

The Engineering and Mining Journal

WITH WHICH IS CONSOLIDATED "MINING AND METALLURGY,"

VOL. LXXIV.

NEW YORK, SATURDAY, August 16, 1902.

No. 7.

THE ENGINEERING AND MINING JOURNAL

(Incorporated.)

261 BROADWAY, NEW YORK.

TELEPHONE. 6866 CORTLANDT. P. O. BOX, 1833.
CABLE ADDRESS "ENGINJOUR" N. Y.

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DAVID T. DAY, PH.D.	Editor in Chief
EDWARD W. PARKER	Managing Editor
FREDERICK HOBART	Associate Editor
ROSSITER W. RAYMOND, PH.D., M.E.	Special Contributor

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Single Copies, 15 Cents.

United States, Canada, Mexico, yearly, 52 copies, in advance, \$5.00

Other countries in Postal Union, \$7.00

By Bank Draft, P. O. Order or Express on N. Y.

English Subscriptions Payable at London Office, £1 8s 9d

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THE ORGANIZATION of a mining course in the University of Birmingham, England, will fill a pressing need for the technical training of young men in that country. The mining engineering course will be in charge of Professor Redmayne, who has recently visited the United States for the purpose of studying the methods used in our mining schools. Professor Redmayne has already prepared a syllabus of the lectures to be given during the first session. The *Colliery Guardian* of London, in speaking of this new branch in the Birmingham University, calls attention to the fact that the Royal School of Mines has utterly failed to respond to the educational requirements of a mining engineer.



A RECENT report by the British Consul-General at Marseilles, states that the attempts to establish a market for American coal in Mediterranean ports has not been successful. The JOURNAL has never thought it would be, nor have we been in sympathy with any efforts made to export American coal, except it be to Mexico or other countries of the Western Hemisphere where American capital and American citizens are engaged in the development of those countries' industries. We do not, or should not, desire to export our raw mineral products. It is better economy in the long run to use them at home, giving employment to American capital and American labor, and limiting the "American invasion" to the finished materials.



ACCORDING to the statistics of the Twelfth Census, the value of the chemical products of the United States in 1900 was \$202,582,396 at the works, to produce which there was an outlay of \$11,340,385 for salaries, \$21,799,251 for wages, \$14,825,112 for miscellaneous expenses, and \$124,043,837 for raw materials and supplies. The total capital invested in the industry was \$238,529,641. There were 1,740 establishments of various kinds in operation and an average of 46,766 wage-earners employed in the industry. It should be remarked that not even this enumeration is complete, because there are numerous metallurgical works which are engaged in certain branches of chemical manufacture, there being no sharp dividing line between the arts of metallurgy and industrial chemistry, and the products of such appear to be missed by the census system of classification, or rather are reported under other categories in such a way that it is difficult to make a combination. The methods of the Census Office are capable of considerable improvement in this particular; we have no doubt that the matter will receive attention now that the establishment has been made a permanent one.



FOR SOME TIME now we have heard very little of the Elleshausen zinc lead process, about which a good deal was said in England. Two years or more ago a large company was formed to work it on a large scale in England, but afterwards the company abandoned this plan and acquired an option—which was never exercised—on the French works and mines. At the beginning of this year the parent company reorganized with the idea of starting experimental works in England. About £16,000 has been thus obtained, but no site for the works has as yet been settled on, and prospects are all there is

to go on. The process has led a singularly chequered life, and has been the sport of promoters and speculators long enough. Though so much capital has been spent, and shares sold at such high prices, no metallurgist of note ever said more than that it was worth testing on a practical scale. The people who have recently put up their money are enthusiastic about the process, so perhaps it may yet get a chance. There are, however, so many wealthy mining firms ready to take up a new process and test it, if a *prima facie* case is made out for it, that there is ground for suspecting the practical value of free-lances of this sort.



MARKET CONDITIONS.

Iron and Steel.—The situation in iron and steel circles remains about the same as reported last week. In spite of the vacation period there is no abatement in the activity, and scarcity of domestic iron, particularly in foundry grades, continues. The prevailing sentiment seems to be one of confidence in the future, and large buyers have covered their needs for the greater part of next year. Considerable quantities of foreign iron are reported as arriving at Philadelphia, which will somewhat relieve pressing demands. There is no change in regard to finished materials. Structural steel and plates are in strong demand and forward business is active.

Copper.—A feeling of uncertainty appears to prevail in regard to copper, which is brought about chiefly through lack of confidence in the future. Consumption is good, but consumers are not doing any buying for future use, and prices are somewhat softer. An anxiety to sell appears to be prevalent in some quarters, which, with the indisposition of buyers to provide for future requirements, has had a weakening effect upon the market. These conditions are not expected to continue, and a stronger tone is anticipated.

Other Metals.—Lead consumption continues good, with prices firm. Spelter is decidedly strong, with consumption in excess of the supply. There is a steady demand from brassmakers and galvanizers, without sufficient zinc to go around. Tin shows weakness, with a declining tendency in prices. This is attributed to the shutting down of some of the works of the American Tin Plate Company in consequence of the refusal of its employees to accept a reduction in wages in order to secure the contract of the Standard Oil Company.

Silver is slightly firmer. The American Smelting and Refining Company is reported to have effected an arrangement with the Government of Mexico by which a part of the silver received here in base bullion for refining is returned to that country for coinage, thus somewhat relieving the market here and in London.

Coal.—The production of bituminous coal is now very heavy, and a great tonnage is going to the various centers of consumption and distribution. There is complaint over poor car supply and slow transportation, and apparently the railroads are in greater need of increased motive power than more cars. The strike in Michigan has been settled on the terms offered by the operators, and an increased number of miners are at work in West Virginia. A shortage of coke continues at Chicago and other points.

The demand for anthracite is becoming stronger as the season when the winter supplies are bought approaches, but there is no relief in sight yet. A few collieries and a number of washeries are busy, and the output is slowly increasing, but it is still too small to have any effect except possibly on the demand for steam sizes. All indications are that the strike will collapse gradually and that there will be a general resumption of mining at no remote date.



COST OF LEAD SMELTING IN THE UNITED STATES.

According to the report of Mr. Charles Kirchhoff for the Twelfth Census, the silver-lead smelters of Colorado, with the exception of two which were engaged in desilverizing and refining as well as smelting, reduced 711,371 short tons of ore and produced 73,363 tons of lead (not base bullion, but the lead content of the base bullion is meant). They reported expenditures, which are reduced to the following averages per ton: Labor, \$2.415; salaries, 0.255; supplies and material, not including ore, \$2.165; taxes, rent, insurance and all other expenses, \$0.125; total, \$4.96. A comparison of these figures with those for 1889 shows a considerable reduction in the average cost of smelting. In 1889 the smelters of Colorado, with the exception of one that was engaged in desilverizing, treated 589,014 tons of ore and produced 66,706 tons of base bullion. The expense was as follows: Labor, \$2.67; salaries, \$0.325; supplies and material, not including ore, \$2.92; taxes, rent, insurance and other expenditures, \$0.855; paid contractors, \$0.05; total, \$6.82. It is obvious that the returns in the two census years must have been made in a different way, so that no reliable comparison can be made except in the case of the totals.

The average yield of the ore smelted in 1899 was 10.3 per cent Pb. If we compute the base bullion produced in 1880 as assaying 98.5 per cent Pb, the average yield in that year was a little more than 11.15 per cent. There is no means of determining what was the actual grade of the ore smelted. If we assume that the apparent recovery was 90 per cent in 1889 and 93 per cent in 1899, the average content of lead in the ore would have been 12.4 per cent in 1889 and 11.8 per cent in 1899; but, inasmuch as the losses are reckoned on the percentage of lead in the ore as shown by fire assay, and the latter is considerably below the truth, the average grade of the ore smelted would naturally be somewhat higher.

Mr. Kirchhoff also reports the results of smelting in Missouri, where the conditions are entirely different from those of Colorado. The ore is a high grade concentrated product, which averages perhaps 65 per cent Pb in the southeastern district and 77 per cent Pb in the southwestern. The works at which it is smelted are small, while those of Colorado are large, and different processes are employed, including the reverberatory furnace and Scotch hearth, though the largest part of the ore is treated by a preliminary roasting and subsequent smelting in the blast furnace. In 1899 Missouri smelters worked up 68,719 tons of ore at an average expense of \$7.72 per ton, which was divided as follows: Labor, \$3.72; salaries, \$0.69; paid contractors, \$0.37; supplies and material, not including ore, \$2.34; rent, taxes, insurance, and all other expenditures, \$0.60. The interest of these figures is diminished by the fact that they represent so many different things; thus, aside from the different methods of smelting employed, certain of the works made lead oxide. The total output of the Missouri smelters in 1899 was 41,976 tons of lead and 5,165 tons of oxide. If we assume that the so-called oxide, which is to a large extent sulphate, averaged 72.5 per cent Pb, the total lead product was a little more than 66.5 per cent of the ore smelted.

THE INTERNATIONAL FEDERATION OF MINERS.

The International Federation of Miners, a body in which the coal miners of all the leading nations of Europe are interested, held its thirteenth yearly meeting at Dusseldorf, Germany, in May last. Its proceedings this year present some points of interest which are brought out in the full report recently published. There were five nations represented by delegates from the national unions—France, Belgium, Germany, Austria and Great Britain—and in addition there was a delegation from the miners of Durham, who are not affiliated with the general British union. In all there were 115 delegates present, representing 1,453,000 miners. The number was somewhat unequally divided, Germany sending 59 delegates and France only 2; but this made little difference, as the votes in the congress were cast in proportion to the number of miners represented by each delegation.

The discussions of the congress differ somewhat from the direction which those of a similar body in this country would take, in that they have a distinct political bearing. The federation in fact is a powerful element in the support of the Socialist Party in Europe, and its proposals are for the most part directly in line with the principles of that party.

The chief points which came up for discussion this year were not new, having been before previous meetings. They included the general adoption of an eight-hour day, the establishment by law of a minimum wage rate, of pensions for old age or disability, and of indemnity for accidents. The new subjects brought up this year were the nationalization of mines, international co-operation in strikes, and the cultivation of an understanding with the coal miners of the United States.

With regard to the eight-hour day, some progress was reported by the French delegates in the passage by the Chamber of Deputies of that nation of a law limiting the working day to nine hours for two years to come, the time to be reduced to eight hours after 1905. Little progress was reported by other delegates. The congress on this point voted to continue the agitation, the only dissidents being the Durham delegates, who took the British rather than the Continental view; while believing in the eight-hour day, they doubted the wisdom of legislation on the subject, which ought to be settled by the miners and operators alone.

The same result—a decision to continue the agitation—was reached with regard to the establishment of a minimum rate of wages by law. A number of the British delegates doubted the possibility or expediency of this, pointing out the difficulty attending the determination of such a rate, and the possibility that the law might work to the disadvantage of the miners themselves in certain cases. The Continental delegates, however, were unanimously in favor of this measure. Their votes also carried the resolutions in favor of old age pensions and indemnities for accidental injuries, both of which are directly in the line of the Socialist programme.

These matters having been settled, a long and interesting debate arose on the question of the nationalization of mines—that is, the direct ownership and operation of mines by the State. Some objections were made by the British delegates, who pointed out the superior results obtained by private enterprise. The main opposition to this proposition came, however, from the German delegates, and was not based upon disbelief in the principle involved, but upon the more practical consideration of the autocratic nature of their government. Under the present rule, the men employed by the State would be subjected to intolerably strict discipline, and would be at a disadvantage in any disagreement as to wages or conditions. A compromise was finally reached by de-

manding as a first step that the State should take possession of and operate all abandoned mines and all mining concessions which have not been utilized by the present owners.

The most important action taken, perhaps, was toward the close, when it was resolved to establish the office of permanent international secretary. The chief object of this office is to keep in constant touch with the national unions, and, in case of a strike in any nation, to devise methods by which the others could aid it, as by withholding exports, or similar methods. The office is also to consider possible measures to regulate the international coal trade, and by limiting exports and in other ways to prevent undue competition and lowering of prices and, consequently, of wages.

The British delegates, who appear to have had the most practical trade sense, pointed out many difficulties attending this plan, and it was decided to appoint a committee to present a plan for the complete organization of the new office. Meantime, however, the international secretary was appointed, and his office established for the coming year at Brussels, in Belgium.

In connection with the debate over this plan, some delegates pointed out the difficulties which might arise in the future from the competition of American coal, and the fact that in case of a strike in any European nation fuel deficiencies might be made up by coal from across the Atlantic. It was therefore made the duty of the international secretary to communicate with the American Federation of Miners, with the object of securing co-operation or union with the congress on the part of that body. Whether it will be possible to do this remains to be seen; that it should be proposed is an interesting fact.

The main difference apparent between this congress and our own miners' meetings appears in the political cast and in the greater reliance on law and on the initiative of government. We are tending toward this far too much for our own good, but we have not yet reached the European point.



THE DUTY OF THE ANTHRACITE OPERATORS.

The *New York Times*, of August 12, in an editorial reply to my last week's article on "The Resumption of Anthracite Coal-Mining," responds to my request by frankly declaring "what steps it would have the operators now take."

Before doing this, however, the *Times* declines to say more about the Pennsylvania law of 1897, because it has already given its opinion thereof "at sufficient length." I do not think that its former utterance covers the points to which I took the liberty of calling its attention; but, for the present issue, its second reason supersedes the first. Namely, it says that the discussion of the law is "irrelevant to the question of the duty of the operators, if the statement of their leading representatives, to the effect that large numbers of certified miners are daily applying for work, is true."

I do not know precisely to what representatives of what statement this refers. But it has been repeatedly admitted, and it is unquestionably true, that there are not enough miners legally qualified and personally now willing to work at any one colliery to permit the resumption of regular work at that colliery. That being the case, and the statute forbidding the immediate employment of certificated miners from an adjoining anthracite district, how can this provision of the statute be regarded as "irrelevant"? In short, the statute is highly relevant to the duty of those who are liable to fine and imprisonment if they disobey it.

But now to the "step" proposed for the operators. The *Times* says, "The first duty of the operators is to mine coal; and every step should have that in view."

Amen! say I, and go further: Accepting for argument the proposition of the *Times* that the duty of mining coal is owed, not to the trade, but to the public, I shall continue, as I began, to treat this question of resumption from the one standpoint—What will most quickly and effectively supply the public with anthracite coal?

1. "Granting that serious obstacles now interfere," the *Times* says, "the proper thing to be done is promptly to remove as many of these obstacles as possible, by showing a disposition to encourage and stand behind those who are ready to resume work."

There have been and are serious obstacles indeed; and I suppose the *Times* will agree that the most serious should have been dealt with first, if everything could not be done at once. Now the most immediately threatening obstacle of all was the instant danger of the flooding of the mines, created by Mr. Mitchell's call upon the engineers, firemen, etc. The work of preserving the property and the capacity of coal-production thus imperilled was imperative and difficult enough; and, in the case of a few collieries, it has failed so completely that these particular mines will probably be abandoned. Perhaps the *Times* is not aware that, in the majority of those instances in which the original employees, or substitutes from outside, manned the furnaces, engines and pumps in defiance of Mr. Mitchell, they consented to do this simply for the preservation of the mines, and not to make mining possible; and that, if mining had been resumed, these men would have refused to work. Their general attitude was neutral. They would not obey Mr. Mitchell so far as to destroy the prospect of resumption at the close of his fight—whatever its result. But, on the other hand, they would not become parties to the fight by aiding the operators to produce coal in spite of him.

Another, a greater and a still imminent danger, is that of the burning of breakers by incendiaries. This was stated in my last article; but the *Times* has overlooked it. Will it kindly say whether it would propose any step which would increase that peril, and whether any such step, if followed by the burning of a few breakers, would promote the early resumption of anthracite-mining in the public interest?

2. The *Times's* prescription for removing obstacles, namely, "by showing a disposition to encourage," etc., seems, to my mind, to have been used already, so far as it was practicable or prudent. Does the *Times* know of any case in which men willing to work now have not been "encouraged"—and even employed? Does it know that *bona fide* applications for employment have been anywhere refused? On the other hand, does it blame the operators for not "showing their hand," by telling exactly what they have done, to the satisfaction of the newspapers and the advantage of the enemy?

3. But perhaps the recommendation of the *Times* was intended to show how "obstacles" were to be removed, and how the desired "disposition" was to be shown. Here it is:

"Primarily, if the interests of the trade demand it, they might with entire propriety give formal notice that they will not recognize or deal with the United Mine Workers now or at any future time."

If the interests of the trade demand it! What strange subjunctive have we here? Methought it was the crime of the operators that they had sacrificed to the interests of the trade those of the public. But I will not quibble. Doubtless the *Times* thinks, as I do, that the true interests of the trade are those of the public. In that view, the only objection I see to this proposed step is that it was substantially taken long ago. Has the *Times* forgotten the letters of President Baer, Truesdale, Fowler, Walter, Olyphant and Stearns, all written in February last and subsequently published, every one of which declares

that the operators will not deal with the United Mine Workers? Or their subsequent answers, in March, to a telegram from Mr. Mitchell, simply reiterating this decision? Or their still later deliverances in May, to the same effect? Is it not notorious that the recognition of the United Mine Workers is the real issue in the present contest? Even in 1900, though the operators made some disastrous concessions, did they not refuse to recognize that Union, and insist upon dealing with their own employees only? What the *Times* now calls for, "if the interests of the trade demand it," is the making of the same declaration for the fifth time, with one change only: namely, that the operators shall refuse to deal with Mr. Mitchell's organization "at any future time!"

4. After saying No! in 1900, and No! No! no! in 1902, let them now say formally, "with entire propriety," NO; NEVER!—and something might happen, to-wit:

"Perhaps, if they were ready to recognize and negotiate with such a union as would be most useful to the miners and best for the trade, such a union, local to the anthracite industry and without bituminous affiliations, would be very quickly organized and the United Mine Workers would find themselves outside the breastworks. Very likely the turbulent elements in its membership would make trouble. This would be regrettable; but they are making trouble now, and a great deal of it."

"If" and "perhaps" are not very strong signs of the ethical imperative or the prophetic authoritative. They leave too much room for the dissent which spoils all. Utilizing the permission thus extended, I must confess that I do not think it either wise or effective to shout *Never!* after saying *No!* Apart from the comic-opera retort which such bravado is sure to invite, there is the serious consideration that the gentlemen who are acting as trustees for the owners of property in Pennsylvania have a perfect right to say, No; but no right to add, Never! Moreover, when the immediate No! does not paralyze the enemy, the rhetorical Never! will not do the business.

5. But the *Times* thinks that, "perhaps," this new supplementary slogan would lead to the organization, "very quickly," of a new and unexceptionable anthracite miners' union, and proceeds to explain how it "might very well be arranged in frank and friendly conference" between the representatives of both parties, and what it should provide for in the regulation of the trade as well as the industry. The programme contains many items worthy of discussion—for instance, "the recognition of the principle of arbitration," concerning which fancied panacea for labor-disputes I have spoken my mind in the past and may do it again. It is sufficient for me to say here that though it were unobjectionable, and even millennial in perfection, this plan of reorganizing the trade, abolishing "ancient grievances" (whatever they may be), scattering anarchists, and elevating individuals to thrifty, industrious and self-respecting citizenship, could not possibly give us anthracite coal this fall!

6. "Meanwhile," says the *Times*, "those who want to work should be employed, and given the best protection possible;" and it suggests various kinds of work to which they could be put. I beg to inform the *Times* that this has been done already, just as far as decent regard for human life and obedience to law would permit. Authentic instances to the contrary it is respectfully invited to furnish.

7. Its further suggestion that the evil effects of the statute of 1897 should be shown under legal advice, and its indirect recommendation of myself as the legal adviser, are highly appreciated. I wish I deserved the implied praise, and could merit and receive the implied retainer; but candor compels me to say that I think the gentlemen in charge of the matter understand it better than I; and, moreover, that

I do not, in my wildest dreams, fancy that my advice about a statute, when the legislature was not in session, would hasten the production of anthracite coal. Dear *Times!* let us work together to get *that* first, at the least possible loss of time, blood and property, and without deplorable surrender to tyranny or terrorism—and then we can consider, in non-bituminous comfort, the reconstruction of society!

R. W. RAYMOND.

CLAY-WORKING INDUSTRIES IN 1901.

The year 1901 was one of the most prosperous in the building trades, and the effect of this prosperity is shown in the great increase in the building brick production and in the statistics of building operations in the large cities, says Mr. Jefferson Middleton in *Mineral Resources of the United States, 1901.*

The total value of the products of clay in the United States was \$110,211,587 in 1901, as compared with \$96,212,345 in 1900, a gain of \$13,999,242, or 14.55 per cent. This is one of the largest gains in the industry recorded in this office. Of this total of \$110,211,587, \$87,747,727, or 79.62 per cent, represent the value of the products classified as brick and tile, but really embracing all structural clay products, together with paving bricks and products used in drainage, and other clay products which it is impracticable to classify separately; and \$22,463,860, or 20.38 per cent, was the value of the pottery products.

The year 1901 was one of unprecedented activity in the building brick industry, the total value of the brick used for this purpose being \$51,048,653, as compared with \$43,099,512 in 1900, an increase of 18.44 per cent; with \$45,461,025 in 1899, and with \$35,191,454 in 1898. The common brick product increased in value from \$38,621,514 in 1900, to \$45,503,076 in 1901, a gain of \$6,881,562, or 17.82 per cent. Front brick increased in production 21.87 per cent, from \$3,864,670 in 1900, to \$4,709,737 in 1901. Vitrified paving brick gained 15.11 per cent, reaching a value of \$5,484,134 in 1901. The fire brick gained less than one-half of one per cent, the total being \$9,870,421. The stove-lining industry alone decreased, the loss being \$39,170, or 8.47 per cent, from \$462,541 in 1900, to \$423,371 in 1901. The sewer-pipe product increased 15.31 per cent; terra cotta gained 41.95 per cent, and the fire-proofing industry made a slight gain of 2.20 per cent, as compared with 1900. Pottery increased in value from \$19,798,570 in 1900, to \$22,463,860 in 1901, a gain of \$2,665,290, or 13.46 per cent.

HYDRAULIC MINING.—The California Debris Commission, in its annual report ending June 30, 1902, shows that 45 permits to mine by the hydraulic system in the drainage basins of the Sacramento and San Joaquin rivers were issued, and that during the year 836,500 cubic yards of auriferous gravel were hydraulicked in those districts. Since the commission was established in 1893 455 permits have been granted to mine by hydraulic process in the drainage basins referred to. In Siskiyou, Trinity and other countries where the drainage is into the Klamath and other rivers this commission has no jurisdiction, and one may mine as he pleases in those sections, there being no navigable rivers to be injured by the debris from the mines.

DYNAMITE IN SOUTH AFRICA.—Consular Agent Gordon telegraphs to the State Department from Johannesburg, July 26, 1902, that a majority of the Chamber of Mines there favors the imposition of a coast duty of \$1.80 per case on dynamite, to protect local factories. A strong minority desires free trade. The annual consumption is 300,000 cases. Mr. Gordon thinks United States factories should compete for this trade, and requests cable quotations from manufacturers for blasting gelatin and No. 1 dynamite, 30,000 cases yearly, five-year contract, delivered at an African port. These figures, he adds, apply to one group of mines only.

THE GOLD MINES OF COSTA RICA.

By MILTON FRANKLIN REITZ.

Like the mines of every other part of the world, something has been said and written of those in this republic. All connected with the mining industry know the nature and effect of such writings. It is a well-known fact that the press throughout the States has given space to reviews of this sort relative to all known mining districts, the authenticity of which has not always been without question. These articles in many instances have been produced by special reporters, who have spent limited time in their preparation, with the prime purpose of obtaining readable matter, and with the result that facts have been sacrificed to give due credit to the legends and traditions met with in all mining communities.

The object of this article is to give a correct idea of the conservative possibilities, if not probabilities, of the mining industry in Costa Rica. The writer has spent two years immediately connected with the mines of the country and has personally visited the more important properties here mentioned. Physical conditions noted are given from personal knowledge, and are corroborated by reports made at various times by eminent engineers. Statistical facts observed are taken from original mint returns, assay certificates, and bills of sale now in the files of the owners of the mines. As there is probably no better way of judging the future than by the past, I have thought it of interest to give some history, especially with reference to the mines of the Aguacate Mountain, for which I am indebted to Don Francisco Maria Yglesias, who, with his father before him, have been associated with these properties for more than eighty years. It was the gold of Monte Aguacate which infused the first symptoms of vitality into Costa Rican commerce.

