggregate they amount to a very fair volume of business. Prices are somewhat easier and we quote this week sulphate of ammonia \$3.62 1/2 @ \$3.65 for gas liquor and \$3.30 for bone. Dried blood, \$2.40@2.45 per unit for high grade and \$2.25@2.30 for low grade. Azotine, \$2.35@2.40. Concentrated phosphate (30% available, phosphoric acid), 75c. per unit. Acid phosphate, 13% to 15% av. P. O., 80c. per unit at seller's works in bulk. Dissolved boneblack, 17% to 18% P. O., 95c. per unit. Acidulated fish scrap, \$15@16, and dried scrap nominally \$25 f. o. b. fish factory; wet scrap

\$15 f. o. b. fish factory. Tankage, high grade, \$22.50 @ \$23; low grade, \$21 @ \$21.50. Bone tankage, \$23 @ \$24; bone meal, \$24 @ \$25.50.

Arrivals of the various German potash salts this week were about 3,000 tons.

In lots of 50 tons on contracts we quote: Double manure salts, 48.53% (basis of 48%); New York and Boston, \$1.12; Philadelphia, \$1.14; Charleston, Savannah, Wilmington, N. C., and New Orleans, \$1.17. High grade manure salts, 90.95% and 96.99% (basis 90%), respectively: New York and Boston, \$2.07 @ \$2.11; Philadelphia, \$2.09 @ \$2.13; Charleston, Savannah, Wilmington, N. C., and New Orleans, \$2.12 @ \$2.16.

Phosphates.—Charleston, S. C., quotations are: Acid phosphate 13% available, \$6.50 @ \$7 cash in bulk. High grade phosphate rock is \$4.75 @ \$5 f. o. b. vessel and cars at mines. Land phosphate rock \$4.75 f. o. b. cars or vessels at mines.

Muriate of Potash.—Arrivals this week aggregate only 50 tons, all of which went into immediate consumption. Stocks are light here. In lots of 50 tons, quotations are as follows: 80.85% and minimum 95% basis 80%; respectively: New York and Boston, \$1.78 @ \$1.91; Philadelphia, \$1.80 @ \$1.83; Charleston, Savannah, Wilmington, N. C., and New Orleans, \$1.83 @ \$1.86.

Kainit.—Prices for kainit (minimum 23%) in cargo lots for 1894 delivery are as follows for invoice and actual weights respectively: New York, Boston and Philadelphia, \$9 @ \$9.25; Charleston, Savannah, Wilmington, N. C., and New Orleans, \$9.75 @ \$10. For sylvinite, 27.35%, prices are as follows per cent. per gross ton, invoice weights: New York, Boston and Philadelphia, 37.5c; Charleston, Savannah, Wilmington, N. C., and New Orleans, 41c. Actual weights, 1c more per cent.

Nitrate of Soda.—This market continues strong and high. There is quite a demand for nitrate and stocks are light. We quote this week: Spot or near-by arrivals, \$2.35 @ \$2.40; summer shipments, \$1.95 @ \$1.97½.

Liverpool. April 16.

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

So far as the general lines of heavy chemicals are concerned, we are still unable to report any improvement in the position. Soda ash is without special feature and for Leblanc makes quotations vary according to market, make and quantity, the nominal spot range being about as follows: Caustic ash, 48%, £3 15s. @ £4 per ton; 57-58%, £4 10s. @ £4 15s. net. Carbonated ash 48%, £3 5s. @ £3 15s. per ton 58%, £3 15s. @ £4 per ton, net cash.

Ammonia Ash, 58% is in moderate request and prices range from £3 10s. @ £3 15s. per ton, net cash per tierces, and 5s. less for bags. Owing to the low prices ruling, several of the outside works still remain closed down.

Soda Crystals are dull at £2 15s. @ £2 17s. 6d. per ton less 5%. Caustic Soda is in poor demand, and the nominal range of values according to export market is about as follows: 60%, £7 15s. @ £8 10s. per ton; 70%, £8 15s. @ £9 10s. per ton; 74%, £9 15s. @ £10 1s. 6d.; 76%, £10 15s. @ £11 10s. per ton, net cash. For parcels under 10 tons, 5s. per ton extra is charged. Bleaching powder is inquired for and "Union" quotations vary according to export market from £7 10s. to £8 5s. per ton, net cash, for hardwood packages.

There is a good inquiry from the states for outside makes, but there is nothing offering at present. Chlorate of potash is still flat and there are sellers at 7½d. for any position, prompt or forward. Manufacturers have reduced the make and talk of still further reducing the output is found necessary. There is next to nothing doing in the article, and until the demand comes on there does not seem much prospect of prices improving.

Bicarb. soda continues steady, at 26 15s. per ton, less 2½% per one cwt. kegs, with the usual allowances for larger packages.

Sulphate of Ammonia has eased off a little to £13 15s. to £14 per ton, less 2½% for good grey 24 and 25% in double bags f. o. b. here, but there is a better inquiry, and it looks as if prices might stiffen a little.

Nitrate of soda is in demand, and being in moderate supply, quotations show a further advance, £10 17s. 6d. @ £11 per ton, less 2½% being quoted today for double bags f. o. b. here.

Carbonate of Ammonia.—Lump 3¾d. per lb.; powdered, 4d. per lb., less 2½%.

MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Aspen, Colo.; Baltimore, Pittsburg, St. Louis, London and Paris, see pages 334 and 386.]

NEW YORK, Friday Evening, April 10. A better feeling prevails in the mining stock market than for some time past. This is due chiefly to the increased demand for gold properties.

The Comstocks are practically without change in prices or demand from last week. Consolidated California & Virginia advanced from \$3.25 to \$3.60, with total sales of 325 shares. Yellow Jacket opened at 69c. and closed at 75c., the total transactions of the week being 400 shares. Of Chollar 1,100 shares were sold at 40c. Other sales were: 100 shares Gould & Curry at 85c.; 100 shares of Ophir at \$3.50; 400 shares of Alta at 25c.; 200 shares of Best & Belcher at \$1.65 @ \$1.75; 50 shares of Mexican at \$1.65; 184 shares of Potosi at \$1 @ \$1.20; 200 shares of Union Consolidated at 90c. and 300 shares of Utah at 10c.

Eureka Consolidated advanced from 30c. to 85c., with total sales for the week of 500 shares.

The Bodie has attracted the most attention this week. Standard Consolidated was in good demand. It was firm at \$1.50 @ \$1.60, and 500 shares changed hands at these prices. Bodie Consolidated shows a good advance. It reached \$1.20 this week; 700 shares were sold at \$1.15 @ \$1.20. Sales of Bulwer Consolidated amounted to 400 shares at 17c., and of Mono, to 200 shares at 50c. No news of importance in reference to the actual developments at these mines has reached this city, so that the advance in Bodie is difficult to account for excepting on the ground that resumption of the payment of dividends by the Standard Company has stimulated the buying in the other Bodie stocks.

Of the Colorado stocks Chrysolite shows sales of 500 shares at 20c., and Lacrosse an equal number of shares at 8c.

Deadwood Terra returns to the exchange this week with sales of 1,500 shares at 60 @ 65c.

Sales of Phoenix of Arizona aggregate 1,200 shares at 15 @ 16c. Mr. W. S. Alley, president of the Phoenix Consolidated Gold Mining Company, writes that the mill is working 50 stamps on good ore.

Through the courtesy of Mr. A. I. Harrison, secretary of the Horn Silver Mining Company, we are enabled to publish exclusively this week the financial statement of the company for the quarter ending March 31st, 1894. Receipts: Balance per last quarterly report \$355,067 sales of ore, \$91,157; interest, \$3,310; outstanding due company, \$500, smelter at Franklin, \$24; total, \$450,058 02. The disbursements were: Mining, \$31,860; concentrating plant, \$33,165; dividend No. 33, \$50,000; general expenses, \$7,013; balance cash on hand, \$328,021.

Boston. April 19.

(From our Special Correspondent.)

This has been a dull week in copper stocks, and prices, with the exception of Quincy, have declined all through the list. The upward movement which started last week was checked by the weakness of the market for ingot copper in both markets and the attempt to realize profits. The closing of the books for Quincy rights gave an impetus to the trading in both rights and stocks, and advanced the stock from \$88 to \$95, and the rights from \$21¾ to \$24. The scrip is now dealt in and commands a premium of about 88 to 89 above par, selling at \$34.

The Montana stocks have been weak and declined, Boston & Montana from \$28¾ to \$27, and Butte & Boston from \$11 to \$10¼, although there has not been much pressure to sell, and the dealings have been on a moderate scale.

Calumet & Hecla declined \$2 from \$302 to \$300 on small sales. Tamarack sold at \$170 and declined to \$168 with very little doing in it. Osceola sold up to \$26½, but declined to \$25 with later sales at \$25½. Atlantic sold at \$10 for 50 shares, the same price as last week's. There was nothing doing in Franklin or Kearsarge, and only 25 shares Centennial were quoted at \$3½.

A small lot of Tamarack, Jr., was sold at \$14½, the last sale being at \$16¼. Wolverine declined to \$2½ for 200 shares.

To-day, 19th, being a local holiday there is nothing doing at the Stock Exchange.

San Francisco. April 6.

(From our Special Correspondent.)

The mining market has been fairly active this week and prices have ranged higher along the entire line of Comstock shares. It is to be hoped this state of things will continue, for during the current month the Comstocks will be delinquent for \$248,920 for assessments. The upward move in the market is simply the result of manipulators pulling the strings and not as the result of any developments of a favorable nature.

During the week, too, Bodie has been again trotted out on the strength of the reported finding of a small seam of good ore in the Burgess winze, below the 200 level of the Bodie Consolidated. The stock jumped to 65c., and at once a large block of stock that has been lying in the treasury of the Bodie Company was loaded on the street at the ruling rate. The company now has the money, and the plungers the stock, and it remains to be seen who will have the best of the bargain.

Consolidated California & Virginia sold to-day for \$3.20, not a great advance on last week's ruling rate. Ophir sold for \$3.45, an advance of 65c; Mexican for \$1.65; Sierra Nevada for \$1.10, and Union Consolidated for 88c.

In the Middle Comstocks Best & Belcher has ruled at \$1.60; Chollar at 40c.; Gould & Curry at 80c.; Hale & Norcross at 65c.; Potosi at \$1.15; and Savage at 70c. These prices are all from 5c. to 15c. in advance of last week's rates.

The Gold Hill stocks have been in fair demand, but prices have not advanced much. Belcher has been active at 98c., the ruling rate last week having been 75c. Alpha has ruled at 12c.; Alta at 16c.; Caledonia at 14c.; Confidence at \$1.45; Overman at 25c.; Imperial at 3c.; Crown Point at 65c.; Justice at 12c. and Yellow Jacket at 72c.

During the afternoon session to-day trading became quite active, and before the market closed prices were a trifle in advance of quoted rates.

SAN FRANCISCO, April 20 (By Telegraph).—The opening quotations to-day are as follows: Best & Belcher, \$1.60; Bodie, \$1.25; Bulwer, 15c.; Chollar, 35c.; Consolidated California & Virginia, \$3.60; Eureka 60c.; Gould & Curry, 84c.; Hale & Norcross, 68c.; Mexican, \$1.60; Mono, 52c.; Navajo, 10c.; Ophir,

\$3.65; Savage, 75c.; Sierra Nevada, \$1.15; Union Consolidated, 84c.; Yellow Jacket, 70c.

London. April 10, 1894.

(From our London Representative.)