COSTA RICA.

The name, meaning "rich coast," was given to the country by the first Spanish explorers in 1512, when they were attracted by the many golden images worn by the native Indians. Many of these gold idols, dug from old burying grounds, are found in the collections made by the pioneers. The collection at the National Museum is valued at about \$50,000. Events subsequent to those early times show the name is an appropriate one.

The republic has an area of 34,000 square miles, and the population, according to the census of 1901, was 311,444. The ports of entry—Puerto Limon, on the Atlantic, and Puntarenas, on the Pacific, lie on the tenth parallel, which crosses the higher developed section, the central part of the republic. These ports have excellent landing and shipping facilities, and are both connected with the interior by railway.

The laws of the country governing mining are liberal and ample. Mining machinery and supplies are admitted free of duty, and full protection is accorded the business. Many of the leading business men of the republic are financially interested in the mines. The attitude of the government has long been especially friendly, and the present administration hopes to see the mining business develop into a chief industry. The peaceful character of the people and the stability of the government are facts worthy of particular mention in this connection.

ECONOMIC CONDITIONS AFFECTING MINING.

Climate.—The climate in all localities where mines are now being worked and in all places where work is contemplated is healthful and pleasant. The general elevation of the mines is about 1,800 feet. Observations taken at this elevation at the Aguacate mines indicate the average temperature at 72 degrees Fahrenheit. The temperature varies but little during all the year.

Water.—This important element is well provided, and the supply of pure water is sufficient for all purposes. The mountain streams afford ample power and are numerous in the mining districts, so that immediate or transmissible power is available at moderate expense.

Timber.—The native woods are well adapted to mining purposes and abound in sufficient quantity in most localities to supply this demand for many

years. The timber requirements can in most of the mines be reduced to less than past consumption by employing modern methods. Cheap power and labor being available; good lumber is produced at moderate cost.

Labor.—The native labor is good, cheap and steady. The miners are hard-working and intelligent. The maximum price paid to drill-men in 3 colonies, or \$1.35 gold per day, and ordinary labor is secured at half this price.

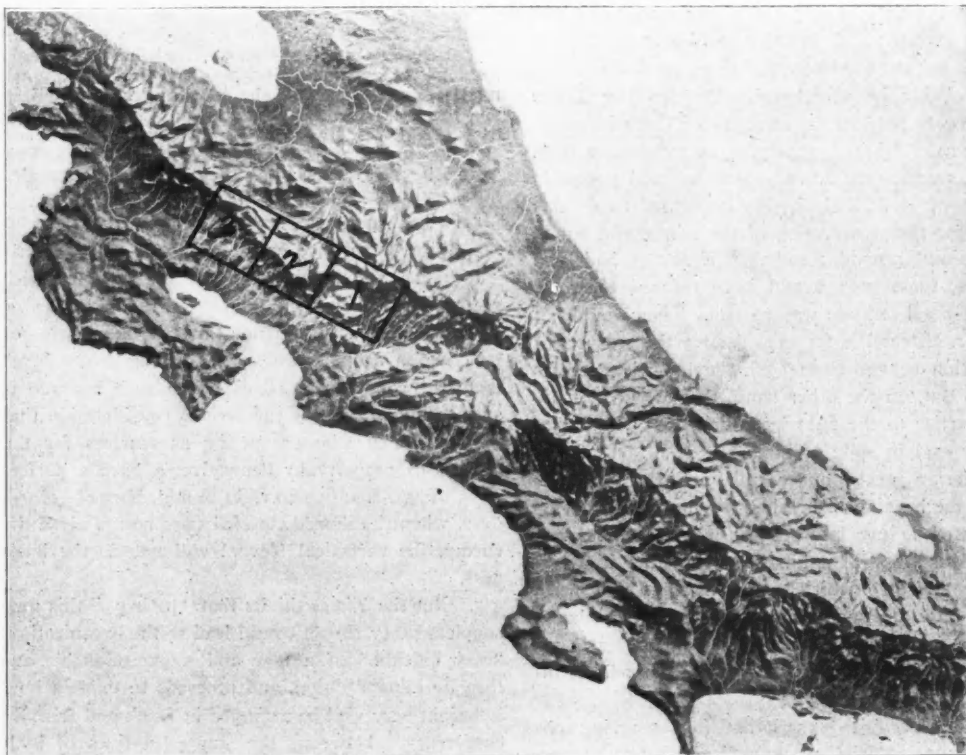
As a summary of these facts it is conservative to say that all economic conditions are favorable to profitable operations.

GEOLOGY AND MINERALOGY.

To treat this subject briefly, suffice it to say that the following conditions will apply with little variation to all of the localities mentioned.

The country rock is of igneous origin; diorite and the porphyries are the more common. Large black boulders conspicuously mark many localities. It was

known to-day was made in the district of the Aguacate Mountain (then called El Torroto) by the Spanish Bishop Garcia, bishop of Costa Rica and Nicaragua, while crossing the mountain over the old trail which connected Cartago, the destiny of the bishop on this journey, with other important provinces within his dominion. The principal residence of the bishop was then in Nicaragua, and a visit from him to Costa Rica was a notable event. In this particular instance more than thirty years had elapsed since the visit of his predecessor, Bishop Tristan, hence, in order to show their appreciation of the event, the Costaricans sent a delegation of prominent citizens to accompany him from Esparta to Cartago. On their way through the Aguacate mountains the bishop, who had some knowledge of ores, observed the outcropping of a vein over which they passed, and suggested the probability of gold and silver veins existing in the locality. This discovery was made on the main ledge of the mine, afterwards denounced as the Sacra Familia. The place is still



MINING DISTRICTS OF COSTA RICA.

1. MONTE DE AGUACATE. 2. MONTE DE ORO. 3. ABANGARES DISTRICT.

due to this fact that Los Quemados (which means "the burned"), a village in the interior, was so named. The ores bearing the precious metals usually occur in fissure veins, and the gangue consists principally of quartz, clay talc, and porphyry. The values are largely held by crystalline quartz, which occurs in all its varieties, from the pure white and barren to the highly mineralized, carrying sulphides of the base metals in varying proportions and in rarer cases manganese, arsenic and antimony. Ores presenting highly refractory features are rare. The remaining gangue often carries gold which has been freed from the quartz by aqueous agencies, to which the oxidation of the base metals and the crumbling of the quartz was probably due. The percentage of silver values in the auriferous ores I have examined is comparatively small, but, it is said, there are some rich silver ores.

HISTORY.

Lost and perilous expeditions, intrigues, persecutions and other causes, especially the marine disaster suffered by the Governor of Costa Rica, Juan Vazquez de Coronado, occasioned much delay in the development of the first mineral discoveries. This was retarded also by frequent invasions by the Talamancas and other Indian tribes. During two centuries prior to 1815, but four mineral denouncements are of record, and but two of these are located.

The first discovery affecting the principal mines

marked by a surface-working, made in the discovery days. A Spanish gentleman, Don Santos Lombardo, of Cartago, a member of the delegation, took some samples to Cartago, had them assayed and found them to be rich in gold. Returning in company with two friends, one of whom was Don Rafael Gallegos, second president of Costa Rica, they denounced the mine under the name Sacra Familia (Holy Family). These first and the many subsequent discoveries caused much excitement in Costa Rica and prospecting was actively entered into.

GOLD MINING ZONE.

The gold mining zone of Costa Rica lies on the Pacific slope, and comprises three different districts, viz.: The mines of the Aguacate Mountain, Monte de Oro District, and the Abangares District, the locations of which may be seen on the accompanying map.

The Mines of the Aguacate District.—The position, past importance and promised future of these extensive properties suggest them for first mention. This district consists of five distinct mines or groups, viz.: The Aguacate mines, the Sacra Familia, Los Castros, Quebrada Honda and El Porvenir. They are situated in the mining district of the Aguacate Mountain, in the Province of Alajuela. The mountain is in latitude 10° 12' 30" North, and in longitude 84° 28' 30" West of Greenwich. The Pacific Railway, now being completed to connect the capital (San

José) with the Pacific Coast, passes within 2 miles of the mines, at the Río Concepción. The national cart road, connecting these points, passes the entrance to the mines at the post office Desmonte, which is about 30 miles from the Pacific port and 35 miles from San José.

The Main Lode—According to a report made by an eminent engineer of San Francisco, "the vein is an exceedingly powerful one and possesses all of the characteristics of great strength and permanency. It is undoubtedly a true fissure vein. The width is from 15 to 150 feet. Very few of the workings show both walls, although some cross-cuts are in vein matter from the foot-wall, a distance of from 25 to 30 feet. At one point in the San Rafael level, a cross-cut near the bonanza El Balsa shows the foot-wall at 8 feet, while at a lower tunnel a cut shows it to be 40 feet wide. On the national cart road a cutting exhibits a width of 150 feet. There are two parallel veins in what is known as the Oreamunos portion of the lode, one called Veta Colorado, and the other

mines: Guapinol, El Balsa, La Cigüeña, El Fuego and Don Eusebio.

Guapinol.—This was one of the early discoveries, made in 1823. A native while resting in the shade of a Guapinol tree noticed the peculiar appearance of the outcrop. He showed it to a man named Oreamunos, who panned it and found it rich in gold. The discoverer was dismissed with a small present, and Oreamunos with his two brothers denounced the property, calling it "La Mina del Pilar," after the holy virgin Pilar, the patroness of Zaragoza in Spain, although it has always borne the popular name Los Oreamunos. It is estimated by well-informed authorities that the Oreamunos family took from this bonanza the sum of \$1,000,000.

El Balsa.—This early discovery, which proved to be rich, was denounced as the Mina de San Rafael on the Oreamunos lode. In the year 1825 a lessee made a handsome fortune by treating the ore in an arrastra constructed on the Río Grande, ten miles distant, to which point the ore was transported in

of 52 tons, made by the Aguacate company to the Royal Saxony Smelting Works, near Freiburg, Germany, in 1874, was bought on the basis of \$181.27 gold and \$21.03 silver per ton, a total value of \$202.30 per ton.

Don Eusebio.—This bonanza is a part of the San Rafael property. It was discovered while drifting a tunnel to reach El Balsa. A large quantity of rich ore was mined here. I have not ascertained the value of its production. Several drifts were made in this working which are of value, as they show the continuity of some important veins of the locality.

Quite a number of shipments were made by the company in 1893 and 1894 from these various mines to London. The lots shipped ranged from half a ton to 30 tons. The lowest price received was £19 6s., or \$95, per ton for a lot of 30 tons. One lot shipped in March, 1894, was bought at £1,900, or \$9,500 per ton, ten times the value of lowest price.

These were the last shipments made, and there has been no work of production since that time. The total output of the Aguacate mines has been estimated to exceed \$5,500,000. That this is conservative is proved by the marked influence which the opening of these mines had upon the general industry of the country. Until that time the country was exceedingly poor and commerce hardly existed. The circulation of this money, however, facilitated the importation of foreign manufactures necessary to develop the agricultural and other resources of the country.

Sacra Familia Mines.—The scene of the first discovery in the Aguacate District, as before noted, was on the main lode of this important group, which is situated north and west of and adjoining the Aguacate properties. Numerous workings of a superficial nature are yet discernable where the lode has been attacked. No work of extent has been done in recent years. The last productive operations as far as I can learn were in 1884. For several years previous to this time a 10-stamp mill was operated during the wet season. Five tons was the maximum daily capacity. The ores milled were taken from workings known as Cardinilla, Potrero Alto and Sobre Cañon de San Francisco, and were hauled to the mill by ox-cart. But a small percentage of the value was recovered in this mill, perhaps wholly due to improper management. I assayed some samples last November, taken from the old tailings dump, which gave values from \$12 to \$33 per ton gold. Crude and wasteful as were these operations, it is stated by a good authority that the saving was so great at times that it was considered necessary to clean the plates two or three times a day. Considering the quantity treated, such conditions are only conceivable when very rich ore is supplied.

At another point on the Río Quebrada Honde are the ruins of an arrastra and mill of ancient make. The date of operations here I have not learned. Some of these old remnants are interesting. The wooden parts have entirely decayed and washed away. An old shaft or two and some stamp heads, which evidently worked on wooden stems, remain to tell the story. I sampled and assayed some sands which I supposed were tailings of these old works which ran as high as \$79 gold per ton. These ores probably came from the bonanzas found soon after the first discoveries, a number of the workings of which may yet be recognized, though in bad condition. It is conservatively estimated that these properties have produced upwards of \$1,000,000 American gold.

Among interesting historical facts relative to these mines, I learned that Mr. Richard Trevithick, the immortalized English inventor, who was then in Peru, upon hearing of the rich finds in Costa Rica, came to this district in 1824, and for about two years explored and worked some of the Sacra Familia mines. He became convinced of the opportunities presented there, sailed for England and organized the Anglo-Costa Rica Mining Company, which worked the mines with limited capital and little success, attributed to bad management.

Another interesting work was done by a Cornishman named Phillips and a Costa Rican named Moya,



PREPARING MINE TIMBERS IN COSTA RICA.

Veta Blanco, the former being next to the foot-wall and the latter towards the hanging wall. These are considered separate and distinct veins, but are unquestionably component parts of the lode. In the works of the tunnels driven, many feeders have been encountered which unite with the main lode. All indicates that this is the mother lode of its district.

"The ore varies in value, according to the locality in which it occurs. In the bonanzas it ranges from \$75 to \$5,000 per ton. In order to ascertain the value of the lode large samples of from 100 to 300 pounds each were carefully taken, reduced and assayed in duplicate, giving an average of \$25.82."

La Minita.—This is a separate and strong vein. It was discovered and denounced in 1832. Considerable wealth was taken from the surface ores of this vein through the crude methods employed in the early times. This vein joins the main lode in the Los Castros property. The assays made from the vein indicate values of \$25 to \$30 per ton.

San Miguel.—This was another early discovery denounced in 1826, and was profitably worked until after 1862. Assays made from these ores run from \$15 to \$70 per ton.

Of the thirteen bonanzas discovered in this immediate district, five were found in the Aguacate

ox-carts. It was at these works that he, with the permission of the government, made the first Costa Rican gold coin. The assay office of the Swiss-American Bank of San Francisco, Cal., certified to assays made of ores from this bonanza of values ranging from \$600 to \$4,000.

La Cigüeña.—This superficial work yielded as much ore as El Balsa. The last work done there was in 1875. The sum of \$21,000 is said to have been realized from 11 feet of ore taken from this place. The ore was treated at a place called La Union, on the Río del Quebrada Honde, by an arrastra and a stamp mill of primitive pattern, the ruins of which may yet be seen. From the poorest kind of amalgamation they realized \$84 per ton. That these ores were rich is indicated by tests I made from what remains of the old tailings dumps, which show the presence of free gold and amalgam, and values from \$35 to \$80 per ton.

El Fuego.—This bonanza was discovered between the Guapinol and La Cigüeña and like them was but a surface working. The proposition of draining this work was at the time of abandonment considered too great an undertaking. Authorities familiar with this mine estimated the ore then in sight to be at least 1,000 tons and valued at \$300,000. One shipment

who worked some of these mines from 1837 to 1844. Phillips is said to have located a very rich bonanza. He concealed the fact and tried to get title to the property, but the owners were made suspicious by his anxiety and refused to accept the propositions he made. He then completely obstructed the tunnel which lead to the deposit, a distance of perhaps 200 feet, filling it with the rock he had excavated and caved in the entrance, leaving only such marks as he himself could recognize. He then left the country with the intent, it is thought, of returning with sufficient funds to acquire the mine. Nothing was known of his plans for many years, until some natives who assisted him in the work disclosed the secret. It was not until in November, 1901, that this old working was re-located, and it is now being reopened with much interest.

Los Castros.—The first discoveries and denouncements in this group, which joins the Aguacate properties on the north and east, were made in 1822 by the brothers, Nicholas and Pio Castro. The vein is a continuation and the same as the Oreamunos and San Rafael. The lode displays the characteristics of three sub-veins, called Veta Colorado, Veta Negra and Veta Blanca. Samples taken from cross-cuts of the veins assay from \$28 to \$45. Several fortunes are said to have been taken from the surface workings of these mines, known as the bonanzas Don Ricardo, El Manto, El Pochote, Don Antonio Pinto, Lacre, Sequiera and Don José Antonio Castro. The last named is said to have produced \$15,000 in a single day.

El Porvenir.—This mine is situated west of the Aguacate mines, on the Rio Machuca, a short distance north of San Mateo. The property has been sufficiently prospected to prove the existence of some attractive veins. The veins consist of the main ledge, which courses the center the full length of the property at an angle of about 30° east of north, and several subsidiary veins which unite with it. This mine has been the resource of many natives living in that vicinity for many years, who have worked the surface ores with molinettes and arrastras, nothing more modern having been attempted. It is known that they made good wages with the gold pan. One good authority told me of an instance when one ounce and a half of gold was obtained from a hat full of ore found in this mine. A bonanza was found some years ago in a working called Guatuso, from which it is estimated that \$60,000 was realized by amalgamation in an arrastra. Assays I have made of samples taken in these old workings indicate that considerable rich ore remains yet in place. I made a great many assays from different places about this mine, ranging from \$10 to \$2,000 per ton, and believe that after sufficient development is done an abundant supply of ore, ranging from \$15 to \$25 can be obtained. A larger percentage of the values in these ores is free and amalgamatable, and the values remaining I believe can be recovered with cyanide.

The natural conditions at this mine are especially favorable, affording ample power and convenient mill-site near the entrance of the main tunnel, which will begin at the south end of the claim on the main ledge and at a low level. This tunnel with appurtenant upraises and cross-cuts is now contracted, and the ore will be blocked out before a plant for treating the ore is constructed. This mine is the property of the Rio Grande Gold Mining Company.

Quebrada Honda Mine.—This property joins the claims of the Sacra Familia mines on the west, on the Rio Quebrada Honda, and is one of the oldest worked mines in the district. It is said that a great many men were employed here at one time working the ores in a series of arrastras on the river. There has been no production for many years, probably not since 1857. The property consists of three principal veins and numerous feeder veins. The deepest shaft in this district was sunk on this property and was less than 400 feet deep. Many of the old workings are now inaccessible.

The mine is prettily located and the site, which was at one time densely inhabited, is covered with large trees and other rank vegetation. There remains the ruins of molinettes, arrastras and a 10-stamp mill of

early pattern, the date of operation and production of which I have not learned. The ores treated by these crude methods are said to have yielded immense profits, and best authorities estimate that the mine has produced upwards of \$1,000,000. So far as a general removal of ore is concerned, the property is practically virgin. The principal veins vary in width from 3 to 20 feet, carrying values averaging \$8 per ton and upwards.

The production up to date of the mines of the Aguacate District is estimated to exceed \$7,000,000 gold, and has probably reached the sum of \$10,000,000. Considering that this sum has been produced by the crudest mining and metallurgical methods, the reward which would follow the proper application of capital, sufficient to operate on a large and modern scale, seems surmisable. All of the known ore bodies are so situated as to permit the development of the three principal groups of the district by one great tunnel with convenient drifts, the courses of which could be directed so as to cut the veins at great depth

afloat that Mr. Keith would soon reopen the mine at new and lower levels.

La Union.—This property is owned by the Union Mining Company, of San Francisco. It has in the past been unsuccessfully worked. A 20-stamp mill was operated without a profitable recovery. No other treatment than amalgamation has been applied, with a consequent loss, it is stated, of about 60 per cent of the values, which averaged from \$5 to \$8 per ton. Three years ago a chlorination plant was constructed, but for some unaccountable reason a single charge was never chlorinated. Fifteen months ago a serious cave-in occurred, and for the following ten months the property remained idle. A recent effort to reopen the mine by two lessees seems to have been unsuccessful. At present the former superintendent, Mr. John W. Kerr, is reported to be operating the mill with a view to recovering the free gold from some of the better ore remaining in the stopes.

Macacona Mine.—This mine was worked about 30 years ago by a native company with small capital



ROSS PLACER MINE, NEAR SAN JOSE, COSTA RICA.

and give backs extending far below the deepest workings so far made, and who can know the new and possibly richer deposits such a work would disclose. The work done has been sufficient to prove the presence of many veins and deposits which warrant mining and treatment if but half of the values are recovered. There is no reason for a belief that these deposits do not continue to great depth, and the deepest workings indicate that they do. The ores become slightly refractory and the values in silver increase with the gold values constant as depth increases. It is believed that proper treatment will result in saving from 85 to 90 per cent of the values in these ores.

MONTE DE ORO DISTRICT.

Trinidad Mine.—This property is owned by an English company, though Mr. Minor C. Keith, an American, is said to hold the majority of stock. The property includes some large veins of low-grade ore, \$6 to \$10 per ton. Operations were suspended about 10 years ago, owing to the heavy loss in tailings. Plain amalgamation was used, with the result that two-thirds of the values were lost. No extensive experimental work has been done to properly test the ores, but it is believed that they will cyanide to at least 85 per cent. Some rumors have recently been

and inferior appliances. Nevertheless, it is recorded that good dividends were earned. The mine was operated through a shaft, and with depth the difficulty on account of water increased. The mine was closed down for some years. Several years ago the property was acquired by R. A. Crespi & Co., who have added a hoisting, pumping and drilling plant with a view to the better development of the property. The pay portion of the ledge is narrow but runs, it is stated, about \$90 per ton. Treated on a large scale the owners believe the entire vein will pay a good profit.

Thayer Mining and Milling Company.—This company owns and operates the mines locally known as the Bella Vista and the Montezuma. They are situated near the village of Miramar, in the District of Puntarenas, about fifteen miles from the Pacific port. These properties have been undergoing active development for the past six years. The ore bodies excavated and exposed during this time indicate an abundance of ore, ranging in value from \$5 to \$10 per ton. The situation here will permit mining large quantities of ore of this class above water level.

The ore is being treated in two 20-stamp mills, where from 45 to 50 per cent of the values are obtained by amalgamation. The tailings from the plates are passed over Wilfley concentrators. The tailings

from these and the concentrates are separately treated with cyanide, which, with the saving on the plates, gives a total saving of from 85 to 90 per cent. The present capacity is 100 tons per day. The company contemplates doubling this capacity during this year, which will materially increase the output with but a slight proportionate increase in operating expense. A waterway is being constructed to supply additional power for the enlarged plant, uniting part of the Rio Barranca with the Rio Rhin, which has up to this time furnished all the power used. According to recent reports from these mines there is now sufficient ore blocked out to supply eighty stamps for at least two years.

Statements made by able engineers from the United States who have examined these mines indicate a bright future and warrant more extensive operation. Mr. A. F. Holden, of Cleveland, Ohio, says in his report: "The development on the lower levels of the property indicates a permanency to the ore chutes and a strength to the veins that promise an attractive future for the whole property. The mining and milling advantages at the Thayer mines are excellent. I believe the cheap labor, the freedom from import duties on all mining materials and the natural advan-



REMAINS OF OLD ARRASTRA AT EL PROVENIR.

tages of the location should reduce the cost of operation to the minimum."

Mr. Henry C. Holthoff, of Milwaukee, Wis., who examined the property, and Mr. E. C. Small, of Salt Lake City, a metallurgist of considerable experience, who spent six weeks at the mines, also made favorable reports.

The present output of the Thayer company's mines is from \$8,000 to \$10,000 American gold per month.

THE MINES OF THE ABANGAREZ DISTRICT.

This district is situated near the north end of the Gulf of Nicoya. It comprises about 150 square miles of mineral property. It is owned chiefly by the Abangarez Gold Fields, Limited; Las Cañas Syndicate; Guanacaste Syndicate, and R. A. Crespi & Co.

Abangarez Gold Fields, Limited.—This company owning 30 square miles of this district, has been prospecting and developing for the past four or five years. The country rock is generally porphyritic. The quartz occurs in a mass of porphyry, but it is possible in some instances that the lodes may prove to be contact veins between dike intrusions and the older rock. Some of the veins belong to the gash type, and the probabilities are that these will feather out at depth; others, again, are of great strength, notably the Tres Hermanos, a powerful vein of from 6 to 20 feet in width, and the Big Gilo, 6 to 12 feet in width. Such lodes may be classed as fissure veins, for their length and strength are such as to warrant the assumption that they penetrate to great depth. The ore of the Tres Hermanos veins assays \$8 per ton and the Big Gilo \$25 per ton. This information is given on the authority of the Messrs. John

Taylor & Sons, of London, who examined these mines in 1897.

Eleven distinct veins are now in process of development, and the company is erecting a 40-stamp mill of 900-pound stamps, with a 300 horse-power electrical transmission plant, which will be at work by August of this year. A development mill, which has been in operation for some time, is handling 500 tons per month, worth \$17 per ton. By amalgamation and cyaniding 90 per cent of the values is being procured. The success upon which this company is apparently just entering is largely due or attributable first, to the ability and persistence bestowed upon the earlier development of the properties by Mr. R. A. Crespi and, second, to the skill of Mr. C. H. Colburn, the present engineer and manager.

Boston Mines Company.—This subsidiary company to the Abangarez Gold Fields, Limited, is operating the Tres Amigos Mine, and is now erecting a 10-stamp heavy battery, with cyanide annex. A 3-stamp prospecting mill has been at work for the past twelve months on this property crushing ore averaging \$30 per ton and extracting about 60 per cent by amalgamation.

Las Cañas Syndicate.—This corporation owns 27 properties, one of which is a vein known as the Esperanza, which is 70 feet from wall to wall and carries an average of \$10 per ton. There are several feeders or gash veins running into the main ledge carrying higher values. The ore is suitable for economic milling, and water power is practically unlimited.

Guanacaste Syndicate.—This syndicate owns 30,000 acres of mineral land, which embraces some large ledges that are now being prospected and developed. Among others there are: The Gier vein, 60 feet wide, assaying \$8 per ton; the Oracu small, \$60 per ton. The ores are similar to those of the Abangarez Syndicate in character, and it is believed are adaptable to the same treatment, amalgamation and cyaniding. It is understood that this syndicate later proposes to form one or more companies for development and operating purposes.

Las Cañas and Guanacaste Syndicate properties are controlled by Messrs. R. A. Crespi & Co. No machinery has as yet been erected, but these gentlemen have a force of prospectors and surveyors at work.

Since the report of Messrs. Taylor & Sons was made several large veins have been located and are now being thoroughly prospected. The values held by the main or fissure ledges seem to be well maintained at depth. In the Abangarez property a vein carrying \$24.72 per ton in its surface workings is found to carry \$40 per ton at 300 feet below the surface was recently opened.

Conclusion.—The opinion is prevalent here among many of the best business men of the republic that in the business of gold mining Costa Rica is about to put her best foot forward. Among mining men, those best informed believe that within 10 or 15 years the mining business will be the chief industry of the republic. Other industries of the country upon which the mining business somewhat depends are progressing favorably.

No reference can be made to many other promising mineral properties without lengthening this article beyond reasonable bounds of space.

MUNTZ'S METAL.—E. A. Lewis has reported (in the *Chemical News*) that Muntz's metal (38 to 40 per cent Zn and 62 to 60 per cent Cu), which is largely used for sheathing the sides of vessels, is easily attacked by sea water when it is made of pure zinc and pure copper. Metal containing 0.2 per cent of iron or nickel is more resistant, and the metal containing 0.2 per cent of tin, arsenic, or manganese is better still. Lead does not appear to increase the resistance against corrosion, all the samples examined having shown 0.1 to 1 per cent Pb. The conclusion is that unless Muntz's metal contains a small proportion of tin, arsenic, iron, manganese or nickel it is of no value for ship sheathing or similar purposes. (*Chem. News*, 1902, LXXXV., 134.)

SYSTEMS OF ELECTRIC POWER FOR SOFT COAL MINES.

By JOHN PRICE JACKSON AND WILLIAM P. COCHRAN.

The selection of the proper electric system for haulage, power and light in the soft coal mines of the country has come to be a most vital question. Some years ago haulage by mule power and cutting by hand was displaced to a large extent by rope haulage and compressed air power to the very great economy of operation. Within recent years possibilities of still greater economy to be accomplished by the use of electric haulage and electric power have become apparent and are now largely utilized.

In selecting a system of power operation, including haulage for a mine, the first and most important desideratum is a high rate of output. Rope haulage and any kind of power cutting is a great improvement in this regard over mule haulage and hand working. Electric power still further increases the output possible from a plant of moderately large extent. This is especially true of the haulage feature on account of the readiness with which the electric mine locomotives may be controlled.

The second important requisite is to establish a power system which will enable the mine to be worked with the fewest possible openings or drifts. Insomuch as the opening entails a large amount of dead work, and in most cases the expense of making openings is great, this item is of considerable importance. It is evident to any one familiar with mines and the different systems of haulage that the electric locomotive properly installed will far surpass either the mule or rope, or even compressed air, in the distance at which profitable hauls can be made.

The third question of essential importance is the stability of operation, and in this regard the use of electric power may be by far the most satisfactory system or may be exceedingly poor, depending upon the liberality and wisdom of the plant owners. A thoroughly well installed plant constructed of the best material and apparatus obtainable and operated by a thoroughly competent electrical superintendent may be depended upon to give stable service. On the other hand, a plant constructed in a cheap manner and placed in charge of a miner or other man unsuitably trained for the purpose, is apt to give unending trouble and cause the owners serious expense.

Already a large proportion of the soft coal mines of the country have established electric power equipment for haulage, lighting and coal cutting apparatus. These systems are quite varied in detail, but may be classified under three general heads:

First, those using direct currents for both haulage and other power.

Second, those using direct currents for haulage and polyphase alternating currents for other power and lighting.

Third, those using a polyphase alternating system of high pressure, with sub-stations in the mine in which transformers and rotary converters are placed.

The first of these systems has the advantage of great simplicity, but the decided disadvantage, where the mines are of considerable extent, of requiring an excessive weight of copper to furnish a suitable pressure at distant points. One of the most representative illustrations of this system is to be found at Winber, Pa., where a number of large mines are in operation. The openings of these mines are from ¼ mile to 1 mile apart, and at the mouths of several are installed large direct current power plants. These plants supply current to the haulage system of the mines nearest which they are located, and are also tied together by heavy feeders to the other stations in order that excessive drafts upon one station may be relieved by the others. This system, as said before, has the advantage of great simplicity, but has the disadvantage of requiring a heavy expenditure for copper, and has also the disadvantage inherent in using a number of stations where one might be established to serve the same purpose. If, instead of several medium sized stations, one is installed, centrally located with reference to the openings, larger and more efficient units can be used and a smaller number of skilled employes are usually required. The saving in copper can be made very great by this change on ac-

count of the possibility of using high pressures for transmitting purposes.

It may be well here to indicate briefly some of the problems which are to be met in dealing with the different systems for the transmission of mine power. Direct current mining machinery cannot be operated at over 750 volts to advantage. Thus the limit of pressure is in this way fixed by the character of the machinery. The size of a line of copper must be inversely proportional to the square of the pressure in volts for a given absorption of power in the wire. Thus, if 2 square inches of copper were required to transmit a certain power at a certain loss for one mile at 500 volts, $\frac{1}{8}$ of a square inch would be required to transmit the same power at the same loss if 2,000 volts pressure were used.

In the case of a single high pressure central station, as spoken of above, the current can be generated in the alternating form at say 5,000 volts pressure and be transmitted in that form through the air ways of the mine to points near the centre of active operation in the mine, thus requiring a very small expenditure for copper. Here it can be reduced by means of a transformer to low pressure alternating current and then by means of rotary converters this low pressure alternating current can be converted into low pressure direct current. The rotary converter is nothing more nor less than an alternating current motor and a direct current dynamo combined in one machine. Collector rings at one end of the shaft receive alternating current for driving the armature, which in turn gives out direct currents from a commutator on the other end of the shaft.

An offset against the advantages in distribution caused by instituting a single central alternating current high pressure station in place of several independent direct current stations is the expense of equipping and maintaining sub-stations in the mines containing transformers and rotary converters and the greater difficulty encountered in the distribution of high pressure currents from the central station to the sub-station. Where the independent direct current stations are installed, however, it is usually necessary to employ at least 500 volts pressure in order to keep the weight of copper within reasonable bounds. Five hundred volts has been proven quite conclusively to be dangerous to the miners, and many accidents have occurred with fatal results. Therefore such a high pressure should be avoided in the drifts or workings of the mines where possible. The plant at Winber uses compressed air for the coal cutters and pumps, though many other installations of a similar type use electricity for these purposes as well as for haulage and electric lighting with entirely satisfactory results.

The second classification named above avoids the use of pressures as high as 500 volts for anything except haulage, at least so far as the drifts and rooms are concerned. The large plant located at Elkins, W. Va., is a very excellent type of this method of electric power application. The plant is located near the centre of the group of mines at that place and contains direct-current generators direct-connected to large Corliss engines which supply 500-volt direct currents for haulage purposes. (It should be said in passing that direct currents are necessary for haulage motors.) In the same plant are located a pair of three-phase alternating current generators which transmit power at high pressure, 2,000 volts, into the mines, where it is reduced in pressure to 250 volts by means of stationary transformers for the purpose of driving the coal cutters and pumps and for supplying the lighting. The apparatus outside of the mine is also driven by the alternating current. The distribution wires for the high pressure are carried through air ways and thus are not a cause of serious danger to the workmen of the mines. The system of power motors in and out of the mine is of the polyphase alternating current induction type, which for simplicity and the ability to stand severe usage probably excels all other types of electrical apparatus. The men actually cutting coal are relieved from the danger of the higher pressures, as 250 volts is not dangerous to life. This plant has given excellent satisfaction and is a model of its kind. If the operation of such a

plant as this should in the natural-course of development extend over a much wider area, additional power plants would have to be built at proper points for the purpose of supplying the haulage system with power without an excessive expenditure for copper. The alternative method for accomplishing this purpose would be to establish substations at suitable places in the mines, which would be fed by the high pressure alternating currents and deliver direct currents to the haulage system. If the last method was adopted the system would fall under the third classification.

The third system, as already suggested, consists essentially of a single large, well-built station generating polyphase alternating currents for distribution, at from 1,000 to 10,000 volts, into the mines, where it is reduced by means of static transformers to low pressure alternating current and is then changed by means of rotary converters to direct current of 250 volts pressure. This very low pressure direct current is supplied to the haulage at such points as to minimize the cost of copper and offers little danger to the workmen. The other apparatus and the lighting can either be supplied in the form of direct currents or in the form of alternating currents, preferably the latter, as the alternating current stationary motor is less liable to trouble than the direct current form. A large plant at Ehrenfeld, Pa., which was constructed by William P. Cochran, one of the writers, is a type illustrative of this system, and a somewhat detailed description seems not out of place.

The operations at Ehrenfeld consist of four separate openings styled Nos. 3, 5, 6 and 8. Two of these mines have been in continual operation for 20 years, and are consequently of considerable magnitude. All four are drift mines, and, with the exception of No. 5, are almost level on the main heading. That is, while the natural pitch of the veins is about 10 per cent, the main headings are driven on a level or as nearly so as conditions permit. It is more particularly the installation at No. 3 Mine on which we wish to dwell, as it is here that the really unusual features are met with, while in the other mines only the average mining conditions have to be dealt with.

The main heading of this No. 3 Mine is driven over two miles from the drift mouth, while the first working heading is 5,880 feet from the mouth. This, as is readily seen, means a steady haul of over a mile. All the workings between this and the drift mouth are old and abandoned.

Originally the tail-rope system of mine haulage was in operation here, but this was found so unsatisfactory that a more up-to-date method of haulage was decided upon. The trip was heretofore collected at the thirteenth, or first working, heading by mules, from whence the tail-rope haulage came into operation. High cost and small output caused this method to be abandoned, and the substitution of electricity according to the plans of Mr. F. B. Stillwill has been effected.

In the equipment there are four 13-ton 100-horse-power electric mine locomotives, three 80-horse-power Lidgerwood electric hoists, and three 80-horse-power Flory electric hoists. This means a possible load of 880 horse-power. To supply this the power house is equipped with two Stirling water-tube boilers of 250 horse-power capacity each, with room for another 500 horse-power boiler additional, which will shortly be installed. Feed water for the boilers is taken from the general town service mains, being piped 4 miles from the mountains, and is of exceptionally good quality. This water is received at the power house at 125 pounds pressure, so that when necessary it can be forced directly into boilers without pump or injectors. A Webster vacuum heater and filter is used to heat the feed water and delivers it to boilers at 209 degrees. The coal used is the mine road cleanings, which means a very considerable saving in the cost of power.

In the engine room, which is 42 by 56 feet, there are two 225-horse-power tandem compound Harrisburg balanced slide valve engines, taking steam at 125 pounds pressure. There is additional space for adding a direct connected unit of 300 kilowatt capacity, which is to be installed shortly.

The present engines are each belted to a 150-kilowatt General Electric double current generator, and also to a 9-kilowatt direct current exciter by means of a small flywheel overhanging the outboard engine bearing. The generators are, of course, compound wound, and furnish current as 275 volts direct current, with 169 volts on the alternating current end of the generators. The reason for using double current generators—machines that will deliver alternating currents and also direct currents at the same time—is to avoid the necessity of using rotary converters for the purpose of feeding the trolley and supplying other direct current machinery at the mine mouth.

All direct current haulage feed wires into the mines are No. 4-0 B. & S. gauge copper wire and feed into No. 3-0 grooved trolley wire. The grooved wire is found to be far better for mine work on account of the reduced sparking of the trolley wheel and the lessened expense for repairing and replacing hanger ears. Owing to the possible collection of explosive gases in a coal mine, sparking must be kept at a minimum, though this particular mine is unusually free from gas.

At present there is one haulage locomotive working in No. 8 Mine with a haulage of about 1,000 feet inside and 2,500 feet outside of the mine; one locomotive in No. 6 Mine with a haul of 2,300 feet inside and 500 feet outside of the mine, and two in No. 3 Mine with more than a 2-mile haul. In addition, there are two electric hoists in No. 6 mine, inside headings, one in No. 5 Mine, and two in No. 3. The hoists in No. 6 Mine have a haul of 1,000 feet and 1,700 feet, respectively; the one in No. 5 Mine, 2,200 feet, and those in No. 3 Mine 3,500 feet and 900 feet, respectively. This machinery is all arranged for direct current at 250 volts, and must be fed direct from the power house or from the sub-station, as will be explained. From the power house pass three pairs of No. 4-0 direct current feeders and returns for this purpose; one pair goes to No. 3 Mine, with its double track, one pair to No. 6 and No. 8 Mine trolley lines, and one pair to hoists in No. 6 Mine.

The alternating current from the double current generators is transformed from 169 volts to 5,600 volts at the power house and is carried to a sub-station, which is situated in the mine 9,000 feet from the power house, in a three-phase lead covered cable consisting of three No. 6 flexible wires. The transformer room at the power house is separate from the engine room, and is 18 by 35 feet in dimensions. The high pressure switchboard is placed here, room being left for an additional switchboard panel and transformers as they are found necessary. All switchboards are of blue Vermont marble, and make a very handsome appearance.

In order to insure protection the high pressure cable is not carried in the manway or haulage road, but in the return airway, which is very little used except for ventilation. The method of carrying the cable in the mine is comparatively inexpensive, while it affords ample protection. A 3 by 4-inch oak prop is placed every 12 to 15 feet. A wooden arm is placed on this 3 feet from the bottom, and this arm in turn supports a 3-inch square wooden box. The bottom, inside, and top of this box were put together, after which the cable was put in place and the box closed. Small air gaps are allowed about every 100 feet for ventilation in the box, thus preventing the gathering of moisture. This rigid construction was made necessary by the weight of the cable, which is 5 pounds to the foot. Where it is necessary to cross working headings the cable is carried from box to roof and suspended from porcelain clamp insulators, all of which construction is in turn covered by a trough of tin lined with asbestos paper to prevent any one from coming in contact with the cable. The cable is carried from the power house to the drift mouth on 40-foot poles, while from the mouth to the wooden box it is laid in vitrified conduits.

The sub-station room at the end of the high pressure cable is 20 by 30 feet, is cut in the coal, and is from 10 to 13 feet high. Three step-down transformers, for reducing the high alternating current pressure, are situated at the back of the room, with a suitable switchboard alongside of them, and a rotary

converter of 250 kilowatts capacity, 340 horse-power, for converting the low pressure alternating current to direct current of 250 volts pressure, is in front of the transformers. This arrangement allows room for additional transformers, switchboards and converters should they become necessary. All cables from the switchboard to the converter and transformers in the sub-station are run in conduits, as are all wires and cables in the power house, thus doing away with a network of unsightly and dangerous cables overhead.

Concrete floors are used in both power house and sub-station. At present there are three pairs of No. 4-0 direct current feeders leaving the sub-station, two pairs passing to the trolley lines in No. 3 Mine, and one pair to the hoist in No. 5 Mine. The latter go 3,500 feet from the sub-station. An additional pair of feeders is placed to run from the sub-station to one of the hoists in No. 3 Mine, which at present feeds directly through trolley line. The high tension cable and feeder lines in the sub-station are suspended from the roof by porcelain clamp insulators.

The haulage rails are used for the return circuit wherever possible. For this purpose No. 2-0 bond wire is used, with frequent cross-binding.

There are several striking features in this plant which are entirely new. For instance, the use of alternating currents with a sub-station, while being frequently used in suburban trolley lines, is something quite new for mine work, and also the use of double current generators is also something of a new departure, but has been found to work very satisfactorily.

One question which is apt to cause considerable anxiety is, whether or not the dampness of a mine will not be injurious or even prohibitive for use of a rotary converter inside a mine. However, a particularly dry spot was chosen in the plant just described, and it has been found that the heat from the machine itself more than overcomes any moisture which might otherwise collect over the entire sub-station equipment.

Although this article was not intended to be of a descriptive nature, but rather for the purpose of pointing in a general way to suitable systems for applying electrical energy to the operation of soft coal mining, the writers believe that the plant at Ehrenfeld forms so satisfactory a basis for equipping large mines that the rather detailed description given of that plant is justified.

For small workings the pure direct current systems will usually prove most economical, while a system using double current generators, high pressure transmission to sub-stations in the mines, direct current haulage and possibly hoisting, and alternating current stationary motors for all other purposes will usually be found desirable for large installations covering a great territory.

The question as to whether a single central station will be desirable is dependent upon the length of the resultant transmission line and the cost of power. This question and other modifications to suit special conditions must of course be dealt with carefully for each particular case as it arises.

NEW TRANSPORT FACILITIES FOR WESTERN ONTARIO.

CONSULAR REPORT.

The arrangement lately made between the Pere Marquette and the Lake Erie & Detroit River Railway companies will doubtless prove of vast importance to Western Ontario. By virtue of this agreement, the Pere Marquette Company secures the right to run trains over the Lake Erie & Detroit River tracks from Port Sarnia, Ontario, to Rondeau and Port Stanley, Ontario, where it will connect with the car ferry from Conneaut, Ohio, thus making a short cut from the upper peninsula of Michigan to the Bessemer & Lake Erie Road and the Eastern States. Supplying as it does nearly all the soft coal for Western Ontario from the Ohio and Pennsylvania fields, the ferry is already of considerable importance, but it is expected through this new arrangement that greater facilities will be added to the ferry system across Lake Erie, making it a line of general traffic, adapted for passengers as well as freight. There is

now but one ferry steamer running across Lake Erie between Conneaut and Port Stanley. It has a capacity of 26 to 28 loaded cars and makes 12 round trips per week. It is proposed to add several steamers of equal or greater capacity, sufficient to meet all the demands of the new line. The distance from Port Sarnia to Conneaut, Ohio, is about 150 miles, half by land and half by water.

MINERAL PRODUCTION OF THE UNITED STATES IN 1901.

The United States Geological Survey, Charles D. Walcott, director, has just issued its annual chart showing the total output of the mines of the United States during 1901. The statement has been compiled in the Division of Mining and Mineral Resources, under the supervision of Dr. David T. Day, chief of division. It shows that the aggregate value of the mineral products in 1901 amounted to \$1,092,224,380,

natural gas and all structural materials. The output of each mineral, with its value, is shown in the following table, the corresponding figures for 1900 being also given for purposes of comparison.

ELECTRIC FURNACE PRODUCTS AND THEIR POSSIBLE USES

A symposium on electro-chemistry and electro-metallurgy was recently held by the American Institute of Electrical Engineers. C. B. Jacobs discussed some of the remarkable products of the electric furnace, of which calcium carbide is the best known. He suggests that calcium carbide may attain greater importance as a reagent in manufacturing chemistry than in the production of acetylene. It is a powerful dehydrating agent and may come into extensive use for extracting moisture.

The silicides of calcium, barium and strontium are

Mineral Products of the United States in 1900 and 1901.

	1900.		1901.	
	Quantity.	Value.	Quantity.	Value.
METALLIC.				
Pig iron, spot value (long tons).....	13,789,242	\$259,944,000	15,878,354	\$242,174,000
Silver, coining value (troy ounces).....	57,647,000	74,533,495	59,653,788	77,126,382
Gold, coining value (troy ounces).....	3,829,897	79,171,000	3,880,578	80,218,800
Copper, value at New York City (pounds).....	606,117,166	98,494,039	597,443,212	86,629,266
Lead, value at New York City (short tons).....	270,824	23,561,688	270,700	23,280,200
Zinc, value at New York City (short tons).....	123,886	10,654,196	140,822	11,265,760
Quicksilver, value at San Francisco (flasks).....	28,317	1,302,586	29,727	1,382,305
Aluminum, value at Pittsburg (pounds).....	7,150,000	1,920,000	7,150,000	2,238,000
Antimony, value at San Francisco (short tons).....	4,226	837,896	2,649	542,020
Nickel, value at Philadelphia (pounds).....	9,715	3,886	6,700	3,551
Tin (pounds).....	(none.)	.....	(none.)	.....
Platinum, value (crude) at San Francisco (troy ounces).....	400	2,500	1,827	13,000
Total value of metallic products.....		\$550,425,286		\$524,873,284
NON-METALLIC (Spot Values).				
Fuels:				
Bituminous coal (short tons).....	212,513,912	\$221,133,513	225,607,649	\$236,201,899
Natural gas.....	51,221,353	85,757,851	60,242,560	112,504,020
Petroleum (barrels).....	63,362,704	75,752,691	69,389,194	86,417,335
Structural Materials:				
Brick clay.....	12,000,000	.....	13,800,000	.....
Cement (barrels).....	17,231,150	13,283,581	20,068,737	15,786,789
Stone.....	.....	44,321,345	.....	55,615,926
Abrasive Materials:				
Corundum and Emery (short tons).....	4,305	102,715	4,305	146,040
Garnet for abrasive purposes (short tons).....	3,185	123,475	4,444	158,100
Grindstones.....	.....	710,026	.....	580,703
Infusorial earth and Tripoli (short tons).....	3,615	24,207	4,020	52,950
Millstones.....	.....	32,858	.....	57,179
Oilstones, etc (pounds).....	.....	174,087	.....	158,300
Chemical Materials:				
Borax (pounds).....	Refined, tons. 1,602	170,036	Refined, tons. 5,344	697,307
	Crude tons. 24,235	848,215	Crude tons. 17,887	314,811
Bromine (pounds).....	521,444	140,790	552,043	154,572
Fluorspar (short tons).....	18,450	94,500	19,586	113,803
Gypsum (short tons).....	594,462	1,627,203	659,659	1,577,493
Marls (short tons).....	60,000	30,000	60,000	30,000
Phosphate rock (long tons).....	1,491,216	5,359,248	1,483,723	5,316,403
Pyrite (long tons).....	204,615	749,991	234,825	1,024,449
Salt (barrels).....	20,869,342	6,944,603	20,566,661	6,617,449
Sulphur (short tons).....	3,525	88,100	7,699	223,430
Pigments:				
Barytes, crude (short tons).....	67,680	188,089	49,070	157,844
Cobalt oxide (pounds).....	6,471	11,048	13,360	24,048
Mineral paints (short tons).....	72,222	881,363	61,460	789,962
Zinc white (short tons).....	48,840	3,667,210	38,889	3,111,120
Miscellaneous:				
Asbestos (short tons).....	1,054	16,310	747	13,498
Asphaltum (short tons).....	54,380	415,958	63,134	555,335
Bauxite (long tons).....	23,184	89,676	18,905	79,914
Chromic iron ore (long tons).....	140	1,400	368	5,790
Clay, all other than brick (long tons).....	.....	1,840,377	.....	2,591,332
Feldspar (short tons).....	21,353	173,659	34,741	220,422
Fibrous talc (short tons).....	63,500	499,500	69,200	483,600
Flint (short tons).....	32,495	86,352	34,420	149,297
Fuller's earth (short tons).....	9,698	67,535	10,967	80,697
Graphite (pounds).....	Crystalline, lbs. 5,507,855	197,579	Amorphous, tons. 3,967,612	167,714
	Amorphous, tons. 611	.....	Crystalline, lbs. 809	.....
Limestone for iron flux (long tons).....	7,495,435	4,500,000	8,540,168	4,659,836
Magnesite (short tons).....	2,252	19,333	13,172	43,057
Manganese ore (long tons).....	11,771	100,289	11,995	116,722
Mica (pounds).....	456,283	92,758	360,060	98,859
	Scrap, tons. 5,453	54,302	Scrap, tons. 2,165	19,719
Mineral waters (gallons sold).....	47,558,784	6,245,172	55,771,188	7,586,962
Monazite (pounds).....	908,000	48,805	748,736	59,262
Ozocerite, refined (pounds).....	(none.)	.....	(none.)	.....
Precious stones.....	233,170	.....	.....	289,050
Pumice stone (short tons).....	(none.)	.....	(none.)	.....
Rutile (pounds).....	300	1,300	44,275	5,710
Soapstone (short tons).....	27,943	383,541	28,643	424,888
Total value of non-metallic mineral products.....		\$512,983,035		\$566,351,096
Total value of metallic products.....		550,425,286		524,873,284
Estimated value of mineral products unspecified.....		1,000,000		1,000,000
Grand Total.....		\$1,064,408,321		\$1,092,224,380

which was the largest figure ever reached, notwithstanding notable decreases in the value of copper, pig iron and petroleum, as compared with the preceding year. In the case of pig iron, the production increased over 2,000,000 long tons, while the value decreased \$17,770,000. The value of the crude petroleum product of 1901 was \$9,300,000 less than that of 1900, although the output increased over 6,000,000 barrels. Copper production fell off 8,675,000 pounds in quantity, and \$11,865,000 in value. The most conspicuous increases were in the production of coal,

formed in the electric furnace at somewhat higher temperature than those required to produce the carbides. The silicides decompose with water and yield free hydrogen in a pure state.