During the past week the mining stock market has been uniformly brisk and shown even a greater improvement than has been stated in the last two or three weekly reports. It is now quite certain that the painfully depressed times of the latter half of 1893 are now entirely left behind and on all sides there is evidence of a steady though slow return of general speculation in mining. The American market is the slowest of all to answer to a revival, as it is by no means a popular, but rather a restricted, department of mining investment, but there is very much more being done now than six months ago. In fact it may be said that there is some chance of new American properties being considered by financiers and promoters at present, a thing which could not be said during 1893. Altogether prospects in the mining market are quite hopeful. Several American mining companies which have not been heard of in the market for many months are beginning to receive attention. For instance, Pinos Altos, of Mexico, a company in good hands, has been inquired for publicly during the last week with the result that the price has risen from the nominal figure at which it has been quoted to 4s. 6d., fully 100% rise. Another American company that has been entirely neglected lately is La Yescosa Gold and Silver Mines, Ltd., the reconstruction of "The Silver Mines of La Luz." During the last week public inquiries have been made for these shares and 1s. has been paid for the shares on which 18s. 6d. has been called up.

In the general market, most of the shares usually dealt in have been steady and in one or two cases the prices have advanced slightly. Harqua Halas, De Lamars, Elkhorn, Montanas are all fractionally higher. Idaho Explorings have reacted from the high price quoted last week, viz.: 2s. on account of realization, on the part of those who bought when the shares were at 3d. a few months ago. La Plata continue in demand. The subsidiary company floated to take up the Mozambique gold claims in the interest of the La Plata shareholders has proved very successful, and all the shares have been applied for and allotted. Among low-priced shares, Springdales, Holcomb Valleys and American Belles have been in demand.

The first statutory meeting of the new reconstruction of the Golden Gate of California Company (Ltd.) was held the other day. There was no special business to transact, but it was announced that the reconstruction had proceeded satisfactorily, as 76,000 shares had been applied for, out of a total of 80,000. Since the date of allotment the remaining 4,000 shares have been sold in the open market, and the proceeds have been distributed in paying out the dissentient shareholders in the old company.

Last week the future of the Flagstaff Company was left undecided, as a poll had been demanded by Professor Vincent. The result of the poll is that 30 shareholders holding 139,266 shares voted for the professor, while 162 shareholders representing 64,831 shares recorded their votes against him. Though the majority of shareholders are against the professor they have lost the day, chiefly owing to the loyalty of the chairman of the company, Mr. George Hopkins, to the professor as managing director, and to the large vote of 40,000 shares allotted in the new company to the professor himself. The matter is more or less a compromise, and the management of the company's property will continue unaltered in spite of the protests of those who are in a position to know best.

It may be worthy of mention that Lord Thurlow, chairman of the Harvey Peak Consolidated Tin Mining Company and other companies, has been declared a bankrupt in London. Probably the noble lord's unfortunate and in judicious speculations in mining have caused this undesirable result.

The Almada & Tiritio Mining Company has been very unfortunate during the last year, 1893. Shortness of capital and of water supply has restricted their explorations, and the reduced price of silver has caused a loss on the year's working of £4,878. The depreciation in the exchange value of silver has caused a further loss, so that the total loss for the year amounts to £9,145. Considering the mine manager's report the outlook for the company is almost hopeless.

DIVIDENDS.

Homestake Mining Company, dividend No. 189 of 15c. per share, \$18,750, payable April 25th, at the office of the company in San Francisco, Cal., or at the office of Messrs. Lounsbury & Co., No. 15 Broad street, New York City.

Midas Petroleum and Improvement Company, dividend of 2½%, payable May 1st, at the office of the company in Pittsburg, Pa.

MEETINGS.

Justice Mining Company, at the office of the company, 1655 High street, Denver, Colo., May 14th, at 10 a. m.

Pocohontas Coal Company, at the office of the company, in the Terry Building, Roanoke, Va., May 2d, at 12 o'clock noon.

Virginia Mineral Railroad Company, at the office of the company, in Roanoke, Va., May 2d, at 8:45 a. m.

NEW YORK MINING STOCK QUOTATIONS. DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, April 14, April 16, April 17, April 18, April 19, April 20, SALES. Lists various mining companies like Belcher, Nevada, and their stock prices.

NON-DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, April 14, April 15, April 17, April 18, April 19, April 20, SALES. Lists non-dividend-paying mining companies like Am. Flag and their stock prices.

*Ex-dividend. †Dealt in at New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. D dividend shares sold 5,225. Non-dividend shares sold 4,134. Total shares sold, 9,359.

BOSTON MINING STOCK QUOTATIONS.

Table with columns: NAME OF COMPANY, April 13, April 14, April 16, April 17, April 18, April 19, SALES. Lists Boston mining companies like Atlantic, Michigan, and their stock prices.

Table with columns: NAME OF COMPANY, April 13, April 14, April 16, April 17, April 18, April 19, SALES. Lists Boston mining companies like Algonz, Michigan, and their stock prices.

Dividend shares sold, 2,838

Non-dividend shares sold, 1,836.

Total shares sold, 3,674.

CURRENT PRICES.

These quotations are for wholesale lots in New York unless otherwise specified. Acid-Acetic, chem. pure... 17@.19. Commercial, in bbls. and cbsys... 01 1/4 @.02. Carbonic, liquefied, # lb... 18@.25.

Cadmium Iodide - # lb... \$5.50. Chalk - # ton... \$1.50@22.25. China Clay - English, # ton... \$13@18.00. Chlorine Water - # lb... \$1.00@25. Chrome Iron Ore - # ton, San Francisco... \$10.00.

Mineral Wool - Ordinary slag... 01 1/4. Ordinary rock... 02 1/4. Naphtha - Black... 10.63. Nitric Acid - # ton... \$10.00. Oehre - Rochelle, # lb... 01 1/4 @.01 1/4.

Tin - Crystals, in kegs or bbls... 14@15. Muriate, single... 07@12. Double or strong, 64" B... 10@15. Oxymur, or nitro... 19.

THE RAREER METALS.

The prices given below are the prices in Germany, and are per gramme except where otherwise stated: Arsenic (metallic), per kilo... \$0.25. Barium (ex amalgam)... 2.12.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns for Name and Location of Company, Capital Stock, Shares, Par, Assessments, Dividends, and Name and Location of Company, Capital Stock, Shares, Par, Assessments. The table lists numerous mining companies and their financial details.

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 \$42,336,000. § Previous to the consolidation of the Copper Queen with the Atlanta, August, 1885, the Copper Queen had paid \$1,350,000 in dividends. ¶ Previous to this company's acquiring Northern Belle, that mine paid \$2,400,000 in dividends against \$425,000 in assessments.

COAL AND COAL RAILROAD STOCKS.

Table with columns for stock names, dates (April 14-20), and sales. Includes entries like Am. Coal, Balt. & Ohio, Bull. R. & F., etc.

Total shares sold, 63,582.

INDUSTRIAL AND TRUST STOCKS.

Table with columns for stock names, dates (April 14-20), and sales. Includes entries like Adams Express, Am. Cotton Oil, Am. Dist. Tel., etc.

Total shares sold, 2,639,2.

CALIFORNIA.

Table for California stocks with columns for stock names, dates (Apr. 13-19), and closing quotations. Includes entries like Alpha, Belcher, Buller, etc.

COLORADO.

Table for Colorado stocks with columns for stock names, dates (Apr. 12), and prices. Includes entries like Argentum-Juniata, Aspen Contact, Aspen Deep Mining, etc.

Colorado Springs, April 13.

Table for Colorado Springs stocks with columns for stock names, dates (April 13), and prices. Includes entries like Aola, Anaconda Gold, Ancharia Leland, etc.

Total shares sold 790,925

Denver.

Table for Denver stocks with columns for stock names, dates (April 16), and prices. Includes entries like Alamo, Anaconda, Amity, Argentum, etc.

Table with columns for stock names and prices. Includes entries like Golden T., Isabella, Jack Pot, Mollie Gibson, etc.

MARYLAND.

Table for Maryland stocks with columns for stock names, dates (April 19), and prices. Includes entries like Atlantic Coal, Conard Hill, Cons. Coal, etc.

MINNESOTA.

Table for Minnesota stocks with columns for stock names, dates (April 17), and prices. Includes entries like Biwabik M. Iron Co., Cinnemat Iron Co., etc.

UNLISTED STOCKS.

Table for unlisted stocks with columns for stock names and prices. Includes entries like Adams Iron Co., Ashland Iron Co., etc.

MISSOURI.

Table for Missouri stocks with columns for stock names, dates (April 19), and prices. Includes entries like Adams, American & Nettie, etc.

PENNSYLVANIA.

Table for Pennsylvania stocks with columns for stock names, dates (April 19), and prices. Includes entries like Cambria, Edison E. Light Co., etc.

Pittsburg.

Table for Pittsburg stocks with columns for stock names, dates (April 19), and prices. Includes entries like Bridgewater Gas, Chartiers Valley Gas, etc.

UTAH.

Table for Utah stocks with columns for stock names, dates (April 19), and prices. Includes entries like Westinghouse Air Brake, Westingh'se Elect., etc.

London Quotations.

Table for London quotations with columns for buyer and seller prices. Includes entries like Alaska Treadwell, Alaska Ter, etc.

Paris.

Table for Paris quotations with columns for stock names and prices. Includes entries like Belmes, Spain, Golden River, etc.

Shanghai, China.

Table for Shanghai quotations with columns for stock names and prices. Includes entries like Sheridan Con., Puyong Mining, etc.

New York Mining Stocks.

Table for New York mining stocks with columns for stock names, dates (April 20), and prices. Includes entries like Alice, Alta, Beat & Belcher, etc.

ASSESSMENTS.

Table for assessments with columns for company, date, and amount. Includes entries like Andes, Nev., Belcher, Nev., etc.

CLASSIFIED LIST OF ADVERTISERS.

Address and Calculators... Air Compressors and Rock Drills... Assayers and Chemists' Supplies... Brass Castings... Cable Railways... Car Wheels... Centrifugal Pumps... Cement... Coal... Crushers, Pulverizers... Copper... Drill Bits... Dynamite... Electric Machinery... Gas Works... Hoisting Machinery... Iron Castings... Lead... Locomotives... Lubricants... Marine Engines... Metal Works... Mining Machinery... Paper... Pipe... Plaster... Portland Cement... Rope... Safety... Steam Engines... Telegraph... Trenching... Water... Wire... Zinc... Zinc Lead...

FREE ADVERTISING.

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

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

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

Positions Vacant.

1320 WANTED—AN EXPERT PLACER miner to superintend the installation and operation of hydraulic plant in South America. Address COMPETENT, ENGINEERING AND MINING JOURNAL.

1321 WANTED—AN EXPERIENCED AS-sayer and chemist for silver-lead smelter in Mexico. Salary fair. Address MEX., ENGINEERING AND MINING JOURNAL.

1322 WANTED—AN ENGINEER WHO is familiar with subsoil and spring drainage to report on draining a property near New York City. Address, giving experience and references, SUBSOIL, ENGINEERING AND MINING JOURNAL.

1323 WANTED—A CHEMICAL OR ME-chanical engineer capable to erect a bone black and sulphate of ammonia works. Address BONE BLACK, ENGINEERING AND MINING JOURNAL.

Situations Wanted.

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

A FIRST-CLASS DRAUGHTSMAN, EXPERT letterer, large experience, desires a steady position; samples and references will be furnished. Address PERMANENT, ENGINEERING AND MINING JOURNAL.

FIRST-CLASS FOREMAN AND DRAUGHTS-man, served 10 years as a practical mechanic, would like to correspond with a firm who wants a good, reliable man; no objection to locality. Address J. P. LISK, 636 Monroe street, Brooklyn, N. Y.

ASSAYER AND CHEMIST WANTS SITU-ation. Best references. Address H. T. NICHOLS, Gibbonsville, Idaho.

A YOUNG GRADUATE CHEMIST DESIRES a position as assistant in assay laboratory. Address G. A. G., ENGINEERING AND MINING JOURNAL.

POSITION WANTED OF ANY KIND CON-nected with mining. Am a recent graduate in mining of a technical school; good assayer, surveyor and draughtsman. Will start on a low salary. Address J. TURNBULL, ENGINEERING AND MINING JOURNAL.

ARENSELAER GRADUATE, THREE years' experience, desires a position. Has had experience in preliminary, location, construction and maintenance of way; also on masonry dam. Address T. X., ENGINEERING AND MINING JOURNAL.