It was said in the course of this discussion that these silicides promise to become important in the steel industries through their actions on sulphur and phosphorus. It is stated that an iron high in sulphur and phosphorus yielded by this treatment a steel from which the last traces of these elements were removed.

ST. MARY'S LEAD WORKS, CORNWALL, ENGLAND.

By W. RYAN LEWIS.

The rearrangement of the dressing plant at the Mary Ann Mine, Menheniot, Cornwall, England, was completed in July, 1901. The plant was erected to work and dress the burros or tailings of the Mary Ann Mine for the silver and lead contents. The mine was worked to a depth of over 300 fathoms or 1,800 feet. The lode at the deepest point in the mine is stated to be its richest part, but owing to the inclination of the lode from the shafts, which are perpendicular, cross-cutting proved costly and tedious, and work at the mine was abandoned. The antiquated machinery in use at that time also helped to close it down.

Lead ore to the value of over £900,000 was produced and sold during the working of the mine, the loss in the tailings owing to the crude system of

underneath the picking table to the rolls. The 0 to 20 millimeter stuff passes on to the cross-screen, which also acts as a conveyor, taking out the 15 to 20 millimeter material which also falls down to the rolls. The 0 to 15 millimeter stuff goes to the first jigger screen of 12 millimeters, where the first size for jiggling is rejected and delivered to the first jig. The four first jigs serve only as roughing jigs treating four sizes of material 15, 12, 10 and 8 millimeter material. The light slaty stuff is at once discarded and residue passes on to the first pair of crushing rolls for reduction down to 6 millimeters; and after elevating and passing the 6 millimeter guarantee screen it joins the other 6 millimeter stuff that had come down direct, and is delivered to the third double jig which takes 6 and 4 millimeter sizes for treatment. Here the first clean concentrates are obtained, while the middlings pass on to the second pair of rolls, are crushed, elevated, and pass through

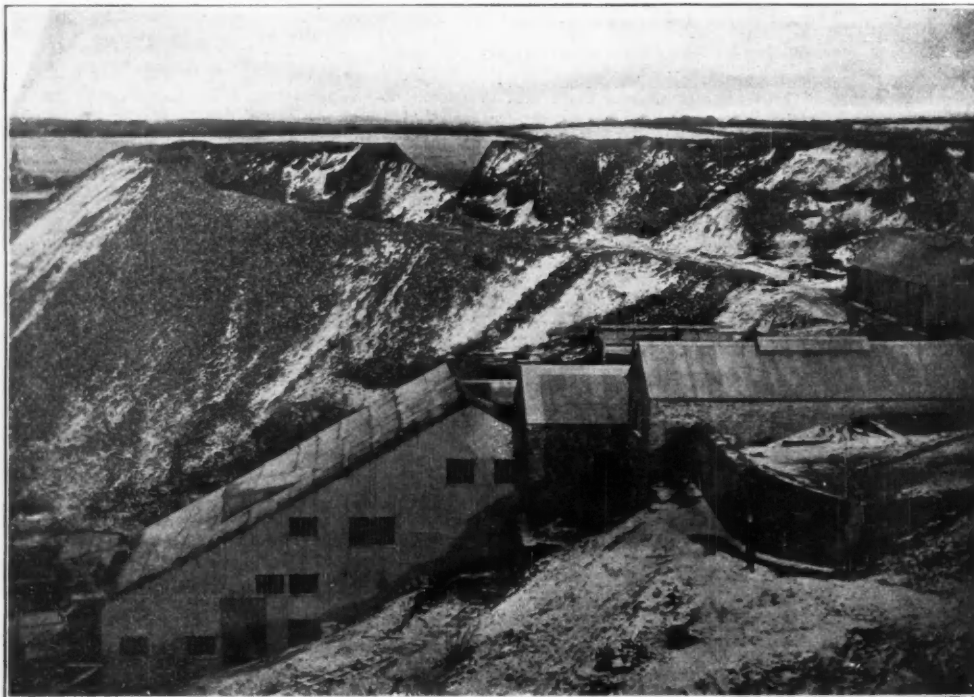
SOME NEW ROASTING FURNACES.

The design of mechanical roasting furnaces is one of the favorite ways in which metallurgical engineers exercise their inventive faculties; there are perhaps more patents taken out in this particular line than upon any other single type of furnace. Some of the recent American patents for roasting furnaces are summarized in the following paragraphs. It will be observed how difficult it appears to be in the case of the long reverberatories to get away from the slot and recessed chamber, which are the characteristic features of the Brown and Ropp furnaces, and have been the cause of a long and hard legal contest between the owners of those patents, which now appears to be approaching a final settlement.

Philip Argall has designed a reverberatory furnace, of which the hearth has a reciprocating movement, back and forth, whereby the ore is caused to move forward by the action of fixed rabblers extending across the hearth from side to side. The rabblers are arranged so as to be lifted mechanically out of the ore, so as not to interfere with the advance of the latter when the hearth makes the return movement. The hearth consists of tiling laid on transverse I-beams, which rest on a pair of inverted T-rails. The latter move on a series of car wheels, which are fixed in position, but are free to turn. The hearth is made longer than the furnace proper by the extent of the movement conferred upon it, which may be 10 to 30 feet; consequently, it projects alternately from one end or the other by that amount. The furnace may be of a length of 100 feet or upward. The drawings show a design in which the hearth has a movement of 25 feet, the rabblers being arranged 24 feet apart. The hearth is moved at intervals of 10 to 30 minutes, according to the character of the ore. (United States patent No. 653,202, July 10, 1900.) The mechanical details of this furnace have been well worked out, as would be expected of an engineer of the ability of its inventor. Among the advantages of this type of furnace is the removal of all working parts from the roasting chamber, except the rabblers, which are so arranged that they can easily be cooled by air or water. However, the furnace has not yet received a practical trial, by which alone its usefulness can be determined.

Joseph P. Cappeau has patented a modification of the Ropp furnace, in which the space beneath the hearth is entirely open, the furnace having the appearance of a long box supported by legs, the latter being of course the lateral buckstaves, or vertical posts of the steel framework, inside of which the masonry is built. The longitudinal slot in the middle of the hearth is arranged so that it is closed by a series of automatically operating gates, after the rake-carriage has passed. These gates, which are adjustable and regulate the admission air, are considered to be the essential feature of the invention (United States patent No. 691,112, January 14, 1902). This furnace has been used at the works of the Lanyon Zinc Company, at Iola, Kan.

Henry Carmichael has patented a revolving cylinder furnace, which consists of a brick-lined drum with a cast-iron extension of smaller diameter. The cast-iron extension passes through a fireplace, by which it is heated externally. The ore fed into the brick-lined drum burns there naturally at first, and finally passes over into the externally heated tube, where the roasting is completed. The air for oxidation of the ore enters through the discharge end of the tube. The brick-lined drum is 8 feet long and 2.5 feet in diameter; the cast-iron extension is 12 feet long and 1 foot in diameter, with an inclination of 1 inch in 3 feet. The drum and tube are turned five revolutions per minute (United States patents 676,417 and 676,418, both of June 18, 1901). This furnace has been used at the works of the Carmichael Reduction Company, at South Boston, Mass., for the oxidation of mispickel from Nova Scotia, burned for the recovery of arsenic from the fumes and of gold by chlorination of the residue. It will be understood from the above description that the fire-gases do not come in contact with the ore. The ca-



DRESSING PLANT, ST. MARY'S LEAD WORKS, CORNWALL, ENGLAND.

dressing then employed being estimated in value at 30 per cent of the above amount. The tailings average about 3 per cent of silver and lead, containing over 40 ounces of silver to the ton of ore.

The capacity of the plant is 75 tons per day of 10 hours, at which rate it will take 40 years' work to exhaust the heaps of tailings. The plant contains the following machines, etc.: 1 Galloway boiler; 1 hopper feed regulator; 1 stone breaker; 1 picking table; 1 shaking table; 2 pair of crushing rolls; 2 elevators; 12 trommels; 15 jigs (1 to 4 fitted with side delivery boxes); 1 60 horse-power Corliss valve engine; 6 saddle-back classifiers; 1 four-compartment spitzluten; 1 two-compartment spitzkasten; 1 Wilfley table; 2 Luhrig vanners; 2 pumps; 2 water tanks; 1 reservoir.

The plant as shown on the plan is divided into two sides, with the crushing and elevating gear in the center. The first side treats the debris from the burros, and the second side treats the middlings from the first side. The principle of the plant is good sizing and classification, each machine having its own size, and recrushing all the middlings, and treating them on separate machines. All the debris is screened below 2 inches before being dumped into the hopper, the reason being to get rid of the bulk of the waste stuff so as not to treat useless material.

The debris after being dumped into the hopper is fed to a shaking table by an automatic feed regulator; from the shaking table the debris goes to a trommell having 20 and 25 millimeter holes, which delivers all stuff over 25 millimeters to the picking table, where after hand picking it travels along to the stone breaker, and passing through the same falls down to the first pair of crushing rolls, having been joined by the 20 to 25 millimeter stuff which passes

a 4 millimeter guarantee screen and over the second series of jigs commencing at 4 millimeters down to ½ millimeter.

Clean concentrates are taken from the 4th, 5th, 6th, 7th, 8th and 9th jigs (first series) as well as from the first compartments of each of the second series of jigs, the middlings of which at present go to the second pair of rolls.

The first and second compartments of the spitzluten deliver to the Wilfley table, while the third and fourth to a Luhrig vanner, both compartments of the spitzkasten deliver to the second vanner.

It is proposed to put in a mill to crush the middlings below 4 millimeters down to 1 millimeter and under, then to elevate and pass the crushings to the spitzluten, also to take out the vanners and put in two rotary slime tables 16 feet in diameter; an extra Wilfley table may also be added. The debris consists of a very easy dressing material, most of it having been washed and hand-jigged by the old miners. The concentrates are sold direct to the smelters, and average about 75 per cent of lead and from 40 to 50 ounces of silver to the ton of ore.

In conclusion, I may say that this plant was the first modern dressing plant ever erected in Cornwall, and I believe that with modern machinery and modern and capable men to take charge, Cornish mining would have the same success as it did in years gone by.

BORING FOR COAL IN GERMANY.—A number of experimental borings for coal are being made near Lünen-Ludinghausen, Westphalia. In several instances the Coal Measures have already been reached, and arrangements have been made to open up a new coal-mining center.

capacity of a single drum and tube was said to be 1 to 1.5 tons of ore per 24 hours, but several tubes were arranged side by side in the same furnace.

Benjamin Hall has designed a furnace which may be considered as a modification of the Wethey, the stirring carriage traveling on rails outside of the furnace, but the slot through which the horizontal arms passes is water-sealed, instead of being closed by tripping gates. On each side of the hearth there is an iron water trough. The skewbacks of the arch are carried by cast-iron angle beams, bolted to the buckstaves, and from the bottom of the latter there is a vertical flange which dips into the water in the

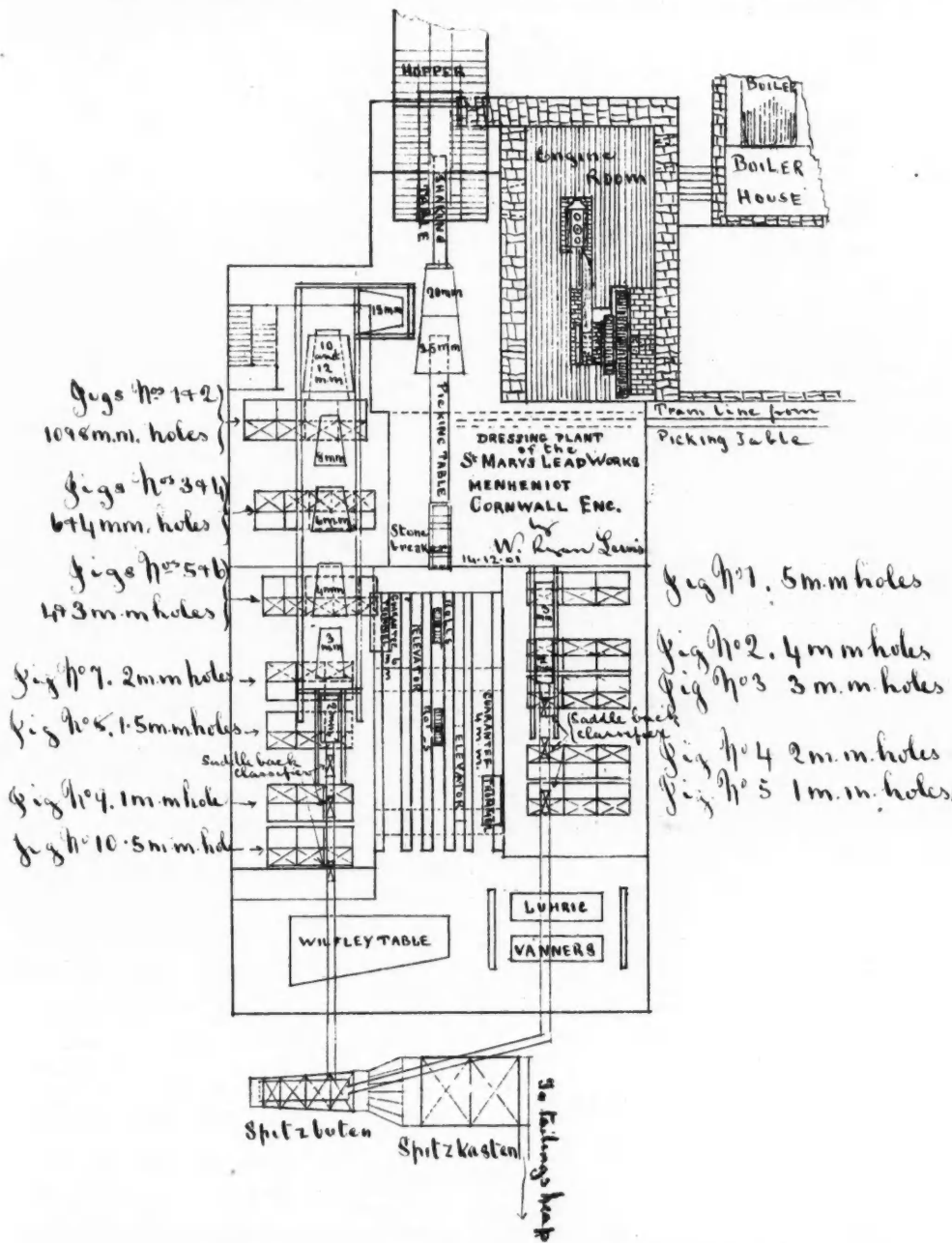
William A. Lorenz has patented a modification of the Ropp furnace, in which the roof of the roasting chamber is formed by a pair of arches, extending longitudinally side by side, with a slot arranged between the abutting skewbacks. The stirring carriage consequently travels over the furnace instead of through a tunnel beneath the hearth. (United States patent, No. 691,787 January 28, 1902.) This construction involves the suspension over the hearth of a pair of arches with a continuous longitudinal slot between them, which is a rather difficult arrangement, and one that is likely to be unsatisfactory.

Thomas D. Merton has patented a multiple-hearth

does not appear to be essentially different from that of the Haas furnace, which is used in Europe.

John Price Wetherill patented a muffle furnace, especially intended for blende roasting, which is designed on scientific principles, though it is very complicated in construction, and in its parts reminiscent of other well-known furnaces. The drawings show a long roasting chamber, in which the ore is moved forward by means of a continuously traveling rabble, the arms of which extend through slots in the sides, as in the Wethey furnace; the slots are closed by tripping gates in the same way. The roasting chamber, or muffle, is heated by flues above and below it, the gas which burns in the flues being supplied by producers arranged symmetrically along the sides of the furnace and the air for the secondary combustion being pre-heated by the waste gases in counter-current recuperators built under the furnace. The roasting chamber is also supplied with heated air, which is supplied at intervals in its length. The sulphurous gas is also led off at intervals. The arrangement of the furnace is such that the temperature can be closely controlled in its different parts, the roasting chamber being considered as consisting of an initial portion in which the ore is supplied with hot air and where the external combustion flues are maintained at a fairly high temperature, in order to raise the ore rapidly to a dull-red heat, an intermediate portion in which the desired temperature is afforded by the burning of the ore itself, and there is no necessity for so high a temperature in the external heating flues, and a final portion, wherein hot air is again admitted and the external combustion flues are raised to a high temperature in order to effect the difficult removal of the last of the sulphur. (United States patent No. 678,078, July 9, 1901.) The theory of this furnace is undoubtedly correct, as has been manifested by the experience with the Rhenania furnace of three superimposed muffles, wherein the combustion flues under the middle muffle have been omitted and are now made to pass only under the lowest and over the uppermost, and the recuperation of heat from the waste products of combustion is obviously scientific but hardly novel.

Lewis T. Wright has patented a modification of the Herreshoff-McDougall furnace, in which the spindle and stirring arms are cooled by the circulation of water through interior pipes. (United States patent No. 629,023, July 18, 1899.)



DRESSING PLANT, ST. MARY'S LEAD WORKS, CORNWALL.

trough. The ends of the horizontal rake-arm are bent down in U shape, so as to pass through the trough, under the downward projecting flange. The roasting chamber is thus sealed perfectly on the sides. (United States patent No. 677,510, July 2, 1901.)

Frederick W. Holtman has patented a modification of the Spence furnace, in which the rakes are moved to and fro by means of threaded shafts, one for each hearth, mounted horizontally outside of the furnace, on which nuts fastened to the arms carrying the teeth are set to travel. The direction of rotation of the shafts, which are driven by bevel-gearing from a vertical shaft, is reversed after each movement of the rakes. The rake arms come through slots in the side of the furnace, which slots are closed by long plates fixed to and moving with the rakes. (United States patent No. 664,153, December 18, 1900.)

furnace, in which the forward movement of the ore is effected by a series of revolving spindles, standing vertically, each of which has a rake arm on the plane of each hearth. The circles described by these arms intersect, but the arms themselves are arranged so as not to interfere with each other. The ore is therefore pushed forward in the arc of a circle by the first arm, when it is caught by the rotation of the next following arm and moved further forward, again in the arc of a circle, and so on. (United States patent No. 697,863, April 15, 1902.) The idea is practicable, but not new, having been advanced in one of the early patents of McDougall.

Utley Wedge has designed a turret furnace of the McDougall type, in which the roasting chambers are muffles, there being a combustion chamber beneath each hearth and a lateral fireplace. (United States patent No. 654,335, July 24, 1900.) The arrangement

MAGNETIC SEPARATION OF ZINC BLENDE AT DENVER, COLO.

The magnetic separation of zinc blende from mixed sulphide ores by means of the Wetherill machines, which has already been done with more or less success at Broken Hill, N. S. W., is now being carried out as a regular process by the Colorado Zinc Company, at Denver, Colo. This company erected a mill on the site of the old Bailey smelting works at South Denver, and is treating ore from Leadville, Colo. The ore is first broken by means of a Gates crusher, and is then reduced by rolls to 30 mesh size. This product is distributed among eight Wilfley tables, which separate it into galena-pyrites and pyrites-blende classes. The latter is dried and is then passed over the Wetherill magnetic machines, of which there are two, each having three magnets. These produce a blende product, assaying about 50 per cent Zn, 10 to 12 Fe and 1 per cent Pb, which is sold to zinc smelters, and a pyrites product, containing some lead and about 5 to 7 per cent Zn, which is united with the galena-pyrite heads from the Wilfley tables, the mixture being sold to the lead smelters, for whom it is a desirable ore, the excess of iron being high and content being due chiefly to ferrous sulphide combined chemically with the zinc sulphide, to which fact indeed is due the ability to separate the blende, a percentage of iron in the latter making it susceptible to the intense effect of the Wetherill magnets, while pyrite and galena are not. The capacity of the zinc mill at Denver is about 40 to 45 tons of crude ore per day.

PRODUCTION OF ABRASIVE MATERIALS IN 1901*

The natural abrasive materials produced in the United States consist of oilstones and whetstones, grindstones, pulpstones, millstones, pumice, infusorial earth, crystalline quartz, garnet, corundum, and emery. The supply of oilstones and whetstones is obtained from Arkansas, Indiana, Ohio, New York, Vermont and New Hampshire. The production in 1901 was valued at \$158,300 against \$174,087 in 1900. Grindstones are obtained almost entirely from Ohio and Michigan. Pulpstones (used for grinding wood pulp for paper making) are made from a "Berea grit" quarry at Tippecanoe, Ohio. The production of grindstones and pulpstones in 1901 was valued at \$580,703, a decrease from \$710,026 in 1900.

Millstones to the value of \$57,179, were made in 1901, from a quartz conglomerate rock quarried in Ulster County, New York; Lancaster County, Pennsylvania, and Montgomery County, Virginia. In 1900 the output was valued at \$32,858. The production in 1901 was the largest in 13 years.

Pumice, or volcanic ash, is found in Nebraska, South Dakota, and Utah, but the exploitation of the deposits has not been successful owing to the distance from the large markets and the inability to compete with that imported from Sicily. Infusorial earth occurs in a number of States, but the production is not of much importance. Including a so-called "tripoli" (a porous siliceous rock) from Newton County, Missouri, the output in 1901 amounting to 4,000 short tons, worth \$52,950.

Crystalline quartz, used chiefly as a wood-filler but also as an abrasive in the stone-cutting trade and in the manufacture of sandpaper, was produced in Connecticut, the output amounting to 14,050 short tons, valued at \$41,500.

Abrasive garnet is produced in Warren and Essex counties, New York; in Litchfield County, Connecticut; in Chester and Delaware counties, Pennsylvania, and at several localities in North Carolina. It is used in the manufacture of grinding wheels and "garnet paper," a superior quality of sandpaper. The product in 1901 was 4,444 short tons, valued at \$158,100, as compared with 3,185 short tons, worth \$123,475 in 1900.

Corundum occurs in a narrow belt extending from Tallapoosa County in Eastern Central Alabama, to Trenton, New Jersey, and also along the same line in New York, Connecticut, Massachusetts, New Hampshire and Maine. The Corundum Hill Mine, which was the only producer in 1901 of corundum from deposits occurring in this belt, is located about eight miles southeast of Franklin, Macon County, North Carolina. Corundum is known to occur in many other localities in the Eastern States. Within the last few years a deposit of corundum of a commercial quantity for abrasive purposes has been found in the south central part of Gallatin County, Montana, on the headwaters of the Elk Creek, and it is expected that this Montana corundum will be placed on the market before the close of 1902.

Corundum and emery are put upon the market in the three forms—as grains of powder, as emery paper and as wheels and blocks of various shapes and sizes. The total amount of emery and corundum produced in the United States in 1901 was 4,305 short tons, valued at \$146,040, as compared with 4,305 short tons, valued at \$102,715 in 1900.

Artificial Abrasives.—The experiments in producing artificial abrasives that have been in progress during the last fifteen years have met with success, and there are now three artificial abrasives on the market—carborundum, crushed steel and artificial corundum. Carborundum is produced by the Carborundum Company at Niagara Falls, and in 1901 the total production of carborundum was 3,838,175 pounds, valued at from 8 to 10 cents per pound, as compared with 2,401,000 pounds in 1900. Carborundum is now used to a certain extent as a general abrasive. Crushed steel is used in the stone-cutting trade, particularly by the marble and granite cutters.

*Joseph Hyde Pratt in *Mineral Resources of the United States*, 1901.

The production of crushed steel by the Pittsburg Crushed Steel Company in 1901 amounted to 690,000 pounds, being 10,000 pounds less than the production of 1900. A new industry has been started in the manufacture of artificial corundum. The Norton Emery Wheel Company has erected a plant at Niagara Falls for the manufacture of artificial corundum, and already two or three carloads of the material have been manufactured and made into wheels, etc., which are reported as giving good satisfaction.

THE LAKE SUPERIOR TRAFFIC

The movement of traffic to and from Lake Superior in July passed all records. The official report gives the total freight passing through the canals at the Sault Ste. Marie during the month at 5,082,398 short tons. From the opening of navigation up to August 1 the total movement is given in the accompanying table. As last year traffic was diminished by a late opening of navigation and other causes, we give the movement for three years, in order to make a full comparison. The figures are in short tons:

	1900.	1901.	1902.
Eastbound freight.....	10,069,802	9,350,923	13,886,984
Westbound freight.....	2,705,444	2,197,269	2,681,915
Totals	12,775,246	11,548,192	16,568,899

The increase this year over 1901 was 5,020,707 tons, or 43.5 per cent; over 1900 it was 3,773,653 tons, or 29.6 per cent. The items of mineral freight included in the totals for two years have been as follows, in net tons, with the exception of salt, which is given in barrels.

	1901.	1902.	Changes.
Anthracite	274,698	105,228	D. 169,470
Bituminous	1,640,096	2,197,418	I. 557,322
Total coal.....	1,914,794	2,302,646	I. 387,852
Iron ore.....	7,685,808	11,594,239	I. 3,908,431
Pig and manuf. iron....	60,187	72,260	I. 12,073
Copper	38,508	54,362	I. 15,854
Building stone.....	15,280	20,081	I. 4,801
Salt, barrels.....	216,659	251,021	I. 34,362

The total number of vessels passed through the locks this season was 11,029. It seems now quite probable that the freight movement to and from Lake Superior will reach the great total of 35,000,000 tons for the season.

GERMAN CHEMICAL INDUSTRY.—The London *Engineer* says, that notwithstanding the general depression in trade in Germany, the chemical industry has suffered little. The number of establishments has increased from 6,911 in 1900 to 7,169 in 1901, and the number of hands employed from 143,119 to 153,011. The average dividends of 121 chemical companies for the past ten years has not been lower than 11.29 per cent, and has not exceeded 13.52 per cent.

ABSTRACTS OF OFFICIAL REPORTS.

Waihi Gold Mining Company, New Zealand.

This company's report covers the year ending December 31, 1901. The mine is the most important and successful in New Zealand. The capital stock is £500,000 in £1 shares; 495,907 shares have been issued.

The report shows that 159,925 tons, dry weight, of ore were taken out during the year. Of this 95,829 tons were treated by dry crushing and 63,496 tons by wet crushing. The average duty per stamp per day was 1.96 tons. The developments during the year are estimated at 230,910 tons of ore; the total ore in sight at the close of the year was 628,595 tons.

The yield from the ore treated, including sulphide concentrates, was 98,029 ounces gold and 407,055 ounces silver, an average of 0.61 ounce gold and 2.55 ounces silver per ton. The average extraction, according to assay, was 84.3 per cent of the gold and 59.0 per cent of the silver, equivalent to 81.3 per cent of the total value. The total return was equivalent to \$14.13 per ton, and the costs to \$7.07, showing a net return of \$7.06 per ton. The directors' report says:

"During the year 159,325 tons of ore were treated, producing £461,205. This amount, together with £3,606 and sundry other receipts, makes a total gross revenue for the year £464,811. The expenditure in New Zealand and London, including development work in the mine, amounted to £232,331, leaving a profit for the year of £232,480. This sum, added to the balance of £30,850 brought forward from last year, gives a total of £263,330. Out of this the directors have paid £1,918 for various special expenses in connection with the labor dispute, issue of new capital, etc.; they have written off £7,524, paid on account of the conversion of the Victoria Mill from dry to wet crushing, and £9,962 for depreciation of plant and machinery. Dividends paid were 10s. per share, amounting to £166,426; in addition the sum of £30,000 has been carried to reserve account, raising this account to £100,000, the balance remaining to the credit of revenue account December 31, 1901, being £31,650.

"In addition to the amount spent upon the conversion of part of the Victoria Mill from dry to wet crushing, which has been charged to revenue account, there has been expended during the year upon additional plant, buildings and machinery, tramways, etc., £9,019, which sum has been charged to capital account. The expenditure in the mine upon development work of £15,311 has been charged to revenue account; that upon the sinking and equipment of the various shafts, amounting to £16,180, has been charged to capital account.

"At a general meeting of shareholders held in January, 1902, resolutions were passed for the acquisition of the property previously held by the Union-Waihi Company. This included the Union-Waihi and Silverton mines (containing a mining area of 428 acres), hoisting works, a 40-stamp mill, water rights, tramway, stores, etc. The total expenditure on capital account at the end of the year, including the purchase of property, was £481,483, and as the amount received and to be received upon shares, including premium, is £580,489, there remained a balance on capital account on December 31 of £99,006.

"The developments in the mine during the year have been favorable and in some parts attended with remarkable results. At the fifth level (which is 90 feet below No. 4) the Martha lode has now been explored for a distance of about 1,300 feet, between the crosscut at No. 2 shaft and the eastern end of the level, and the lode has been found by comparison larger and richer than for the corresponding distance at No. 4 level overhead. The sixth level (110 feet below No. 5) is now being opened. The northwest crosscut from No. 2 shaft has been driven for 375 feet from No. 2 shaft, and the superintendent, Mr. H. P. Barry, reports that the reefs are larger than ever, and what is even more important, the greater portion consists of first-class ore. The work in other parts of the mine has developed quantities of ore of good quality, and so has largely increased the ore reserves.

"The new 100 stamps were started on wet crushing early in the year, but, as frequently happens in new works on a new process, various alterations and modifications have been suggested, and it is expected that further improvements will be effected in the treatment and extraction, and also in the working costs. The 40-stamp mill acquired by the purchase of the Union-Waihi property is being improved in condition, and a tramway to carry locomotives is being built to connect the mill with the Waihi Mine. The mill will be employed on ore from the Waihi section of the company's mines. The addition of 40 stamps will increase the milling power to 330 stamps. This increased stamping power should in the current year reduce a much larger tonnage of ore for treatment than in 1901. Moreover, for the first six months of 1901 the average yield from the mills amounted to £32,127 per month; the latter half of the year gave an average monthly yield of £41,298, which has been maintained up to the present; there is no reason for anticipating a diminished return. The outlook for 1902, therefore, points to an increase upon the returns of the past year."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Meteorite Studies. By Dr. Oliver Cummings Farrington. Chicago; the Field Columbian Museum. Pages, 44; illustrated.

United States Geological Survey. Production of Magnesite in 1901. By Joseph Struthers. Washington; Government Printing Office. Pamphlet, 4 pages.

Lights and Fog Signals on the Atlantic and Gulf Coasts of the United States. Prepared for the United States Light-house Board. Washington; Government Printing Office. Pages, 240; with maps and 31 plates.

The Quarry Industry in Southeastern New York. By Edwin C. Eckel. Reprinted from *Twentieth Report of the State Geologist.* Albany, N. Y.; University of the State of New York. Pages, 40; illustrated. Price, 15 cents.

BOOKS REVIEWED.

Geological Survey of New Jersey. Annual Report for 1901. Henry B. Kümmel, State Geologist. Trenton, N. J.; State Printers. Pages, 208; with maps and plates.

The Geological Survey of New Jersey has issued a number of excellent and valuable reports in the past; and though the greater part of its work has been completed, its yearly volume still contains much good material. The present report devotes a good deal of space to questions relating to the water supply of the State—a very important subject, the consideration of which has for several years past been specially charged upon the Survey. The water supply papers in the present volume are on Artesian Wells, by Lewis Woolman; and on Chlorine in Natural Waters, by William S. Myers. In addition to these papers and the administrative report showing the work accomplished by the Survey during the year, there is an interesting paper on the Rocks of the Green Pond Mountain Region by Henry B. Kümmel and Stuart Weller. The State Geologist also gives a summary of the work done in the mines during the year. This included a very active period for the iron and zinc mines, while a good deal of exploration and testing work was done in several of the old copper mines of the State.

Maryland Geological Survey. Volume IV. William Bullock Clark, State Geologist, Baltimore; the Johns Hopkins Press. Pages, 524; illustrated.

This volume, which is the fourth issued by the Maryland Survey, after a very brief general introduction, consists of three parts. The first is entitled "Paleozoic Appalachia, or the History of Maryland during Paleozoic Times," is by Bailey Willis, and is a contribution to the study of the physical changes which have taken place over a wide area of which Maryland is a part. It is a valuable summary of the geological history of the Appalachian section of the State as recorded in the mechanical characteristics of the rocks.

Part II is the second report on the Highways of Maryland, and was prepared by Harry F. Reid and A. N. Johnson. It covers the operations of the Highway Division of the Survey, showing the work which has been carried on in the improvement of roads, and in testing and preparing road material. It is of much interest in showing how extensive permanent improvements of roads can be made by the proper use of materials now within reach, without additional cost to counties and towns. The report of the roads engineer of Baltimore County, which is appended, is a lesson in the practical application of the work done by this division.

The third part is a report on the Clays of Maryland, by Heinrich Ries. This is valuable on account of the careful study of the special characteristics of the clays of the State, and also on account of the high reputation of Dr. Ries as a clay expert. The

first part of his report is a discussion of the properties of clays, the effects of their chemical and physical composition, and the methods of counteracting the bad qualities found. The second part is taken up by a careful study of the principal clay deposits of the State and numerous tests of samples taken from clay banks in all parts of Maryland. This shows that the State possesses very valuable resources in its clays; and that their abundance and general nearness to transportation facilities make them a basis for the development of important industries. This part of the work has a special practical value, which ought to be generally appreciated.

CORRESPONDENCE.

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

Josephine County, Oregon.

SIR: We see a letter in your paper July 19, page 85, from W. M. Courtis. The item is "A New Metal," and gives this as coming from Idaho. He says it is called "Josephinite," and because it is found in Josephine County. Now, while we have the kindest feeling for our sister State, we must object—without proper legislation—to have Josephine County, with its rich mines, transferred to Idaho from Oregon. Kindly make this correction, for Josephine County is in Southern Oregon, and is a very rich county in minerals, agriculture and timber.

PONNAY BROTHERS & DAVIS.

PORTLAND, Oregon, July 25, 1902.

The Passing of the Miners' Union.

SIR:—I am not one of those who believe in superstitious coincidences. If there is any truth in the assertion that history repeats itself, we may be sure it does so upon the inexorable lines that like causes produce like effects. On the 1st of August, 1877, ten thousand miners assembled in the Round Woods, on the west side of Scranton, just in sight of the Oxford breaker, which started up work last week. They were asked by their leader on that day to hold up their hands and vow to heaven that until they won the strike in which they were engaged no man would return to work. They did so, every man, with the enthusiasm born of the conviction that they were in sight of the promised land. A week later all these men were at work without gaining a single concession. Two days after this mass meeting on the Round Woods common occurred the memorable riot in this city which discredited unionism in the anthracite coal regions during the better part of a quarter of a century. Twenty-five years later, to the day, the miners assembled on the same spot, almost under identical conditions, to hear President Mitchell address them, and, strangely and perhaps fatalistically, he called upon the strikers to repeat the ceremony of the holding up of hands which his predecessor, now dead, or forgotten, little thought was the nunc dimittis of a strike which lasted six months, and which created a reign of terror in Northeastern Pennsylvania that was a disgrace to civilization.

Many of those who gathered around President Mitchell recalled the incident of a generation ago with a pessimistic premonition, which they discussed openly and not a little sadly. Mr. Mitchell's speech did not do much to dispell their forebodings. It was a spiritless affair, feeble, discursive and poorly delivered. Mr. Mitchell is not what is termed a good speaker at best, and on this day he seemed to be so impressed with the gravity and responsibility of his position that he appeared almost to bend under it. He came there, he said, to find out, what every one else knew to be a fact, whether the report that the Scranton miners were getting tired of the strike was true. Of course, he discovered that it was not so, although, to do him justice, he rather insinuated his incredulity that such should be the case than declared his conviction that it was not so. He had only

to look over his shoulder and see the Oxford breaker in full blast. It is not necessary to follow Mr. Mitchell in his gloomy predictions of the consequences that will ensue if the strike fails, or of the wholly unwarrantable assertion that the operators either drove or induced the miners' little boys and girls into the breakers and the mills. If Mr. Mitchell knew as much about the sociological conditions of life among the miners of the anthracite regions as he should know before declaiming against men who are as humane as himself, he would have made some allowance for the incessant importunities with which breaker bosses, mine foremen and mine superintendents were assailed by the parents of lads to place them on the pay roll when the majority of them should certainly be at school and some of them in the cradle. The employment of these children was a moral and physical outrage. But the breaker boy is practically an occupation of the past, and in a year or two will be only a reminiscence. The mule driver, too, is doomed. Their disappearance from the occupations in which they were engaged will be a social and economic blessing to their parents, to the operators, and, above all, to themselves. Machinery in the breaker and electric traction in the mines are an assured and essential evolution of the times.

It is another no less strange and probably no less significant coincidence that the two men who were shot in the riot of 1877 were either part of or spectators of the mob who were bent upon burning down all the breakers in the vicinity of Scranton. The Bellevue washery was destroyed by an incendiary fire at the very moment when Mr. Mitchell was bidding the assemblage on the Round Woods to be of good cheer. The Bellevue washery will be rebuilt immediately, and worked as soon as it is built. The act shows how little the men who fired it and those who sympathize with them realize the obloquy which they are bringing upon their cause and its leaders. It is easier to understand the motives of the incendiaries than it is to explain why Mr. Mitchell should have selected the anniversary of the collapse of the most notable strike that ever took place in the anthracite coal fields as the day for inaugurating his stump tour. The president of the United Mine Workers' Union seems to have lost both heart and head during these closing days of the strike. In the same breath he tells the miners to make the best of the pittance which they have received or will receive, and to abstain as far as possible from seeking it at all, on the presumption that the majority of them are well off.

Mitchell declared at the same time and place that if the strike was lost the operators would reduce the wages of the miners to recoup their immense unproductive expenditure during the time.

I am not in the secrets of the operators; neither, it may be confidently asserted, is President Mitchell. But it may be safely assumed that the operators will not for the balance of the year disturb the scale which was in vogue at the beginning of the strike. The financial loss involved in the strike must be ultimately borne by the public. That patient ass must bear the burden, and in many respects he deserves to bear it. Since strikes became rampant in this country popular opinion has seemingly passed into a state of hibernation. It has taken more interest in outlaw Tracy's murderous escapades and the indisposition of a foreign ruler than it has in ascertaining the rights and wrongs of this strike. The dominating feature of American journalism is a shrinking of arguing issues as primary concrete facts in which labor troubles are involved, or, what amounts to the same thing, of impartially analyzing these issues as they arise. The operators are told that they should either work the mines or come to terms with the miners. The strike was, in a measure, welcomed. It was not, of course, expected at the outset that it would last more than ten weeks. District President Nicholls thought that the miners would win hands down in that time, and upon that calculation, as the instigator and in a large measure the author, of this strike, he based his calculations of succession to the presidency of the miners' union. The opera-

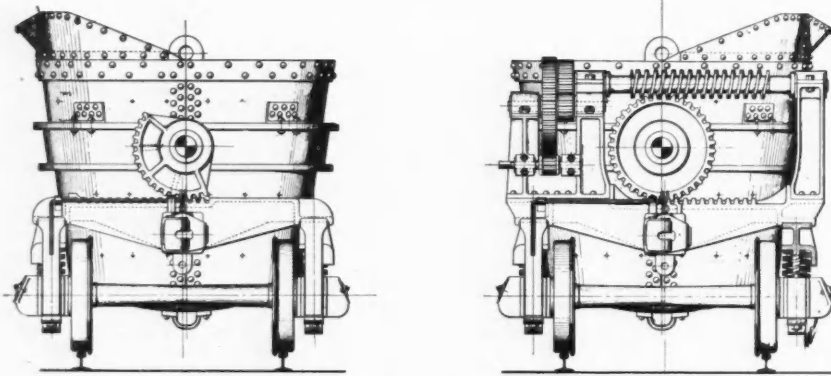
tors would not have gone to the extreme length to which they determined to go were they not fully informed of Mitchell's intention of resigning and of Nicholl's determination to succeed him.

With Nicholls as president of the union there would be no peace, no matter what arrangements or contracts were entered into. The man has an agreeable, insinuating personality, but he has no executive ability. He imagines that what, according to his lights, should be must be. He has no comprehension of the interacting forces that bind society together. Back of all this, of course, is his own personal ambition and his place and reputation as a paid agitator, which are at least correlative to his interest in the advancement of the miners' wages and the shortening of their hours of labor.

The curse of the Miners' Union in the anthracite regions was the utter selfishness of its fundamental

it is true, worked longer hours, but if the miner helped to load his coal as efficiently and industriously as the so-called laborer helped him to cut it, the average time worked between them would hardly amount to four hours.

The most intolerable oppression of the union was, however, exercised against people who were in no way connected with it. The paper of the unfortunate editor who had the hardihood to express a dissident opinion upon any subject which had the seal of approval of the union was boycotted, his property ruined, and himself sent adrift to face the world with empty hands. If he hoped to survive he had to convert his editorial columns into a joss house for the worship of the cult of Mitchellism. And the natural effect of all this is the efflorescence of lying, hypocrisy and sycophancy in newspapers, which has had no parallel since journalism began to exercise



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YOUNGSTOWN, OHIO, U.S.A.
MAY, 1902.

principles. I am writing of it in the past tense, because I do not think it can or will survive the end of the strike, and that has virtually ended. According to the creed of the union, the operator was a mere paymaster, with no interest in them or they in him. The various locals were small, inquisitorial centers and tax collecting bureaus. They neither entertained or debated schemes of philanthropic or social amity, not to speak of education or associative purposes of fellowship. There was no room among them for the interplay of independent thought or action or sentiment. Three years ago, when the union was formed in the anthracite coal regions, it was, broadly speaking, an oligarchy. After the first strike it became an autocracy. John Mitchell became a demigod, not only among the miners, but among those dependent upon the miners.

It is common to all unions that while the members relinquish their individual rights to make the best of their own powers, they insist that others shall not exercise that fundamental prerogative of citizenship—the social and moral obligation of the worker to make the most of his opportunities on his own responsibility. The union laborer is becoming more and more a conscript, and in such a body as the United Mine Workers' Union he can only escape the banal thralldom of conscription by relinquishing his calling, deporting himself elsewhere, and adapting himself to other conditions, when that is possible, which is very rarely indeed the case. The unionist is industriously taught that this implacable organization is necessary for his preservation against the aggression and oppression of the trusts. I believe myself that to a certain extent that is so. But the miners' union has not been fighting the trusts, if there is a coal trust. It waged war upon the operators because it was confident at the beginning of a successful issue. The action of the union was in no sense regulated or dictated by a policy of defense. The demand for an eight-hour day was an unmitigated farce. The average working day of the miner was not more, and was probably less, than five hours. The laborer,

an appreciable influence on the affairs of men. The storekeeper who dealt with or was accused of dealing with a "scab" found his occupation gone unless he was a man of substance, who could stand the storm. To gain a certain advantage, no matter by what means or by what cruelty, has been always regarded by the union as a good political defense.

There never has been such a strike as this in the history of the world. It has been a trial of strength, of endurance, of incandescent enthusiasm, of flaring hopes and of disappointments. If ever a man was necessary to a cause Mitchell is indispensable to the cohesion of the miners' union. This is attributable to a psychological cause, or series of causes, which it is not necessary to explain here. Mr. Mitchell at the Rounds Woods publicly declared his intention of retiring from the presidency of the union after the strike is over. Quite possibly the union in the anthracite region will exist in a comatose state for some time. But unless its principles are radically transformed it will fall asunder. HISTORICUS.

SCRANTON, Pa., August 12, 1902.

QUESTIONS AND ANSWERS.

(Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.)

Bismuth and Uranium Ores.—Who are buyers of these ores in quantities?—M. L. P.

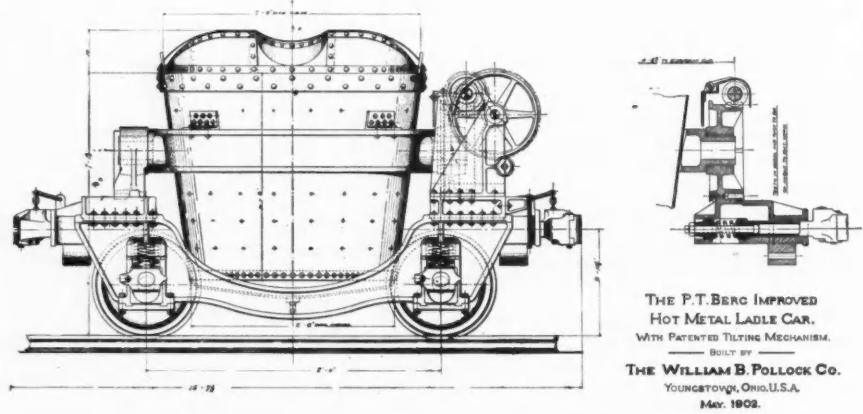
Answer.—In further answer to this question—which was published in this column June 28 and August 9—Herr Paul Speier, whose address is "Ernststrasse 1, Postamt II, Breslau, Germany," informs us that he is a buyer of both descriptions of ores.

Producers of Fluorspar.—Will you please inform me who are the principal producers of fluorspar in the United States?—H. S. M.

Answer.—The principal producers of fluorspar in this country are the Rosiclaire Lead and Fluorspar Mines, Rosiclaire, Ill.; Eagle Fluorspar Company, Salem, Ky.; Kentucky Fluorspar Company, Marion, Ky.

Copper Mines of the World.—Can you tell me where I can get information on the mining methods followed in the large copper mines of the world: Rio Tinto, Mount Lyell, American mines and especially those of Mexico? I suppose much of the literature on the subject consists of scattered articles.—F. W. S.

Answer.—You are correct in saying that the detailed information relating to the important copper mines of the world exists largely in scattered reports and papers, and is difficult to find. You can, however, get much general information in relation to those mines from works on mining; such as Dr. Le



THE P.T. BERG IMPROVED
HOT METAL LADLE CAR.
WITH PATENTED TILTING MECHANISM.
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Neve Foster's *Treatise on Ore and Stone Mining*, and others.

Baryta, or Barium Oxide.—Will you kindly give me the names of parties manufacturing baryta (BaO), anhydrous or hydrated, of commercial purity?—H. A. H.

Answer.—With regard to this question, which was answered in this column July 12 last, E. de Haen writes that his chemical works at List, near Hannover, Germany, manufacture barium oxide on a large scale.