A MINING ENGINEER AND MINE MAN-ager of experience in various sections of the United States, and recently returned from a three-years employment in Spanish countries, is open to an engagement. Address 322 So. 4th avenue, Mount Vernon, N. Y.

SITUATION WANTED—ENGINEER AND draughtsman, theoretical and practical. Long experience in machine design, cableways, boilers, structural iron, erection, shopwork, etc. Good manager. Has specialties and desires opportunity. Address ENGINEER, ENGINEERING AND MINING JOURNAL.

LOCATING ENGINEER WANTS SITU-ation on Railroad, Waterworks, Townsite or in office: is good draughtsman, has instruments and first-class references. "H.", ENGINEERING AND MINING JOURNAL.

SITUATION WANTED BY PRACTICAL Diamond Drill foreman, twelve years' experience drilling all kinds of formations and deep standpipe stand sinking. Can give best references. Address GILL, ENGINEERING AND MINING JOURNAL.

MINING ENGINEER, GRADUATE, OPEN for engagement May 15. Twelve years' practical experience in the development and management of metalliferous mines. Can give present employers' and other references. Address COLORADO, ENGINEERING AND MINING JOURNAL.

WANTED.—AN EXPERIENCED CORNISH miner and mechanical engineer wants position in the West. Very best of references. Address JOHN O. HOSKING, Houghton, Mich.

A GRADUATE (M. I. T.) COPPER CHEMIST and metallurgist of experience desires engagement; references. Address WEST, ENGINEERING AND MINING JOURNAL.

WANTED—SITUATION AS CHEMIST AND metallurgist; have had several years' experience with all classes of furnace supplies and products; technical education. Good reasons given for leaving present situation. Address A. M. H., ENGINEERING AND MINING JOURNAL.

WANTED—SITUATION IN SMELTING OR-concentrating works; technical education; several years' experience in treating low grade ores. References given. Address SMELTING AND CONCENTRATING, ENGINEERING AND MINING JOURNAL.



Contracts Open.

PIPING, CASTINGS, VALVES, ETC.—Proposals are wanted until June 21 for furnishing a quantity of water pipe, special castings, gate valves, fire hydrants, etc. Address E. M. BIGELOW, Director of Department of Public Works, Pittsburgh, Pa.

BRIDGE—HOUSTON, TEX.—Sealed proposals addressed to the city secretary will be received until April 30, for the proposed bridge across Buffalo Bayou, at the foot of Factory street; said bridge to be built in accordance with the plans and specifications now on file with the city engineer of the city of Houston; each bid must be accompanied with a certified check for \$500. JOHN T. BROWNE, Mayor.

BRIDGE—Sealed proposals for the design, manufacture and erection of the superstructures of one metal single track railway swing bridge, and one metal highway swing bridge at Milan, Ill., will be received until May 1. Specifications, blank forms, and all available information will be furnished on application to W. L. MARSHALL, Captain Corps of Engineers, 2258 Wabashavenue, Chicago, Ill.

WATERWORKS SYSTEMS.—U. S. Indian service, Fort Peck Agency, Poplar Creek, Mont.—Sealed proposals, indorsed "Proposals for Waterworks Systems," and addressed to the undersigned at Poplar Creek, Mont., will be received at this agency, for furnishing, delivering and placing in position at this agency and at the Wolf Point sub-agency, water-tanks, wind-mills, pumps, iron pipe, fire hydrants, etc., required in the construction of waterworks systems. A full list of the articles required together with plans and specifications governing the work at each point will be furnished upon application to the undersigned. Indians to be employed to do all necessary work of excavating for water pipes, foundations, etc. Rates per day to be paid them will be supplied bidders upon application. Capt. H. W. SPROLE, U. S. Army, Acting U. S. Indian Agent.

U. S. ENGINEER OFFICE, 2258 WABASH Avenue, Chicago, Ill.—Sealed proposals for the design, manufacture and erection of the superstructures of one metal single track railway swing bridge and one metal highway swing bridge at Milan, Ill., will be received at this office until May 1, 1894, and then publicly opened. Specifications, blank forms and all available information will be furnished on application to this office. W. L. MARSHALL, Capt. Corps of Engineers.

ORDNANCE SUPPLIES.—Benicia Arsenal, Benicia, Cal.—Sealed proposals, in triplicate, will be received until June 4th, 1894, for furnishing leather, coal, iron, hardware, lumber, forage, etc., during the fiscal year ending June 30th, 1895. Printed lists of supplies needed, with full instructions, stipulations, etc., can be had on application to Lieut.-Col. L. S. BABBITT, Ordnance Department, U. S. Army, Commanding.

LEVEE.—U. S. Engineer Office, Memphis, Tenn.—Sealed proposals, in triplicate, for the construction of levees in Upper White River Levee District will be received at this office until April 30, 1894, and then publicly opened. Specifications, blank forms and all available information will be furnished on application to this office. S. W. ROESSLER, Captain of Engineers.

BREAKWATER.—U. S. Engineer Office, Duluth, Minn., April 18th, 1894.—Sealed proposals for extension to breakwater at Marquette, Michigan, will be received at this office until May 18th, 1894, and then publicly opened. Specifications, blank forms and all available information will be furnished on application to this office. CLINTON B. SEARS, Major Corps of Engineers, U. S. A.

BRIDGE.—ELKHART, IND.—The Elkhart & Western Railroad Company will receive bids until May 1, for a pile and trestle bridge about 800 feet long. Address E. C. BICKEL, Manager.

BRIDGE.—Bids will be received until MAY 1 for constructing two draw bridges. Address CAPT. W. L. MARSHALL, Davenport, Ia.

ARTESIAN WELL.—Sealed proposals will be received by the City Clerk of Boone, Ia., until May 2d, 1894, for sinking, tubing and testing an Artesian well in the City of Boone, Ia. Well to be large enough to receive 15-in. tubing to bed rock and 12-in. tubing to the depth of 500 ft., and continued to a depth of 2,000 ft., if necessary, with hole large enough to receive 6-in. tubing.

The city to furnish steam and tubing, all other tools, pumps, machinery, labor and material to be furnished by contractor.