Bismuth and Uranium Ores.—Will you kindly give me the names of the parties who deal in bismuth and uranium ores, and whether they are in this country or in Europe?—M. L. P.

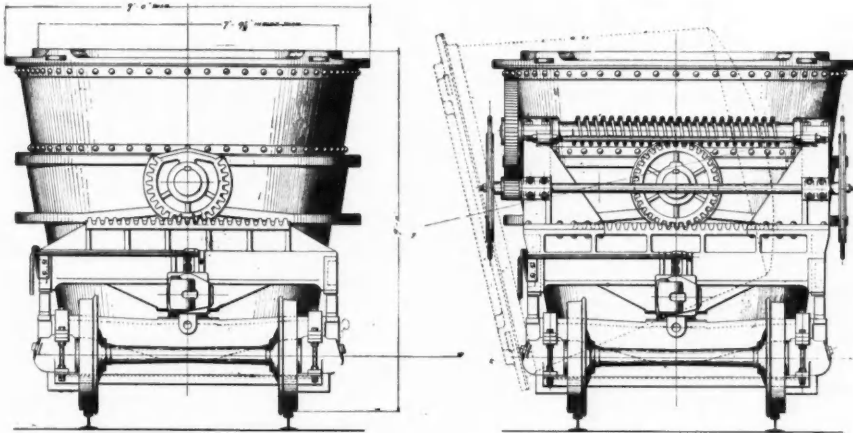
Answer.—In further answer to this question, which was published in this column June 28 last, we are informed that E. de Haen, List, near Hannover, Germany, is a large buyer of both bismuth and uranium ores, which are consumed in his works.

IMPROVED HOT METAL AND CINDER CARS.

The William B. Pollock Company, of Youngstown, Ohio, builder of blast furnaces and steel works, is offering for sale an improved hot metal and cinder car, which has been designed by Mr. P. T. Berg, of the Carnegie Steel Company. The designer's practical knowledge of cars of this type, gained from a long experience, has enabled him to design a car uniformly strong and durable in all parts, the idea being to strengthen those parts which had a tendency to break down under continuous service or from sudden and unexpected strains or shocks.

The cinder car is shown by Figs. 3 and 4, and is similar in design to the hot-metal cars, the same idea being carried out in this as to the interlocking frame, which is sufficiently rigid to relieve the ladle or trunnion ring from any outward pressure. The idea of the trunnion ring being for the support of the ladle only, and from which it can be easily and quickly removed. All parts of the car are made of steel, with the exception of the boxes, brasses and trunnion ring. The worm is cut from a solid steel forging, and the tipping of the ladle is accomplished in the same way as that of the metal car.

The car is of standard gauge and equipped with



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JULY 1902.

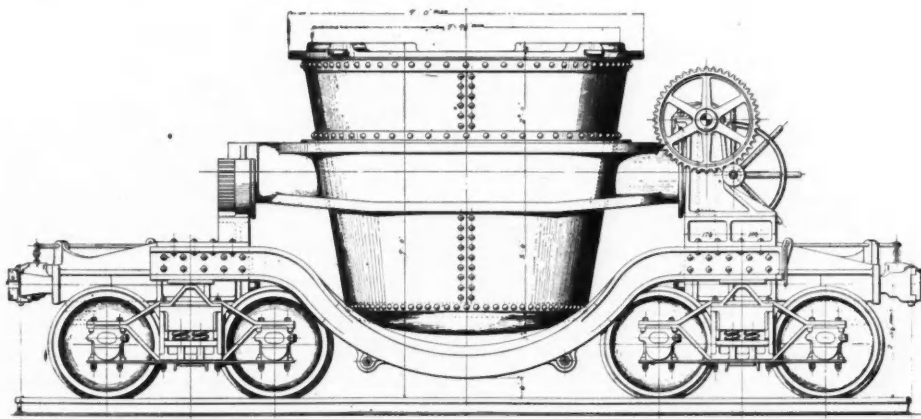
A brief description only can be given of the cars here, but Figs. 1 and 2 will indicate the general construction of the hot-metal car. The frame, trunnion ring and gears are of steel, and the side pieces or truck beams are interlocked with the end pieces or buffer casting, and then riveted so as to make it practically as solid and rigid as if cast in one solid casting.

The trunnion ring is made to revolve and travel to the side of the car simultaneously for pouring by steel

M. C. B. boxes and brasses and automatic couplers, but, unlike the hot-metal cars, has double truck with four wheels to each truck.

The ladle has a capacity of 200 cubic feet and is furnished with a patent cast-iron lining.

The William B. Pollock Company has the exclusive sale and manufacture of both of the above cars, and from the favorable reports of them from steel and furnace superintendents, the indications are that they will have a ready and large sale.



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gears and pinions driven by a steel worm cut from a solid forging. These gears, pinions, and worm are so arranged that the ladle can be easily turned over by one man, the use of the steel worm locking the ladle in any position.

The car is of standard gauge, equipped with M. C. B. boxes and brasses and automatic coupler. The ladle has a carrying capacity of 20 tons of molten metal, with an ample allowance of 15 to 20 per cent for curves, grades, sculls, etc. The ladle is carried within the trunnion ring, which relieves it from all external thrusts and prevents the natural tendency of ladle to flatten.

PRODUCTION OF ALUM IN THE UNITED STATES.—According to the Census report, there were 13 concerns engaged in the manufacture of alum in the United States in 1900. They made 3,290 tons (\$102,308) of ammonia alum, 7,100 tons (\$215,004) of potash alum, 8,014 tons (\$403,100) of burnt alum, 51,508 tons (\$1,062,547) of concentrated alum, also known as aluminum sulphate; 2,024 tons (\$34,047) of alum cake, and 17,796 tons (\$629,570) of other alums. The total make was therefore 89,734 tons, valued at \$2,446,576. For this purpose there was consumed 34,000 tons (\$230,000) of bauxite, 5,000 tons (\$110,000) of cryolite, 2,000 tons (\$4,100

of salt cake and niter cake, 360 tons (\$21,900) of ammonium sulphate, 477 tons (\$19,600) of potassium sulphate, and 61,424 tons of sulphuric acid. In making the acid there was used 3,323 tons (\$66,000) of brimstone, 49,081 tons (\$107,000) of pyrites, and 513 tons (\$18,000) of sodium nitrate. The statistics of alum production are reported in tons of 2,000 pounds, and the values are for the product at the works. Of the 13 works engaged in the business, six are in Pennsylvania, three in Massachusetts and the remaining four in Illinois, New York and Michigan.

PATENTS RELATING TO MINING AND METALLURGY

UNITED STATES.

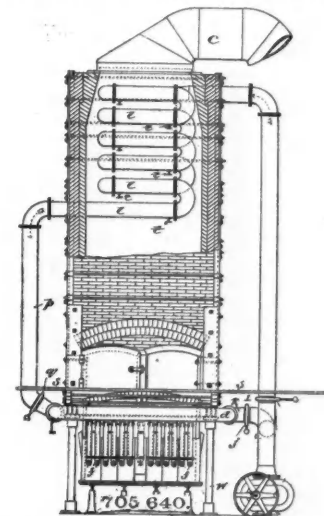
The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon receipt of 25 cents.

Week Ending July 29, 1902.

705,565. OIL-FUEL GENERATOR.—William H. Dye, Indianapolis Ind., assignor of one-half to John M. Wharton, Indianapolis, Ind. An oil-fuel generator including a steam-chamber, and a water-and-oil chamber into which the steam-chamber extends for heating the contents thereof, the outlet from the water-and-oil chamber being at a higher point than the steam-chamber, whereby the water will envelop the steam-chamber and support the oil above and out of contact with the steam-chamber.

705,589. APPARATUS FOR PRECIPITATING GOLD AND SILVER FROM THEIR SOLUTIONS.—Alfred James, London, England. A metallurgical filter for separating precious metal from a solution containing said metal consisting of an iron vessel cast in one piece having an integral partition at one end thereof extending to a point near the bottom, said vessel and partition being provided with an inner coating of enamel, an extension at the top of said vessel opposite said partition forming a chamber, and a spout leading from said chamber.

705,640. HOT-BLAST FURNACE.—Edward T. Bradford, Denver, Col.; Mary C. C. Bradford, administratrix of said Edward T. Bradford, deceased, assignor to Standard Smelter Company, Denver, Col., a corporation of Colorado. A hot-blast furnace, provided with blast-heating pipes, located

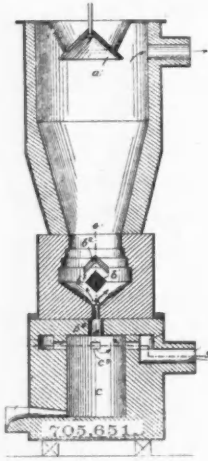


within the furnace and arranged to conduct the blast from the upper and cooler to the lower and hotter portions of said pipes, and tuyeres connected to the hotter end of said heating-pipes, a portion of said heating-pipes consisting of pairs of horizontal pipe-sections supported on transverse supports, said pairs being arranged in zigzag order, so as to economize space and more effectually intercept the rising products of combustion, and a series of U-sections secured to the said straight pipe-sections to complete the system.

705,650. ARTIFICIAL STONE.—Valentin Conti, George de Geofroy and Georges le Gall du Terte, Paris, France. An artificial stone, cement or similar product, consisting of the following elements combined in substantially the weight proportions named: Sulphate of aluminum, 15 parts; pulverized kieselguhr, 15 parts; calcinated magnesia, 50 parts; chloride of magnesium, 25 parts; sulphate of magnesium, 75 parts, and inert matter to give the required density and specific gravity.

705,651. REDUCTION OF METALS FROM THEIR ORES, ETC., IN ELECTRICALLY-HEATED FURNACES.—Ramon C. Contardo, Sevres, France. A process of obtaining metal direct from the ore consisting in subjecting the lower end of a descending column of ore to a high temperature by a voltaic arc not in physical contact with the ore, and simultaneously causing a current of heated reducing-gas to flow upwardly through the column of ore.

705,669. LIQUID-SEPARATOR.—Sophus C. Hauberg, Copenhagen, Denmark. In a separator, in combination, a two-part outer drum, an inner conical plate, and conical partitions attached to said plate, the lower margin of the said plate being clamped between the upper and lower parts of the drum.



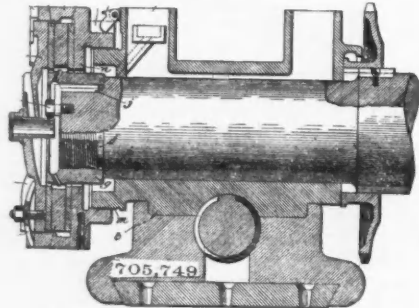
705,681. PROCESS OF MAKING THE INTERIOR OF COKE-OVENS OR OTHER KILNS TIGHT.—Rudolph Kuhn, Bruch, Germany. A process of making the interior of coke-ovens and other kilns tight which consists in mixing fine ore-dust with fine-ground ashes or other dusty material and then blowing the mixture into the hot chamber, the walls or sides of which are intended to be tightened, the effect being that the dust will keep floating for a while and then settle by degrees in the pores and cracks and thereby make the walls perfectly tight.

705,721. APPARATUS FOR CASTING INGOTS IN CONTINUOUS LONG LENGTHS.—Johan O. E. Trotz, Worcester, Mass. The combination of a jacket and hollow heads, the latter fastened to the ends of said jackets and having supply and discharge pipes, also having separate openings to receive and hold the ends of the ingot-mold with said ingot-mold, the latter held rigid at the upper end, fitted loose at its lower end, and whose inner surface is polished straight and smooth, and a funnel, said funnel having a downward extension into the ingot-mold.

705,727. METHOD OF TREATING METALLIC OXIDES IN THE PRODUCTION OF METALS AND ALLOYS.—Frederick C. Weber, Chicago, Ill. A method of treating metallic oxides with aluminum in the production of metals, metalloids and alloys and their compounds which consists in subjecting the entire charge, comprising aluminum in admixture with a metallic oxide reducible by aluminum to a drying and preparatory treatment by heat, whereby the charge is brought into a condition for reaction by eliminating all the moisture, rendering the charge wholly anhydrous, and thereafter subjecting the mixture to a temperature sufficient to effect reaction.

705,761. ORE-BIN.—George H. Hulett, Cleveland, Ohio. In a bin for handling ore and similar material, the combination with a body having one inclined side and an opening in its opposite side, and a shelf or projection extending out beyond the opening, of a plunger adapted to move toward the opening and force the material in said bin through said opening.

705,749. CORNISH-ROLL.—Albert J. Gates, Chicago, Ill., assignor to Allis-Chalmers Company, Jersey City, N. J., a corporation of New Jersey. In a Cornish roll, the combination of a shaft, a thrust-collar secured thereto at or



near one end thereof, a ring-nut in engagement with the journal-box of the shaft and means for holding the thrust-collar rotatably in engagement with the ring-nut to take up the thrust thereof, whereby as such ring-nut is rotated and moved inwardly and outwardly the thrust-collar is likewise moved, carrying with it the shaft and roll.

705,791. PORTABLE DRILLING-MACHINE.—James Rourke, Parkersburg, W. Va. The combination of a frame, a crank-shaft mounted upon said frame, a band-wheel mounted upon said crank-shaft, a sprocket-wheel also mounted upon said shaft, of a bull-wheel shaft, a sprocket-wheel carried by said bull-wheel shaft, one of the gudgeons of said bull-wheel shaft being mounted in one side of said

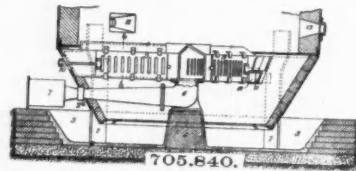
frame, the other gudgeon being mounted in a post, one side of said frame being of lesser length than the other, to permit the mounting of the bull-wheel in close proximity to the ground and enable the same to spool the requisite amount of cable for deep drilling.

705,796. DISINTEGRATOR.—Edgar R. Sutcliffe, Leeds, England, assignor to one-half to Fred Speakman, Leigh, England. In a disintegrator and in combination, a fixed casing having a feed-inlet and a discharge, a revoluble grinding-chamber having circumferential openings and fan-blades fixed around and outside of the circumferential openings and revolving with the grinding-chamber, whereby the ground material is drawn from the chamber into the casing and ejected from the latter.

705,803. ASPHALTIC PAVING MIXTURE OR COMPOSITION.—Walter S. Wilkinson, Baltimore, Md., and Charles H. Burchinal, Pittsburg, Pa. A bituminous paving or pavement mixture or composition wherein the body material is crushed rock or sand, said mixture or composition containing a small percentage of comminuted copper in amount not exceeding 3 per cent. of the body material, and a bituminous cement.

705,822. BLAST OR OTHER FURNACE.—Ellery F. Coffin, Muirkirk, Md., assignor of one-fourth to Charles E. Coffin, Muirkirk, Md. An improvement in the art of operating furnaces requiring a blast of air, consisting in drying the air by passing an electric current through it and then forcing the dried air into the furnace.

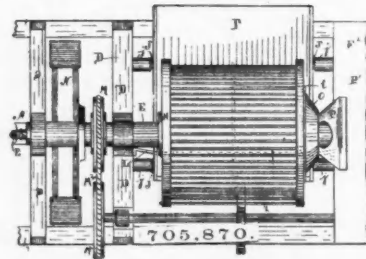
705,840. GAS PRODUCER.—James A. Herrick, Johnstown, Pa. The combination of the body of a gas-producer, having an ash-hopper at the base of the same, with a box structure projecting into the ash-hopper from the sides of the same, said tuyere-box structure being located above the bottom of the hopper so as to provide a sealing-body of ashes in the hopper below the tuyere-box structure, the lat-



erally-extending portions of the structure having openings therein for the escape of air into the mass of ashes surrounding the same, and the bottom of the hopper being some distance above the ash-supporting bed or platform whereby access to the body of ashes at all points between said ash-supporting bed and the bottom of the hopper is permitted.

705,845. AMMONIA-SEPARATOR.—Victor Johnson, St. Louis, Mo. In an ammonia-separator, a trap adapted to be incorporated into the ammonia-pipe, said trap comprising a horizontal spherical body cored to form the inlet-opening, and the outlet-opening and a branch outlet-opening extending downwardly half-way between the openings; a baffle-wall extending downwardly and backwardly immediately inside of the opening; a baffle-wall extending upwardly and forwardly immediately in front of the opening, a receptacle connected to the outlet, and a pipe running from the receptacle and communicating with the ammonia-pipe.

705,870. CRUSHING AND PULVERIZING MILL.—John F. Sanders, Boise, Idaho. In a crushing and pulverizing mill, the combination of a rotatable cylinder or drum, longitudinal bars set apart to leave spaces or interstices between them and forming the body of the cylinder or drum, supporting-heads one at each end of the cylinder or drum each head having a circular groove open to its periphery or rim and receiving the end of the bars, a continuous circumferential hoop or band for each head circumscribing the head and the ends of the bars for retaining the bars in place, a rotatable tubular shaft on which the cylinder or drum is mounted, holes or perforations in the shaft within the cylin-



der or drum, a pipe leading into the shaft for supplying water thereto and discharging the water into the interior of the cylinder or drum through the holes or perforations, an amalgamating-plate located beneath the cylinder or drum, a cam-wheel engaging the end of the amalgamating-plate, a shaft on which the cam-wheel is mounted, and a power connection between the shaft of the cam-wheel and the tubular shaft for revolving the cylinder or drum and reciprocating the amalgamating-plate from a common source of power.

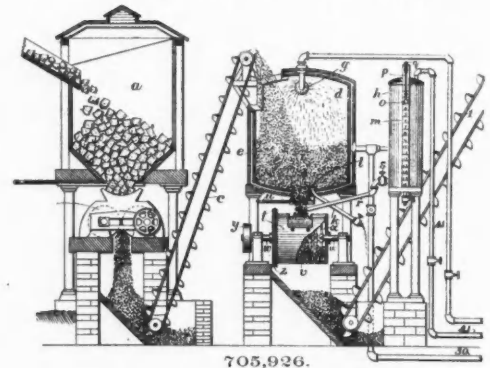
705,904. DESULPHURIZING OF SULPHIDE ORES PREPARATORY TO SMELTING.—Archibald D. Carmichael, Broken Hill, New South Wales, Australia. A

process of treating mixed sulphide ores, which consists in mixing with said ores a sulphur compound of a metal of the alkaline earths, starting the reaction by heating the same, thereby oxidizing the sulphide and reducing the sulphur compound of the alkali metal, passing a current of air to oxidize the reduced sulphur compound of the metal of the alkalies preparatory to acting upon a new charge of sulphide ores.

705,906. RETORT FOR WOOD DISTILLATION.—William B. Chapman, Boyne City, Mich. A retort made of a series of separate plates, said plates being bent or corrugated in direction transverse to the longitudinal axis of the retort.

705,910. EARTH OR ROCK DRILL.—Ferdinand H. Dannhardt, South Yarra, near Melbourne, Victoria, Australia, assignor of two-thirds to Melrose Mailer, North Carlton, near Melbourne, Victoria, Australia. In a rock drill, a cutter or tool carrier, laterally-operating sliding bolts arranged therein, a key-plate having pairs of oppositely and vertically extending inclined surfaces, the inclined surfaces of each pair being substantially parallel to one another, the said pairs of inclined surfaces adapted to alternately operate the said bolts laterally in opposite directions, and a weight connected to said key-plate.

705,926. CONTINUOUS PROCESS OF COKING COAL.—Joseph Hemingway, Chicago, Ill., assignor of three-fourths to Curtis Joel Rothermel, Springvalley, Minn., and William Edwin Rothermel, Chicago, Ill. A continuous process of making metallurgical coke, which consists in pulverizing



bituminous or semi-bituminous coal, mixing it with about 4 per cent of water and about 10 per cent. of coal-tar, charging the coke-ovens with said mixture, and distilling it.

705,938. PAINT.—William Lennard-Foote, Brooklyn, N. Y. A composition of matter, consisting of talc, kaolin, silice, dissolved rubber, zinc oxide, diluted hydrofluoric acid and silicate of soda.

705,956. COMPOSITION FOR CLEANING AND PRESERVING METALS.—William C. Oberwalder, New York, N. Y. A composition of matter for cleaning and preserving the polish of metals, said composition consisting in an abrasive material, sulphate of soda, borax, pulverized camphor, and a soapy substance combined.

705,997. COMBINATION MINER'S TOOL.—Martin Hardsocg, Ottumwa, Iowa, assignor of one-half to Lester C. Hardsocg, Ottumwa, Iowa. A miner's combination-tool comprising a tubular stem, a tubular funnel-shaped cleaner on one end of said stem and a tamping-head on the opposite end of said stem, said tamping-head mounted eccentrically on said stem and notched radially for straddling a miner's needle when in use.

705,978. REGENERATIVE FURNACE.—Francis H. Treat, Pittsburg, Pa. A regenerative furnace having air and gas regenerators on each side thereof, reversing-valves on opposite sides of the furnace, and a flue leading from one regenerator on each side to the reversing valve on the side opposite the said regenerator.

GREAT BRITAIN.

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

Week Ending July 3, 1902.

15,250 of 1901. IRON PRECIPITATION.—E. P. Peyton, Birmingham. Precipitating iron from waste pickling liquor by blowing in ammonia, and then roasting the precipitate to produce a rouge.

19,623 of 1901. MINE CAGE.—J. Stringer, Wakefield. Improved safety appliance for pit cages.

1,428 of 1902. ROCK DRILL.—F. Eisenbeis and F. Garely, Saarbrücken, Germany. Rock drill mounts for regulating the feed and adjustment.

6,197 of 1902. BLAST VALVE.—A. K. Reese, Lebanon, Pa., U. S. A. An improved valve for admitting the blast to blast furnaces, and for regulating the temperature of the blast.

7,661 of 1902. ELECTROLYSIS OF LEAD SALTS.—A. G. Betts, Lansingburg, N. Y., U. S. A. Use of fluosilicic acid as a solvent for lead in the electrolysis of its salts, so producing a less spongy deposit.

PERSONAL.

Mr. Ernest Bamberger, of the Daly West Mine, Park City, Utah, is on a trip to Baker City, Ore.

Mr. Victor M. Clement, of Salt Lake, Utah, recently returned from Mexico and is now on a hunting trip in Idaho.

Mr. Thomas Collins, clerk of the Calumet & Arizona Mine, Bisbee, Ariz., is at Calumet, Mich., for a month's visit.

Mr. John Dern, president of the Consolidated Mercury Company, has left Salt Lake, Utah, for a trip to the Pacific coast.

Mr. C. W. Whitley has assumed his duties as manager of the American Smelting and Refining Company's Utah plants.

Mr. John Stanton, of New York, recently inspected the mines under his management in the Lake Superior copper district.

Mr. W. J. Boardman, of Buchanan, Mich., has been examining mining properties near Encampment, Wyo., in which he is interested.

Mr. Robert McCart, Jr., of Fort Worth, Texas, has been stopping at Breckenridge, Colo., looking over the placer mining operations in that district.

Mr. B. Crowell, of the firm of Crowell & Peck, Cleveland, O., is on a 3 weeks' trip, examining mining properties in the Lake Superior region.

Mr. O. W. Kennedy, general superintendent of the Frick coke interests, has returned to Uniontown, Pa., from the Pocahontas District in West Virginia.

Mr. R. B. Brinsmade, mining engineer, of St. Louis, Mo., recently arrived in New York City from an extended professional trip in the Argentine Republic.

Mr. Alvin Phillips, of Denver, Colo., has been appointed consulting and directing engineer for the Henson Creek Lead Mines Company, Lake City, Colo.

Mr. S. I. Hallett, manager of the Silver Lakes Mining Company, Silverton, Colo., recently returned after an examination of mining property in southern Santa Fe County, N. M.

Mr. H. J. Masters has resigned as superintendent of the United States Slate Quarry, Bangor, Pa., to accept a similar position with the Eureka Slate Company, Kelsey, Cal.

Mr. David Campbell, captain of last year's Harvard football team, is now employed at the United States Company's smelter, near Bingham, Utah, as a machinist's helper.

Mr. William Gray, of London, England, has been appointed manager of the Velvet Mine at Rossland, B. C. He passed through New York City this week en route to Rossland.

Mr. Todd C. Woodworth, superintendent of the experimental plant on the Calumet & Hecla tailings at Lake Linden, Mich., has returned from a visit of several weeks in Boston, Mass.

Mr. Wm. Roslington, traveling representative of the firm of F. W. Braun & Co., dealers in assayers' supplies, of Los Angeles, Cal., is at present making a business trip through Colorado.

Mr. Alberto Piazzini will act as superintendent of the Zaragoza Mine, in the Diente District, Mexico, recently purchased by the Guggenheim Exploration Company from his father, Mr. Calixto Piazzini.

Mr. Solon J. Vlasto, a well-known New York City importer of minerals, is returning from a business and pleasure trip through France, Germany, Greece and Turkey. He is due in New York City on August 20.

Dr. A. H. Elftman, manager of the Wabuse Mining Company's property in Silverton, Colo., recently returned from a 2 weeks' business trip at the main office in Minneapolis, Minn., and immediately departed for Los Angeles, Cal.

Dr. F. M. Simonds and Mr. E. Z. Burns, of the firm of Simonds & Wainwright, mining engineers of New York City, have just returned from a professional trip in New Brunswick, and are now engaged in examining iron properties and furnaces in Pennsylvania.

Mr. S. H. C. Miner, president of the Granby Consolidated Mining, Smelting and Power Company, Limited, visited Phoenix, B. C., last week on his annual trip of inspection of the company's mines. He was accompanied by Mr. J. P. Graves, the general manager, and Mr. A. C. Flumerfelt, assistant to the manager.

Mr. Newton W. Emmens, mining engineer of Pittsburgh, Pa., has gone to inspect the West Penn and Amador & Eldorado gold mines in Amador County, and the Scott River Placer mines in Siskiyou County, Cal.; the Ethel, John D. and adjacent properties in the Index District of Washington, and the Bald Butte Mine in Montana. The inspection is made in the interests of Pittsburgh men.

SOCIETIES AND TECHNICAL SCHOOLS.

DEURY COLLEGE.—This college at Springfield, Mo., in its catalogue for 1902 gives information regarding the various courses of study, the necessary expenses of students, etc. The scientific department offers instruction in modern languages, chemistry, mathematics, physics, surveying, mineralogy, geology, and biology. The total number of students enrolled in the college proper last year was 106, those in the academy connected with the college, 208. The college is co-educational.

PURDUE UNIVERSITY.—The following appointments to the faculty have recently been made: J. R. McColl to be associate professor of thermodynamics, and Fritz B. Ernst to be instructor in car and locomotive design. Prof. McColl is a graduate of the department of mechanical engineering, Michigan Agricultural College, Class of '90, and has done work as a graduate student both in that institution and at Cornell University. In 1892 he was placed in charge of the department of mechanical engineering of the University of Tennessee at Knoxville, and for 10 years has devoted himself to its development. Mr. Ernst is a graduate of the department of civil engineering of Purdue University, class of 1900, and since graduating has been a member of the editorial staff of the *Railway Age*, of Chicago, in which position he has had much to do with certain phases of railway design.

SOCIETY OF CHEMICAL INDUSTRY.—The 21st annual meeting was held in the Arts Theater of University College, Liverpool, England, on Wednesday, July 9. Dr. Joseph W. Swan occupied the chair in the absence, through illness, of Mr. Ivan Levinstein, the president of the society. The members of the society were heartily welcomed by the principal of University College, Mr. A. W. W. Dale. Chairman Swan announced that upon his election to the chairmanship of the London Section Mr. Walter F. Reid had resigned as vice-president, and Mr. Marston T. B. Gart, of New York, had been elected to fill the vacancy.

The society gained during the year more than 150 members, and now has a total of 3,790. There is a tendency for members to come from abroad, from the Colonies, from America, and other foreign countries, and applications for membership from such sources is testimony to the value of the society and the work it is doing. Mention should be made here of the society's *Journal*, which is published twice a month, and contains synopses of articles, papers, etc., on the chemical and allied industries.

On July 10 and 11 excursions were made to works and places of local interest, among which were the plants of the United Alkali Company and the Ditton Works of the Broughton Copper Company. Everywhere the visitors were well entertained, and credit is due the leaders of the various parties, who were untiring in their efforts to please their colleagues.

The next meeting will be held at Bradford, and in 1904 the society will visit New York City.

INDUSTRIAL NOTES.

The Sterling Company, of Chicago, Ill., is figuring on some contracts for water tube boilers for shipment to South Africa.

The Rand Drill Company, of New York City, is reported to have secured a large contract for air drills for shipment to Johannesburg.

The Joseph Dixon Crucible Company, of Jersey City, is reported to have received a large contract for graphite, etc., for the Australian market.

The William Powell Company, of Cincinnati, O., has received an order for a large number of valves to go to the shops of the Trans-Siberian railway.

Arthur Koppel, of New York City, is reported to have received several fair-sized contracts for structural material, etc., for the South African market.

The Chicago House-Wrecking Company, of Chicago, Ill., is reported about to ship a stone-crushing plant, comprising automatic engines, fire-box boilers and portable crusher.

For the Susquehanna Iron and Steel Company's new plant, at Columbia, Pa., the Pittsburg Gage and Supply Company, of Pittsburg, will furnish 3 250-h.p. water tube boilers.

The American Machinery and Export Company, of New York City, has received a contract for machine tools for the new shops of the Wellington & Manaroa Railroad, Wellington, New Zealand.

The National Tube Company exported through Eastern seaboard points 2,121 tons of iron pipe in July. Europe took nearly 1,500 tons, while 355 tons went to Chinese and Japanese ports.

The Allis-Chalmers Company has secured a contract for 2 500-h.p. compound engines for shipment to South America. The engines are being built at the Edward P. Allis shops, at Milwaukee, Wis.

The Burt Manufacturing Company, of Akron, O.,

has furnished 2 very large Cross oil filters to the United States Steel Corporation for the works at Youngstown, O., making 108 now in use by this corporation.

Luther Brothers' Company, of Milwaukee, Wis., recently closed a contract with the Carborundum Company, of Niagara Falls, N. Y., for the exclusive use of its carborundum diamond wheel on the former's hand-power grinders.

During July the daily average of cars built at the plants of the Pressed Steel Car Company, of Pittsburgh, Pa., amounted to 103, which broke all previous records. If the cars produced in the month were coupled together they would make a train 20 miles long.

The Heine Safety Boiler Company, of St. Louis, Mo., has recently taken orders for boiler equipment to be installed in the plants of the Kioto Traction Company, Kioto, Japan, and the Great Boulder Gold Mining Company, Limited, of Great Boulder, West Australia.

T. A. Budd, 610 Elliott Square, Buffalo, N. Y., the manufacturers' agent, who is well known in engineering circles in Western New York, has been appointed sole agent for Western New York for the We-Fu-Go and Scaife water-softening and purifying systems, which are manufactured only by William B. Scaife & Sons' Co., of Pittsburg, Pa.

The Otis Elevator Company, of New York City, has received an order from the Manhattan Railway Company for 4 heavy electric passenger elevators equipped with magnet-controlling devices, to be installed in the new station at 110th street, near Eighth avenue. Each of these elevators will have a maximum lifting capacity of 3,300 lbs. and a speed of 300 ft. per minute.

The new crucible steel plant of the Jessop Steel Company, at Washington, Pa., is nearly completed. The annual capacity will be about 10,000 gross tons of fine crucible steel. No bars will be rolled, but the concern will import Jessop bars from the works in England. William Jessop is president; Sydney J. Robinson, vice-president, and James Jessop, secretary and treasurer.

The Calcasieu Iron Works and Mill Supply Company, Limited, has been organized at Lake Charles, La., with a capital stock of \$20,000. The company will have boiler works, foundry and machine shops and a mill supply store. The officers are A. McKinnon, president and manager; F. W. Hansen, vice-president; H. McKinnon, secretary, and L. A. Goudeau, treasurer.

The Batopilas Mining Company, of Batopilas, Mexico, is reported to have placed a large contract for gasoline-driven machinery, including a gasoline motor, for mine haulage, with the Weber Gas and Gasoline Engine Company. The Weber Gas and Gasoline Engine Company of Kansas City, has lately secured a contract for 6 gasoline engines, to be shipped to Sydney, Australia.

The Crescent Portland Cement Company, of Wampum, Pa., organized to succeed the National Cement Company, has installed new machinery and increased the output to 500 bbls. per day. The company has \$100,000 capital stock and is composed of W. J. Prendice, president; R. M. Hughes, New Castle, secretary, and George W. Hackett, Beaver, treasurer. The other directors are C. M. Hughes and Judge H. Wilson.

The American Steel and Wire Company exported through New York, Philadelphia and Baltimore over 6,000 tons of wire and wire nails during July. Of wire, 4,323 tons were sent out. Australia was the largest buyer, taking 1,444 tons. South America took 1,381 tons. The nail exports were chiefly to Great Britain and the Far East, Great Britain taking 703 tons. To China and Japan 521 tons went forward.

Westinghouse, Church, Kerr & Company announce the removal of their New York office from the Havemeyer Building, 26 Cortlandt street, New York City, to the Maritime Building, Nos. 8 to 10 Bridge street, near Bowling Green. The change is the result of a largely increased business. The firm will use 3 floors—the first, second and third. The new quarters will afford about double the floor space available in their present location.

The Clearfield Steel and Iron Company recently formed by Charles and H. L. W. Hyde, of Hyde Brothers & Co., Pittsburg, Pa., has awarded contracts for puddling furnaces and rail re-rolling mills. The plant will be at Clearfield, Pa., and the company expects to begin operations within 3 or 4 months. It is the intention to erect 24 puddling furnaces with a capacity of 50 tons of iron. It is also the intention to re-roll steel rails, the capacity being about 50 tons a day.

The American Shipbuilding Company, of Cleveland, O., has taken an order for a steel steamer to be built for the Estate of Captain Mack and others. The vessel will be almost a duplicate of the steamer "William S. Mack," turned out last fall. She will be 374 ft. keel, 48 ft. beam, 28 ft. deep, with triple expansion engines, and steam being furnished by 2 Scotch boilers. The draft will be natural. This makes a total

of 26 vessels under orders for 1903 delivery by the American Shipbuilding Company.

The C. O. Bartlett & Snow Company, Cleveland, O., manufacturing conveying machinery, has moved to a block bounded by French, German, Fall and Winter streets, having purchased the property from the Viaduct Turning Company and the Klosterman-Young Company. A side-track from the Big Four Railroad has been laid through the main building, and a lot of new equipment, including an Ingersoll-Sergeant compressor, has been installed. The company is preparing to use coal dust as fuel, believing that it thus can save 30 per cent in fuel.

The United States Realty and Construction Company, recently formed with \$66,000,000 of capital stock, half of which is 6 per cent cumulative preferred, is to take over all the real estate, contracts and other property of the George A. Fuller Company, all the real estate and other assets of the Alliance Realty Company and the New York Realty Corporations, also the real estate interests of the Central Realty, Bond and Trust Company. The new company will conduct building operations in all parts of the country, and will have, it is said, \$11,000,000 of working capital.

The plant of the Troy Steel Company, on Breaker Island, near Troy, N. Y., was sold at auction on August 7 to satisfy a judgment obtained by the Guarantee Trust Company of New York, as trustee of the bondholders. The property included the mortgaged premises and all property rights, interests and franchises controlled. A. F. Donovan, of St. Louis, Mo., was the successful bidder at \$525,000. The company had a capital of \$2,000,000, and was backed principally by the Wetherbees, of Port Henry. H. H. Rogers and J. P. Morgan are supposed to have an interest in the plant.

The Weimer Machine Works Company, of Lebanon, Pa., is building the following liquid cinder cars of 200 cu. ft. capacity: Lackawanna Steel Company, Buffalo, N. Y., 10 cars, steam dump; Colorado Fuel and Iron Company, Pueblo, Colo., 20 cars, hand dump; Crucible Steel Company of America, Pittsburg, Pa., 6 cars, hand dump; Copper Queen Consolidated Mining Company, Douglas, Ariz., 7 cars; Lake Superior Power Company, Sault Ste. Marie, Ont., 3 cars, hand dump; National Tube Company, Wheeling, W. Va., 2 cars, hand dump; Carnegie Steel Company, Braddock, Pa., 10 cars, hand dump.

A general strike of structural iron workers in the employ of the American Bridge Company was ordered August 13 in sympathy with the strikers in Philadelphia. The International Association of Bridge and Structural Iron Workers settled wage scales with the bridge combine for one year on May 1 at all points except at Philadelphia. The company was given until to-day to concede the terms, but failed, and the strike order followed. The members of the union in Chicago, Pittsburg, Wheeling and New York City will be affected. In the Pittsburg district, which extends for a radius of 130 miles from the city, except Wheeling, about 1,000 union men are affected.

Final details in the sale of the Bethlehem Steel Company to the United States Shipbuilding Company have been completed. It is understood that for the payment of \$7,000,000 in cash to J. P. Morgan & Company, C. M. Schwab again secured control of the Bethlehem Steel Company, and then turned it over to the United States Shipbuilding Company for \$10,000,000 of collateral trust certificates of the latter company, \$8,000,000 of its preferred stock and \$8,000,000 of its common stock. To permit the acquisition of the Bethlehem Steel Company, the capital stock of the Ship Trust has been increased from \$25,000,000 to \$45,000,000.

TRADE CATALOGUES.

The C. W. Hunt Company, West New Brighton, Staten Island, N. Y., calls attention by circulars to its "Stevadore" rope for power transmission. The company keeps in stock all sizes of this rope, up to and including 1½-in. diameter.

The Buffalo Forge Company, of Buffalo, N. Y., has issued a new edition of its neat little illustrated pamphlet describing the Buffalo improved ventilator. This ventilator is designed for all kinds of buildings, theaters, hotels, hospitals, factories, mills, etc. The pamphlet will be mailed upon application to the company.

The Novelty Iron Works, of Dubuque, Ia., issues circulars describing its products, notably the Dubuque well-drilling machine. In this machine the frames are made of selected dry oak, with all joints secured by bolts, while the tools are of the best quality of iron and steel. The Novelty Iron Works builds portable gasoline engines for light power purposes and also makes castings and wrought iron work for country bridges.

A 52-page pamphlet issued by the American Steel and Wire Company, of Chicago, New York, Denver and San Francisco, entitled "Electrical Tables," contains 25 pages of tables and other information of value to electricians and users of wires for electrical purposes. The tables are neatly printed and easily read. The

pamphlet also contains a long list of the various products of the American Steel and Wire Company, such as wires, wire rope, springs, nails, wire fencing, etc.

The Peerless Automatic Stoker Company, of New York City, issues a little pamphlet of 24 pages calling attention to the merits of the company's stoker. This stoker has an endless chain bar grate, to which coal is fed from a hopper. It can be applied to any furnace with but slight and inexpensive changes in the firebox. Some merits claimed for it are perfect combustion of fuel, permitting the use of poor coal without smoke; regularity of action, freedom from derangement, low cost of operation, low first cost and a saving of from 15 to 30 per cent of the cost of steam production. Results of tests at large power plants and at a well-known technical school are given.

The Cassel Automatic Water Wheel Company, of Seattle, Wash., issues an illustrated pamphlet of 78 pages describing the Cassell self-governing wheel. This wheel differs from others of the tangential type chiefly in the mode of speed regulation. The buckets are split through the middle dividing wedge by a plane perpendicular to the shaft, and each half is mounted on a separate disk, which can slide longitudinally. The two disks are pulled together by springs, while between them is a third disk, keyed to the shaft, carrying sets of governing weights. When the wheel is running the centrifugal force of these weights tends to force the halves of the wheel apart, thus allowing part or all of the jet to pass without touching the buckets. By adjusting the position of the weights the governor may be made as sensitive as desired. The chief merit of the wheel is its sensitiveness and quickness of action under varying loads and consequent safety and its comparative simplicity. The pamphlet contains directions for calculating the horse-power of water and the flow of streams and has a number of tables of value to those contemplating the development of water-power.

Circular No. 1, Series E-N, published by Webster, Camp & Lane, of Akron, O., is a 16-page pamphlet describing that company's Akron engines. These include heavy duty engines, for a steam pressure of 150 lbs. and a speed of 100 revolutions per minute; tandem or cross-compound engines, with standard or special valve gears; automatic engines, with Tangye beds and double-ported balanced slide valve engines. Circular No. 1, series C-A, issued by the same company, is a 34-page pamphlet which describes some of the various patterns of ore cars and cages, pulleys and sheaves that the company makes. The company's standard mine car is stated to be very simple and of low price; the body is of tank steel, suitably braced and set directly on the axles or axle-boxes. The wheels are cast with chilled treads and are put as close as possible to permit rounding sharp curves. The company makes these cars to suit any track gauge or capacity. For quick unloading the company offers a steel dumping cradle that can be built to handle any size car and is said to be very easy of operation. The company's ore and water skips are made of tank steel, the bail being of refined iron. The wheels have chilled treads and bronze-bushed hubs. The company also makes self-dumping skips, end-dump mine cars, cars for gravity inclines, car wheels and axles and ore and water buckets. In the company's steel safety cages cast steel safety dogs are used, operated by steel springs; the draw-heads are of swede's iron cushioned on steel springs.

GENERAL MINING NEWS.

Mineral Oil Exports.—In July the United States exported 11,585,906 gals. crude oil, 509,184 gals. naphthas, 63,656,211 gals. illuminating, 7,485,965 gals. lubricating and paraffin, and 1,798,434 gals. residuum; total, 85,035,700 gals., against 97,413,060 gals. in the same month last year, showing a decrease of 12,377,360 gals. The exports for the 7 months ending July 31 aggregated 604,702,012 gals., as against 591,039,897 gals. in the corresponding period last year; an increase of 13,662,115 gals.

ARIZONA.

COCONINO COUNTY.

Coconino Copper Company.—This company is shipping copper bullion from its Neil process mill. The company is treating only about 30 tons of crude ore daily. The plant is working satisfactorily, and the tonnage handled will soon be doubled. E. P. Jennings, of Salt Lake, Utah, is manager.

GRAHAM COUNTY.

Arizona Copper Company, Limited.—The production of copper in July is officially reported at 1,276 short tons.

MOHAVE COUNTY.

(From Our Special Correspondent.)

The rainy season has set in, and good showers have been falling. Many ore reduction works are preparing to resume operations.

Distaff.—This mine, at Chloride, belonging to Chas. F. Sherman, of Mineral Park, was examined the past

week by a Denver, Colo., man for a purchasing company.

Gaddis & Perry Company.—This company has sold its group of gold claims at Union Pass to Philadelphia, Pa., men. Thomas E. Ludlow examined the mines and made the deal, which is said to be a large amount.

Iron Deposit.—J. C. Swickard, of Chloride, has located a large body of iron near Tillman Station, on the White Hills wagon road. The ore carries gold.

Metallic Accident.—Hank Lefler, who has a lease on this mine, near Mineral Park, from County Treasurer Owen McNeely, of Kingman, is making shipments to the smelter at Chloride.

Midnight.—This mine, between Chloride and Mineral Park, belonging to the St. Charles Brothers & Babcock, is being developed.

Pinkham.—This mine, in Wallapai District, is delivering a large amount of ore to the new smelter at Chloride.

Sunlight.—John Barry has returned, and is getting this mine, near Chloride, in shape.

Vulcan Smelter.—J. D. Heard, manager and superintendent of the new smelter at Chloride, is getting ready to start the plant. There is a large amount of coke and lime on hand and about 500 tons of ore.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

Amador-Phoenix.—At this mine, near Jackson, Mr. Dye has struck 3 ft. of ore on the east level.

Bunker Hill Consolidated.—This company, near Amador City, C. R. Downs superintendent, has spent about \$100,000 in development, and has more to spend before returns are expected.

Defender.—The new 10-stamp mill for this mine, at Defender, is nearly ready to start.

Mitchell.—Ten stamps of the mill at this mine, at Pine Grove, Mr. Hyner superintendent, have started, and the other 10 will be running in a few days.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

Baltimore Group.—At this group, near Angels, owned by the Ultimo Mining Company, E. K. Stevenot manager, a new main shaft, now down 200 ft., is being sunk.

Mcuna Brothers.—This claim, in Wet Gulch, at Mokelumne Hill, has been bonded to William Hamilton and further developments are to be undertaken.

Neverthought.—This mine, at Mokelumne Hill, owned by the Sampson Mining Company, W. L. Huston superintendent, is being opened by 2 tunnels. Nine men are employed.

Oriole.—In this mine, at Angels, a strike has been made on the 500 level, 262 ft. south of the shaft. The mine is owned by a Stockton company, of which F. E. Dunlap is manager.

Stockton Hill Gravel Channel.—This section of the county, near Mokelumne Hill, yielded well in the early days, but water finally drove the men out. George E. Gard and others, of Los Angeles, are to organize a company to unwater certain ground they have bonded.

ELDORADO COUNTY.

(From Our Special Correspondent.)

Cardilla-Tacchino.—Development work is to be done on this mine, near Newtown, by W. C. Russell. The old incline is to be continued to greater depth. A shipment of hoisting machinery has been made.

Rio Vista Gold and Copper Mining Company.—This company is about to begin the development of the Consumes copper mine. E. P. Colgan, of Sacramento, is president, and F. H. Hood, of San Francisco, secretary and general manager.

FRESNO COUNTY.

(From Our Special Correspondent.)

Copper King, Limited.—Testimony is being taken in the United States Court in the suit of this company against the Wabash Mining Company, the property of which surrounds that of the Copper King. The Copper King for a long time used the waters of Dog Creek, and built a reservoir, the water in which is essential for working its property. The Wabash company sunk a shaft above the reservoir, which depleted the water, and the Copper King people sued out a restraining order.

Divie Queen.—This mine, on Mill Creek, near Dunlap, owned by Capt. A. P. Merritt and others, has been bonded by John McKiernan, of Daunt. The mine will be developed and a mill built.

KERN COUNTY.

(From Our Special Correspondent.)

Kern County Cyanide Plants.—There are 3 of these now running near Randsburg—the 50-ton Primrose, the 20-ton Standford and the 10-ton James Smith. The Yellow Aster is to build a large cyanide plant shortly.

Mammoth.—Wires are being strung between Gralock and this coal mine. It is intended to generate electricity at the coal mine for transmission to mines and mills.

Mount Alamo Mining Company.—This company is shipping mica from its holdings near San Emedio, about 60 miles south of Bakersfield, and has orders for 15 tons of ground mica monthly. The mica is teamed to Bakersfield and shipped thence by rail to San Francisco, where it is being used in the manufacture of fireproof building and wall paper. The mica is ground and bolted through 40-mesh cloth.

MARIPOSA COUNTY.

(From Our Special Correspondent.)

Austin and Dolph.—These mines, at Whitlock, have been sold to T. R. Lombard, of Coronado, and A. M. Kitchen, of Chicago, Ill. Mr. D. A. Conoly is to be superintendent. Fifteen men will be put on the Austin at once, and a contract has been let to sink 110 ft. on the Dolph.

Bandarita and Star.—The quartz mills of these mines, 15 miles from Coulterville, were destroyed by fire recently. The property belongs to the estate of P. P. Mast. Charles L. Mast, No. 11 Monroe street, San Francisco, is manager. The properties have been idle some time.

Crystal and Cabinet.—These mines, near Coulterville, have been transferred by Charles L. Mast and wife to Elizabeth M. Loomis and Charles K. Rodgers, with 534 acres of land, including the Horseshoe Bend ranch and ditches.

Dugan.—This mine, on Bull Creek, near Coulterville, has been bonded by S. R. Porter.

Mariposa.—In this mine, at Mariposa, belonging to the Mariposa Commercial and Mining Company, a station is being cut at the 1,200-ft. level, after which drifts will be run. The Stockton Creek Mine tunnel is being driven to connect with the Mariposa vein. Machine drills will be put in.

NEVADA COUNTY.

(From Our Special Correspondent.)

Buckeye.—This property, near Nevada City, T. B. Gray superintendent, has a 600-ft. tunnel, at the end of which an upraise shows a good 4-ft. ledge.

Ethel.—A fine ledge has been struck in the 600-ft. tunnel on this mine, at Washington, by E. C. Griswell and William Mead. The mine adjoins the Baltic, a former good producer.

North Bloomfield Mining Company.—This company, at North Bloomfield, L. L. Myers superintendent, is arranging for extensive repairs to its ditch system. A contract for 3,000,000 ft. of lumber has been let. The flumes from Bowman's dam down are to be repaired. This was once the biggest hydraulic mine in the world, but of late has been worked largely by drifting.