Each proposal must be made upon printed blanks furnished by city and accompanied by certified check of one hundred (100) dollars, payable to the city, and satisfactory bond for one thousand (1,000) dollars furnished within ten days after receiving notice of award. Contractor to test well with not less than 10-in. pump when required by the city, with compensation in bid for each test. Well must be drilled with the use of poles; no cables or ropes will be allowed. Payment on completion of well. R. M. MITCHELL, City Engineer; JESSE L. HULL, City Clerk.

SEWER, PEORIA, ILL.—The Commissioner of Public Works will receive bids for the construction of the Spring street sewer system in the city of Peoria, Ill., until May 8th, 1894. The approximate estimate of the engineer for the proposed work is as follows: Pipe sewer as follows: 803 lin. ft. 18-in.; 4,163 lin. ft. 14-in.; 4,952 lin. ft. 12-in.; 4,546 lin. ft. 10-in.; 24,626 lin. ft. 8-in.; and 13,184 lin. ft. 4-in. drain tile; 68 manholes; 38 6-in. flush tanks; 7 8-in. flush tanks; 7 independent lamp-holes. For information apply to the City Engineer. Payments cash. JACOB A. HARMAN, City Engineer.

PIPING, ST. JOHNSBURY, VT.—Proposals for piping for the St. Johnsbury Aqueduct Company, St. Johnsbury, Vermont.—Sealed proposals, indorsed "Proposals for laying water pipe," addressed to H. N. Turner, General Manager, St. Johnsbury, Vt., will be received until May 5th, 1894, for laying about 6 3/4 miles of cast-iron pipe comprising approximately: 100 lin. ft. 4-in.; 10,800 lin. ft. 6-in.; 1,800 lin. ft. 8-in.; 19,700 lin. ft. 10-in.; 700 lin. ft. 12-in.; 2,760 lin. ft. 14-in. and 150 lin. ft. 14-in. Ward joint pipe. A certified check for five hundred (500) dollars is to accompany each proposal. The plans and specifications for the work to be done can be seen at the office of Mr. Turner, at St. Johnsbury, Vt., and E. H. Gowing, Engineer, 95 Milk Street, Boston, Mass., where blank forms of proposals can be had. The right is reserved to reject any or all bids without assigning any cause therefor. H. N. TURNER, General Manager.

PUMPING ENGINE, READING, PA.—Sealed proposals will be received at the office of the Commissioners of Water of the city of Reading, Pa., until May 1, 1894, for furnishing one 10,000-gallon pumping engine complete. A proposal bond or certified check in the sum of \$2,000 must accompany each proposal. If proposal bond, a trust or surety company of Reading, Pa., is preferred. Blank form of proposal bond and specifications can be had on application. Proposals shall be marked "Proposal for 10,000-gallon Pumping Engine," and addressed to Commissioners of Water, Reading, Pa., care of I. C. FETTER, Secretary.

WATER-WORKS.—Sealed proposals will be received by the council of the incorporated village of Wapakoneta, O., until May 9th, 1894, for a complete system of water-works in said village, according to plans and specifications now on file with the clerk of said village. Said work to consist of two (2) one million (1,000,000) gallon horizontal compound non-condensing pumping engines and one return tubular boiler; one steel standpipe, 23 ft. x 130 ft., with foundation for same; about 1,000 tons of cast iron pipe, from 14 in. to 4 in.; 116 valves and 106 double nozzle hydrants; brick engine-house and the connecting up of the eight wells already driven. Specifications can be seen after April 20th, 1894, on application to the undersigned. No bid will be considered unless accompanied by a certified check for 1% for the amount of the bid. The Council reserves the right to reject any and all bids. JOSEPH MYERS, Village Clerk.

IF YOU HAVE
Lands or Mineral Property to Sell
AND WANT TO REACH INVESTORS,
The Best Medium to put you in communication with them is the
ENGINEERING AND MINING JOURNAL.

The Most Successful Process for the Extraction of Gold.
IMPROVED BARREL CHLORINATION.
The undersigned has completed drawings and plans of the latest improvements in Barrel Chlorination, and is open to engagement for the testing of ores, the erection and operation of plants of any capacity. The most successful works in this country were managed by the undersigned.
Correspondence solicited.
JOHN E. ROTHWELL,
ENGINEERING AND MINING JOURNAL, New York.

LANDS AND MINES FOR SALE.

Grand Opportunity for Investment

FROM 4,000 TO 4,500 ACRES

Coal, timber and farming lands, near railroad in Somerset County, Pennsylvania, accessible to Eastern markets, for sale on most reasonable terms, or might consider income property clear in part payment if location satisfactory. Owners have not time to give attention. Title perfect. Inquire of

W. P. HUMES,
Bellefonte, Pa.

FINANCIAL.

Golden Reef Mining and Milling Co.

Capital Stock, 100,000 Shares.
Par Value, \$10.
Selling Price, \$2.50 per share

Gold and Copper Mines at Norris,
Madison County, Montana.

TO INVESTORS.

The Golden Reef Mining and Milling Company, of Chicago, Illinois, offer to investors a limited number of shares of their Treasury Stock. This stock is guaranteed and is absolutely safe. The company's mines have been opened up. Many thousand tons of gold and copper ore of paying quality. All that is required to put the property in a dividend-paying condition is a milling plant. The mill is already built and ready for shipment. Make all checks, drafts, etc., payable to THOMAS F. THORNE, of the Commercial National Bank, Chicago, Trustee. For prospectus and full information address E. M. TREAKLE, Sec'y, Room 1595, No. 79 Dearborn St., Chicago.

DIVIDENDS.

MOLLIE GIBSON CONSOLIDATED MINING AND MILLING COMPANY.

COLORADO SPRINGS, Colo., December 1st, 1893,
DIVIDEND NO. 41.

A dividend of five cents per share (\$50,000) has been declared, payable December 15th, 1893, to stockholders of record on December 8th. Transfer books close December 8th, and reopen December 16th, 1893.
PERCY HAGERMAN, Sec'y-Treas.

WE BEG TO ANNOUNCE THAT OUR

Mr. Ede, M. E., leaves here early in April to examine mineral properties in NEW MEXICO, UTAH, Colorado, Oregon and South Dakota. He will undertake other work for private parties or companies. Twenty years' experience. Reference exchanged.

EDE & BURWELL, Mining Engineers,
21 QUINCY STREET, CHICAGO.

THE RICO-ASPEN CONSOLIDATED MINING COMPANY.

A dividend of two and one-half cents per share, twenty-five thousand dollars, has been declared, payable May 10th, to stockholders of record on May 5th. Transfer books close May 5th and reopen May 11th. Transfers of stock to be made at the general office of the company, Denver, Colo., or at the offices of Winthrop M. Tuttle, 22 William Street, New York, or Elliot, Johnson & Co., Philadelphia.
DENVER, Colo., April 26th, 1894.
A. B. ROEDER, Secretary.

"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: 52 QUEEN VICTORIA ST., LONDON, ENGLAND.

"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 Military Proprietors, Quarry Owners and Mining Engineers. Subscription, 7s. per annum, Post Free.
EDITORIAL AND PUBLISHING OFFICES:
EFFINGHAM HOUSE, ARUNDEL ST., STRAND, London, England.

"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.

MACHINERY AND SUPPLIES FOR SALE.

MACHINERY FOR SALE.

THE following Machinery is all new, and was displayed at the World's Columbian Exposition by the Chicago Iron Works. It is now offered for sale by order of the Superior Court. Full details and prices can be obtained on application to Rockwell King, Receiver, Estate Chicago Iron Works, Chicago, Ill.

	Weight
8" x 12" Hoisting Engine—two cylinders, single drum, 42" x 40" grooved for holding 500 ft. 3/8" rope in single coil.	8,000 lbs.
5 ft. Bryan Mill.	22,000 lbs.
10" x 7 Blake Crusher.	7,800 lbs.
33" x 81" Galena Silver Furnace—Steel Jackets and Curb, Ball Joint Tuyeres, Corner Discharge Boxes, Spouts, Leadwell, Binder, Stack, etc.	20,000 lbs.
1 Collom Jig, complete with screens.	
1 Slide Motion Jig, two compartment complete.	
1 Desloge pattern (extra large Collom) complete.	
Rotary Screens—One train of three. Each 36" diameter, 93" long, complete with perforated iron coverings and Steel housings.	7,500 lbs.
1 Riharz Concentrator.	
1 Silver Mortar.	
1 Gold Mortar.	
2 Slag Pots.	
1 Scoop Car.	
3 Bullion Molds.	
1 Sectional 4 x 6" Dodge Crusher.	1,200 lbs.
1 " 10" x 24" Retort complete.	2,500 lbs.
1 " 14" x 36" Corliss Engine.	30,000 lbs.
2 " 44" x 14" Boilers.	22,500 lbs.
1 Brunton Sampler No. 2.	
1 Tulloch Feeder.	

STEEL RAILS, NEW OR SECOND-HAND.

We can furnish any weight of New Rails. We also have for immediate delivery 400 tons of Second-Hand 60 lb. Steel T Rails, 100 tons 35 lb. Girder and 300 tons 45 lb flat steel; all well fit to relay, and cheap.

ROBINSON & ORR.

No. 419 Wood Street, Pittsburg, Pa.

FOR SALE.

Smelting Plant at Trinidad, Colo.,

all equipped, ready to start up. Situated just outside city limits Trinidad, on a 29 1/2-acre tract of land adjoining a river. Side tracks from two competing railway lines. Description of Smelter Buildings and their contents, also photos of works, may be found at the office of ENGINEERING AND MINING JOURNAL.

For terms apply to **MILWAUKEE AND TRINIDAD SMELTING AND REFINING COMPANY, Milwaukee, Wis.**

FOR SALE CHEAP

A Good Instrument for a German Engineer.

- 1 German Mining Theodolite, with extra level for short level work.
 - 1 Eccentric Telescope.
 - 1 Metric Sliding Leveling Rod.
 - 1 Lantern for same (in case).
 - 1 box with metre reel and 6 screws for spreizen-aufleitung of theodolite, and set plate for theodolite on tripod.
- Manufactured by LINGKE, of Freiberg, Germany.

Address Theodolite,
ENGINEERING AND MINING JOURNAL.

WANTED.

The following volumes of the Engineering and Mining Journal, bound or unbound:

XIII. and XIV. (1872); XV. (1873); XXV. (1878); XLVIII. (1879).

For full particulars address the Scientific Publishing Co., P. O. Box 1833, New York.

WANTED AT ONCE.

Copies of the Engineering and Mining Journal of January 11th, February 8th, April 19th, May 3d, August 23d, October 4th and 11th, November 22d and December 27th, 1890; January 3d and 17th, May 2d, 9th and 30th and October 10th, 1891; January 9th and 16th, 1892; January 14th, February 4th, July 29th and December 9th, 1893.

—ADDRESS—

Scientific Publishing Co.,

P. O. Box 1833, N. Y. City.

THE GOLD AND SILVER EXTRACTION COMPANY

TRADE MARK.

OF AMERICA, LIMITED.



MacARTHUR-FORREST

Process.

CAPITAL,
£110,000 Sterling.

TO MINEOWNERS and others having Refractory Gold and Silver ores hitherto untreatable at a profit, the MacArthur-Forrest (Patent) Process of gold and silver extraction offers a solution of the difficulty.

Advisory Board in the United States: THOMAS W. GOAD, Mgr. HUGH BUTLER, Atty. JOHN F. BELL. P. GEORGE GOW. DENVER, COLO.

OFFICE:

McPhee Building, - Denver, Colo.

THE JOURNAL

—OF THE—

Association of Engineering Societies

publishes the papers of nine societies, including the Boston Society of Civil Engineers and the Western Society of Engineers, and a valuable INDEX of

CURRENT TECHNICAL LITERATURE.

JOHN C. TRAUTWINE, Jr., Secretary,
419 Locust St., Philadelphia, Pa.

WANTED.

Two four-foot Denmead Disintegrating Mills,

in good order, with or without cases; or two 42-inch mills with single row of pins in each cage. Reply, stating condition, where to be seen and price. Address X, ENGINEERING AND MINING JOURNAL.

THE HASENZAHN
DIAMOND BIT ROCK DRILL
 FOR HAND AND OTHER POWER.
 Brings out a Core. Write for Particulars.
W. H. HASENZAHN, Mgr.,
 135 West Second Street, Cincinnati, Ohio.

HUNT & ROBERTSON,
 77 PINE ST., NEW YORK,
ANALYSTS & ASSAYERS,
 MINING ENGINEERS.
 Specialty Made of Copper Metallurgy.

THE CANADIAN COPPER CO.
 HEAD OFFICE:
 Room 201 Perry-Payne Bldg., Cleveland, O.
 Miners and Smelters of Copper-Nickel
 Ores at Sudbury, Ontario, Can.
COPPER AND NICKEL.

BALTIMORE
Copper Smelting and Rolling Company
 (THE BALTIMORE COPPER WORKS),
 Office: KEYSER BUILDING,
 BALTIMORE, MD.
 INGOT COPPER. SHEET COPPER.

J. STOCKLY CARY, Chemist and Assayer Dep't of Mines and Mining; Chemist of National Bureau of Awards World's Columbian Exposition.
 JOHN E. MOORE, formerly with Rattle, Nye & Hollis, Rookery Building.

CARY & MOORE,
 Analytical and Consulting Chemists, Samplers and Assayers,
 1760 Monadnock Bldg., CHICAGO, ILL.
 Specialty: Coal and Coke Analyses.

THE AMERICAN METAL CO., LIMITED,

80 Wall Street (P. O. Box 957), NEW YORK.
 114 Laclede Building, ST. LOUIS, MO.
COPPER, COPPER ORES AND MATTES, TIN, LEAD, SPELTER, ANTIMONY, NICKEL, ALUMINUM.
 ADVANCES MADE ON CONSIGNMENTS.
 Agents for Henry R. Merton & Co., London; Metallgesellschaft, Frankfurt-on-Main; Williams, Foster & Co., Limited, Swansea, Eng.; Pascoe Grenfell & Sons, Limited, Swansea, Eng.; Balbach Smelting & Refining Co., Newark, N. J.

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

SELL
INGOT AND CAKE COPPER.
 President, **ROBERT M. THOMPSON,**
 Office, 37 to 39 Wall Street, New York.

JAMES & SHAKSPEARE,
 ENGLAND.

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

METALS, MATTES AND MINERALS.

Cable Address, METALLURGY, LONDON.
 Use A B C Code, 4th Edition.

Established 1845.
W. & L. E. GURLEY, TROY, N. Y.
 Largest Manufacturers of Civil Engineers' and Surveyors' Instruments. Send for Illustrated Circular Price List showing latest improvements.

LEDOUX & CO.,
 9 Cliff Street, New York.

Assayers and Engineers.

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

ASSAYERS BY APPOINTMENT TO NEW YORK METAL EXCHANGE.

RICKETTS & BANKS,
 104 John St., New York.

ORES TESTED!

Complete Ore Milling and Testing Works or making practical working tests of ores to determine the Best Method of Treatment. Milling, Metallurgical and Chemical Processes Investigated.

Assays and Analyses!

CIRCULARS AND TERMS ON APPLICATION.

The Financial Times

THE LEADING ENGLISH FINANCIAL PAPER.
 THE FINANCIAL TIMES gives the best and most trustworthy information upon all market movements, and its comments are PERFECTLY INDEPENDENT. It is universally regarded as an authority upon Banking and Insurance matters.

DAILY, ONE PENNY. Post free to any part of the world, £2 12s per annum.
 Office: 13 MOORGATE STREET, LONDON, E.C.

DR. HENRY FROEHLING,

Chemical and Metallurgical Laboratory.
 7 South 12th Street, Richmond, Va.

Assays and analyses of ores, furnace products, clays, limestones, phosphates, waters, coals, oils, gases, etc. Price lists of analyses on application.
 Mines and mineral properties in the South examined.

HASTINGS, JOHN B.,

Consulting Mining Engineer.
 Office: Broad St. House, Old Broad St., London, E. C., England.
 Present Address: Boise City, Idaho, U. S. A.

A Suggestion

INQUIRIES

from
 employers
 in want of
 assistance,

Superintendents, Engineers, Metallurgists, Chemists, Mine or Furnace Foremen or other assistance of this character will be inserted in the column of POSITIONS VACANT, WITHOUT CHARGE, whether subscribers or not.

Ofrecimiento de Servicios.

A las personas que necesiten maquinaria ó accesorios mecánicos y á bien tengan dar de ello aviso á la administración de **THE ENGINEERING AND MINING JOURNAL**, se les comunicará la dirección de los fabricantes más acreditados en los respectivos ramos.

Y á cuantos deseen comprar mercancías ó productos Americanos para el extranjero, les ofrecemos de igual manera nuestros servicios para el pronto envío de catálogos, con informes completos sobre los diversos artículos, indicación de precios y descuentos de los fabricantes, etc.

Estos servicios se prestan gratuitamente y sólo en obsequio y beneficio de nuestros suscriptores y avisadores, pues los editores-propietarios de **THE ENGINEERING AND MINING JOURNAL** ni somos corredores ni exportadores, ni nos ocupamos en la compra ó venta de mercancías de clase alguna.

LEWISOHN BROTHERS,

P. O. Box 1247. 81 and 83 FULTON STREET, NEW YORK.
 Advances made on Copper, Matte and Ores.

Agents for the following Mining Companies: Boston & Montana C. C. & S. Mining Co.; Tamarack Mining Co.; Butte & Boston Mining Co.; Osceola Consolidated Mining Co.; Arizona Copper Co., Ltd.; Keasarge Mining Co.

HIGH GRADE HOISTING ENGINES AND DRUMS.

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

OTHER SPECIALTIES.

Diamond Core Drills.
 Rock Drills and Air Compressors.

Cable Address:
"BULLOCK."

M. C. BULLOCK MFG. CO.,
 37 Canal Street, Chicago, Ill.