Red Cross.—This mine, at Nevada City, has been taken over by the Western Exploration Company, of Salt Lake, Utah, and is to be developed. A steam plant and large mill are to be erected. Frank Enzenberger will be superintendent.

PLACER COUNTY.

(From Our Special Correspondent.)

Boston & South Dakota.—Mr. G. W. Sackett, lessee of this mine, at Michigan Bluff, expects to have men at work shortly.

California.—This mine, at Shady Run, Andrew Rogers superintendent, was formerly known as the Cedar Creek. It is now turning out about 100 carloads of gravel daily.

Crosby Gold Mining Company.—Important developments are being made on the claims near Lincoln. The old shaft is to be pumped out and machinery has been ordered. J. B. DeGolyer is superintendent.

Summit.—This mine, near Towle, is showing good prospects in gravel. R. F. Hallock and E. F. Sailor are owners.

PLUMAS COUNTY.

(From Our Special Correspondent.)

Thomas Shearer, James Raser and John Murray have struck gold-bearing ore in this county north of Amedee. The croppings have been traced some distance, and a number of miners have gone to the locality. Some of the assays reported are very high.

Diamond Discovery.—The miners near Nelson Point are excited over a supposed find of diamonds in Nelson Creek.

SAN BERNARDINO COUNTY.

(From Our Special Correspondent.)

Aloha.—This group, at Dale, will shortly start work again.

Baldy.—These mines, on Mount Baldy, have small streaks of rich ore. A roller mill has been hauled in.

Brooklyn.—This company, at Dale, owning the Brooklyn and Los Angeles mines, has a 3-stamp mill,

and will add 5 stamps. The cyanide plant is nearly finished.

Capitola Group.—This group of quartz mines at Dale, C. B. Eaton superintendent, is working steadily.

Carlisle.—This group, at Dale, owned by McRae & Hallsworth, will shortly have a mill and pumping plant. The workings are the deepest at Dale—450 ft.

Dale.—The town and post-office of Dale have been moved to near the O. K. Mine, 8 miles southeast of the old town of Dale. The stages run from Palm Springs, 73 miles, once a week.

Providence Gold and Copper Company.—These mines are at Goldstone, in the Providence Mountains, Geo. L. Berg, late of Los Angeles, being superintendent. The camp is at an altitude of 6,000 ft. Shafts are being sunk, and a good water supply has been developed.

Silver Creek Canyon.—A new gold mine is being opened in this canyon near Hesperia. Over 150 ft. of tunnel have been run. The ore found is called high grade. The directors are James Kennedy, H. B. Wilson, W. Keyzer, T. E. Parke and J. O. Henderson, all of Ontario.

Vanderbilt District.—The mines in this district, near Manvel, which have long been idle, are to be reopened. The St. George and Boomerang claims belonging to the estate of A. G. Campbell have been sold to Eastern men. The Gold Bronze, owned by J. M. Hale, of San Francisco, will shortly resume work. The old mill is being overhauled.

Welcome.—These copper claims, near Manvel, have been sold to G. M. Hamstadt, of that place.

SAN DIEGO COUNTY.

(From Our Special Correspondent.)

Julian Consolidated.—This group, including the Helvetia and High Peak claims at Julian, has been bonded. It is also reported that the Bailey Brothers group at Banner has been bonded by Los Angeles men.

San Diego Tourmaline Mining Company.—This company has been organized in San Diego with a capital stock of \$500,000, with shares at \$1 each. The incorporators are M. C. Healion, A. L. Ross, H. L. Benbough, K. C. Naylor, H. Eummelen, C. O. McCarroll and L. L. Boone. The company is to buy and work the Gail Lewis tourmaline mines at Mesa Grande, from which many fine crystals have been taken. The company may establish a cutting and polishing plant at San Diego.

SHASTA COUNTY.

(From Our Special Correspondent.)

Great Western Gold Company.—This widely advertised company, after grading a smelter site near Copley has changed its mind, and will build on a new site. Half the men have been discharged and a new superintendent, J. H. Sturdevant, of Denver, Colo., has been appointed. Although it was claimed the company had 11,000,000 tons of ore in sight, it seems now, according to one of the officials, "that custom business and ore purchased will supplement the supply and keep the smelter running from the start." The company's stock was floated from St. Louis, Mo., and some unique advertising methods were adopted. It is claimed now that development will be confined to extending the tunnels.

SISKIYOU COUNTY.

(From Our Special Correspondent.)

Cherry Hill.—Work has been resumed on the quartz mine, near Yreka, and air drills are used in the long tunnel.

Hawkinsville Dredger.—The dredging company working under Superintendent Winters on Yreka Creek, near Hawkinsville, is reported to be realizing good pay.

Hubbard Wing Dam.—The wing dam on the Klamath River, above Oak Bar, has been completed by J. Hubbard & Co. It cost about \$4,000, and the season will last about 4 months. When the river rises the dam will go out.

Mine and Timber Locations.—In the country west of Hornbrook, in Hungry and Beaver Creek districts, miners are bitter against timber land locators. Thousands of acres located as timber land the miners claim as mineral. The district has been productive for 50 years. The miners have been making protests in the regular way, but allege that the regulations of the Land Office placing burden of proof on them are unfair. Some of the location notices have been posted within the boundaries of active claims. There have been extensive forest fires in the region lately.

New England Dredging Company.—This company owns 2½ miles of dredging ground between Yreka and Hawkinsville, and has a dredger busy with a capacity of 2,000 cu. yd. of gravel per day. The machinery was shipped from Boston, Mass., in sections.

Yellow Jacket.—This quartz mine, on Indian Creek, owned by Goodfellow and Henderson, has been bonded to Arnold & Wright, of the Sheba Mining

Company, of San Francisco. A 3-stamp prospecting mill has been purchased.

SOLANO COUNTY.

(From Our Special Correspondent.)

Pacific Portland Cement Company.—This newly organized company has opened its works near Suisun. George Stone is president, and Nathan L. Bell secretary, with offices in the Claus Spreckels Building, San Francisco. There is only one other cement factory in the State.

SONOMA COUNTY.

(From Our Special Correspondent.)

Skinner Graphite Company.—The mine, near Petaluma, G. R. Skinner manager, is being worked again to fill an order for graphite from Honolulu. The shaft is 185 ft. deep, and some graphite of good quality is being taken out. This is the only active graphite mine in California.

TRINITY COUNTY.

(From Our Special Correspondent.)

Golden Jubilee.—This quartz mine, at Carrville, Mr. Steele superintendent, has encountered a 6-ft. ledge of \$20 rock.

Trinity Gold Placer Syndicate.—Two giants are running day and night on the old Nash Mine at Abrams.

Union Consolidated Gold Mining Company.—The Dorleska claim, at Abrams, is said to show much ore. H. Z. Osborne is manager.

Yellow Rose of Texas.—The new Huntington mill at this mine, near Abrams, George L. Carr manager, is about to start. The mine is developing well.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

App and Rawhide.—Forty stamps are crushing rock on the Rawhide Mine, and 60 at the App, near Jamestown. The mines are owned by Capt. W. A. Nevills.

Buckskin.—T. P. Amos, owner of the Blue Eagle Mine, near Groveland, has bonded the Buckskin claim from Screech & Witt.

Confidence.—In this mine, at Confidence, Neil Carmichael superintendent, the first of the 4 machine drills has started. The cyanide plant is ready. The shaft is down 400 ft., where a station is being cut.

Densmore.—Superintendent Thorn of this mine, at Columbia, reports having 50 men employed.

Hardtack.—T. F. McAvoy, of Alameda, and Andrew White, of Vallejo, now own this mine, at Carsters.

Markham.—This mine, near Groveland, has been bought by the American Exploration Company, and the Eclipse Gold Mining Company has been formed to work it. George De Sallier is superintendent.

Mount Jefferson.—In this mine, at Groveland, J. M. Meighan superintendent, the shoot of ore below the 300 level has widened to over 30 ft.

Patterson.—In this mine, near Tuttletown, Charles Fitzgerald and William McGinn have found some rich gold ore.

Prait.—This mine, near Groveland, has been purchased by Arthur James, and active work will soon start.

YUBA COUNTY.

(From Our Special Correspondent.)

Yuba River Dredgers.—Three Keystone drills are working along the Yuba River, prospecting gravel lands for dredging. Two more drills are to start. There are 70 men doing this prospecting. A great deal of land has recently been sold for mining, much of it being ranch land.

COLORADO.

GILPIN COUNTY.

Gilpin County Ore Shipments.—During July the shipments of smelting and crude ores from Black Hawk to the valley smelters and outside points of treatment were 409 cars, or 8,180 tons. On account of the holidays in the first week of the month, the shipments were not so heavy as previous months, but in comparison with the same month for 1901 show a gain of 90 cars, or 2,450 tons, almost 50 per cent.

Cashier Gold Mining and Reduction Company.—At the annual meeting in Central City the following directors and officers were elected: Directors, J. S. Reninger, F. M. Lockwood, Franklin, Pa.; William Muir, E. E. Allen, Warren, Pa.; A. W. Stone, Buffalo, N. Y.; G. E. De Golia, Salomnes, N. Y.; E. J. Lesser, Titusville, Pa.; J. B. Smithman, Dr. J. P. Strayer, Oil City, Pa. The following officers were elected: William Muir, president; E. E. Allen, treasurer; H. P. Sharer, Newcastle, Pa., secretary. The stockholders visited the company's properties, the Pittsburg, Meeker and Golden Wedge groups. Development is going forward under the management of Bert E. Campbell. A hoisting plant will be installed.

Detrich.—This lode, in Illinois Central District, is

being operated by the Carcasonne Mining Company under the management of H. E. Corn. Sinking has stopped at 100 ft. Drifts have started at a depth of 85 ft., and 2 shifts are at work. Some iron and copper ore is showing.

Kansas-Burroughs.—During July the total shipments from the consolidated properties on Quartz Hill operated by this company amounted to 201 cars, or 1,710 tons, the larger proportion of which went to the stamp mills at Black Hawk, although a fair tonnage was shipped to the Golden Smelter.

Newfoundland.—The water is about out of the shaft, and G. W. Mabee, of Denver, is ready to carry on active developments on the St. Louis extension at 900 ft.

Old Town.—Cripple Creek men are interested in a lease on the east shaft of this mine, in Russell Gulch, and are cross-cutting at a depth of 130 ft. Some ore sent to the Golden Smelter has given very good returns.

Sapp.—Meyers & Co. are interested in a lease on this lode, in Illinois Central District. They have installed a gasoline hoist, and are hoisting from a depth of 130 ft., where they have a good sized crevice. They are shipping milling ore, and taking out ore for the Golden smelter. This property is owned by Hal Sayr, of Denver, and has been idle for a number of years.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Leadville Ore Production.—The output is about 2,250 tons a day. An increase in zinc and siliceous ores is noted. The iron production shows a slight falling off.

Ball Mountain Tunnel Company.—Work is to resume in this gold belt property under the direction of M. P. Murray.

Bartlett.—The lessees are giving their entire attention to the new tunnel which is being run to cut the veins of Sugar Loaf and to drain the territory. They are in over 400 ft. The tunnel when completed will be 1,250 ft. long.

Best Friend.—Local leaders, headed by Patrick Boland, have caught a new vein close to the surface, and are taking out some ore that assays 3 oz. gold and high in silver.

Fairview Combination.—J. C. Hume is operating through both the Fairview and Vulture claims, making a steady production of low-grade iron and taking out occasional bunches of lead ore.

Fanny Rawlings.—The new lessees, Lanphier & Co., have cut a new vein on their lease. They are also taking out a quantity of zinc sulphides, which they will mill.

Fortuna.—Operations have just been resumed by Col. Cunningham, the owner, who will operate through the old tunnel. High-grade ore was taken out there years ago.

Fryer Hill Mines Company.—The water is still rapidly lowering from the heavy pumping through the El Paso shaft. Ore shipments from the Sliver, Jamie Lee and Tip Top will begin from the upper levels as soon as the railroad switches are in. The pumps are handling 1,400 gals. per minute.

Gordon.—The deal for the sale of this mine at Twin Lakes for \$250,000 still holds firm, due to legal complications of the former owner's estate.

Hap-Hazard Mining Company.—A good sulphide vein is being followed in the new work. Shipments made this week showed returns as high as 5 oz. gold. Indications point to the erection of a mill in the near future to handle the low-grade ores.

Home Extension Mining Company.—The company has increased its capitalization to 2,000,000 shares. If it makes a settlement of its indebtedness, as proposed, then 500,000 shares are to be issued to the new Sheedy-Kountz combination as its proportion of the proposed consolidation.

Iowa Gulch Combination.—Backed by London capital, C. J. Moore is carrying ahead important work on a large acreage of fine virgin territory in Iowa Gulch, which ground includes the Clear Grit and Ella Beeler mines, being operated through a tunnel. Some good ore has been found and extensive development is under way.

Keystone Mining Company.—Several members of the company are expected from Pittsburg this week, and it is announced active work will then be resumed through the old Rex shaft.

Leadville Basin Consolidation.—The most important mining deal of the week is a proposed consolidation of a number of the new downtown properties in the Leadville basin, the P. O. S., Bon Air and Morocco territory being the nucleus. The Sheedy-Kountz syndicate of Denver are behind the new enterprise. The consolidation will mean extensive developments in an area now idle. The P. O. S. and Bon Air have already been proven good iron producers, while the Morocco's new shaft, the A. V., has shown the extension of these shoots. If satisfactory terms can be had the California Gulch and Home Extension territory will be

included in the deal. T. S. Schlessinger has general charge of the consolidation.

Little Louise Group.—California capitalists recently secured control and are pushing new work. The new shaft is opening up an immense amount of low-grade milling material, and plans and specifications are out for a new mill to be built to handle this material.

Mayflower.—This adjoins the Resurrection. In a new shaft, just started, a 6-in. seam has been opened, showing .01 oz. gold and 33 oz. silver. The new work will be continued, and more extensive operations are being planned. Al Matthews owns the claim.

New Valentine Mining Company.—New machinery is being put in place and repairs being made. The pumps will be started by September 1.

Nisi Prius Leasing Company.—This property, on Rock Hill, closed down some months ago, is to resume shortly.

Robinson Smelting Company.—The reports that the plant was a failure are without foundation. Two more furnaces have been ordered, and as soon as in place the smelter will resume.

Sedalia.—A change of venue to Arapahoe County has been granted in the suit of O. C. Bartholemew and W. H. Pickings vs. W. H. Yankee and S. S. Kennedy. The trouble is over a lease, the plaintiff's main allegation being that over \$500,000 worth of ore was secretly sent to the smelter under a fictitious name by the defendants.

OURAY COUNTY.

Imogene Basin Mining Company.—L. B. Jackson, president, returned from the East recently after arranging with the owners in Chicago for working the group. The properties join the Camp Bird.

Saratoga.—W. B. Sawyer recently returned from New York City, where he had been last 2 months in relation to starting up the mill at Ironton and also to perfect arrangements for the erection of a pyritic smelter. The working of the smelter will bring about the completion of the railroad between Red Mountain and Ironton, as the rails are already laid.

SAN JUAN COUNTY.

(From Our Special Correspondent.)

Barstow Mining Company.—This company, working the Bobtail, at Red Mountain, is planning to erect a large mill. Pittsburg, Pa., men are interested, and John Geisel, of Ouray, is manager.

Big Five.—Six men are driving this tunnel, on Tower Mountain, Silverton. It is now in 600 ft.

Beasie.—A rich strike is reported in this mine, in Minnie Gulch, near Silverton, owned by Hubbard, Pendleton & Bunker, of Aztec, N. M.

Blue Bell Mining Company.—This company, which controls several old-time properties at Red Mountain, near Silverton, has shipped 3 car-loads of ore to the Kendrick-Gelder Smelter.

Boston-Pennsylvania Gold and Silver Mining Company.—This company has made final payment on the Swan-Elias group, and will continue development on a large scale. The vein shows a streak of high-grade tellurides.

Brooklyn.—This property, at Chattanooga, may be sold by the Manion Brothers to Colorado Springs men. Shipments of 2 car-loads per week continue.

Gladstone Group.—This group of 6 claims on Sultan Mountain, near Silverton, is owned by Moyle Brothers. The vein, being developed by a 400 ft. tunnel, averages 4 ft. wide of good mill dirt. Some higher grade ore is shipped from the Caribou to the smelters.

Henrietta Mining Company.—It is reported at Silverton that this company has, after 2 years' steady driving, cut the vein and a large body of rich ore. The contemplated mill is thought to be assured.

Hercules Mining Company.—The output from the various mines averages 75 tons per day of milling ore, and will be shortly increased to 150. The mill is running successfully on \$7 ore. A night shift will be put on and the force increased from 54 to 100 men. The Empire is the longest of the various tunnels, being in 2,400 ft., and has cut several large veins running from \$5 to \$12. The Montezuma is in 1,800 ft., and the Ricker 800 ft.; both are developing large bodies of milling ore. Upraises are being run to connect the Hercules and Empire and the Montezuma and Empire on the Little Dora vein.

Highland Mary.—This new mill, at Howardsville, is nearly completed, and the machinery is nearly all installed. Four compartment Hartz jigs are being put in.

North Star.—This group of 35 claims, on Sultan Mountain, is being worked by the Silverton Mining Company, a close corporation. It is developed by several thousand feet of tunnels and shafts. John C. O'Neill, of Chicago, is president of the company. The mill is being entirely remodeled, and the new machinery, consisting of 2 200-h.p. boilers, 1 125-h. p. Corliss engine, 1 100-h.p. generator, 1 100-h.p. motor, a 20-in. Leffel turbine wheel, 1,000-gal. electric

pump, and 600-gal. steam pump, will soon be in place. Ten Wilfley tables will also be installed. Robert J. McCartney, of Silverton, is mill superintendent.

Notaway Gold and Copper Mining Company.—The Champion No. 2 group of 5 claims 1½ miles south of Silverton, was purchased some time ago. Since then 250 acres of property on either side have been acquired by bond and lease. A tramway 850 ft. long is to connect with the railroad, and will be completed in a few days. The Thunder tunnel, being driven near the base of the mountain, will open both the Alethea and Champion veins at a depth of 1,000 ft.

Red Rogers.—This property may shortly resume work under the direction of its former owner, Mrs. H. A. W. Tabor, who is trying to redeem the property, which was sold some time ago under tax deed.

Ruby Basin Mining Company.—The Ruby tunnel, being run into Lookout Mountain, is expected to cut the La Plata Mine's vein within the next 700 ft. Several small stringers of high-grade ore have been encountered.

San Juan Mining Company.—This company, recently organized under Delaware laws, with Louis A. La France, of Holyoke, Mass., as president, and S. M. Noel, of Ouray, superintendent, owns 2 claims and a mill-site on Brown Mountain, near Red Mountain, covering an extension of the Saratoga vein.

Stonewall.—A season's supply of provisions and a large force of men have been sent up to the Stonewall, in Whale Basin, owned and operated by M. J. McGuire, of Silverton. The property is supposed to be an extension of the Nevada vein, and lies among the Silver Lake properties.

Tom Moore.—This mine, above Eureka, will soon have a compressor and air drills for the 1,300 ft. tunnel. About 200 ft. remain to be driven to cut the vein.

SUMMIT COUNTY.

Michigan.—On Sheep Mountain this mine is employing a large number of men and shipping some 50 to 60 tons of ore a day. The Michigan is about the largest producer in Kokomo at present. The ore is a heavy iron sulphide.

Robinson Consolidated Smelting and Refining Company.—The second furnace for the smelter has been shipped to destination by the Colorado Iron Works Company, and will be at once put in service, raising the capacity of the plant to 250 tons each 24 hours. The trial run of the initial furnace—35 days—was satisfactory. Frank Bulkley is manager at Kokomo.

Snowbank.—This mine, near Kokomo, which was leased a short time ago by P. Nese and G. Pomeroy, is now a steady shipper of sulphide ore.

Wintergreen.—This sulphide iron proposition, near Kokomo, recently leased, is shipping low-grade ore.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

Lawsuits.—There seem to be more lawsuits in the district than for some time past, most of which grow out of the question of extralateral rights. At present suits are pending between the Damon and Jerry Johnson, Sunshine and Sedan, and Ajax and Triumph. These have already been tried once, but have either been appealed or the jury has disagreed. There are a number of other suits in prospect, the Stratton's Independence vs. Strong, Londonderry vs. Wild Horse, Portland vs. Monument, Aileen vs. Mary McKinney, North Gold Coin vs. Ophir Company and Ophir Company vs. Eclipse.

Brodie Mill.—This mill was completely destroyed by fire on August 9. The cause given is an explosion of one of the pipes of the boiler. The mill was the first one to use cyanide in the district, and was situated at Mound City. It has not worked much for some years until recently, when it was operated under lease by O. B. Finn and associates. The mill was built by the MacArthur-Forrest people and owned by them.

Golden Cycle Mining Company.—The directors of this company have declared the second monthly dividend of \$11,250. It is understood that developments are showing up well, and that the station at the 900-ft. has been completed. The average ore mined runs from \$17 to \$20 per ton, and the company has been able to create a treasury reserve of \$85,000. The property is near the town of Goldfield.

Independence Consolidated Gold Mining Company.—The annual report shows that the company received from the sale of ore during the year \$51,176; the gross amount mined by the lessees being \$179,232; of this the company received \$49,849 in royalty. The trouble caused by the settling of some of the machinery, through the caving of old stopes, up to date has not cost over \$2,000, though considerable time was lost. The station has been cut by the lessees at the 1,050-ft. level, and sinking will soon be resumed for 200 ft. more. In the 950-ft. level a new ore shoot discovered 300 ft. long, adds much to the value of the property. At present the company is still about \$21,000 in debt, with about \$12,000 cash on hand. At

the present rate the royalties are coming in the indebtedness will soon be wiped out.

Mary McKinney Mining Company.—Rumors have been persistently circulated of late that this property is to be sold to Stratton's Independence, Limited, of London. It is understood that the officers of the company deny the report emphatically. What probably gave rise to the rumor, however, is the fact that a number of mining engineers have been examining the property. Rumors of sale have been floating around for 2 years.

Moon Anchor.—It is understood that this property has been leased to Nat Wilson, who was formerly superintendent. Of late it has not been doing as well as formerly, though a fair amount of ore has been shipped, mostly taken out by lessees. The property is on Gold Hill, near the Anchoria Leland.

Pharmacist Consolidated Mining Company.—The annual meeting will occur September 1. The circular issued by the manager shows considerable work has been done during the year, all by lessees. The main shaft has been sunk 90 ft., making it 660 ft. deep. Considerable drifting has been done on the 7th level. Arrangements are being made to sink another 200 ft. This part of the property is worked by the Mitchell Leasing Company. Lessees McDade and Lowe & Company have shipped some ore. On the north end McFarland and Ownbey are making regular shipments of good grade ore, and are sinking the Himes shaft. This lease calls for sinking to 1,000 ft. Considerable drifting has been done, and a winze has been sunk about 130 ft. from the level of the Wrockloff shaft. There has been some litigation in regard to this patent, but the title will not be jeopardized. The company is out of debt, and there is a cash balance in the treasury of \$108. There are also 59,001 shares in the treasury. Albert Wagner, of Cripple Creek, is general manager. The present policy is not to work on company account.

IDAHO.

LEMHI COUNTY.

(From Our Special Correspondent.)

Coal Mines.—The coal seams of the Salmon Valley recently attracted officials of the Oregon Short Line Railroad, who sent Prof. J. E. Talmage, of the University of Utah, to report on the fields near Salmon. Analyses of brown coal from the Pollard Mine, on which most of the work has been done, resulted as follows:

	A.	B.	C.
Molsture	18.857	17.073	16.078
Volatile combustible matter.....	27.857	33.429	34.418
Fixed carbon.....	40.310	40.694	41.553
Ash	12.831	8.710	8.035

Total..... 99,581 99,906 99,980
Prof. Talmage pronounced the coal well suited to domestic and steam purposes.

Climax Gold Mining Company.—The property, consisting of 9 quartz claims situated at the head of Pratt Creek, on the main Continental Divide, is developed by a main shaft 230 ft. deep. Levels run every foot from the shaft on the 130-ft. for several hundred feet showed a continuous shoot of milling ore 500 ft. long, which was treated at the 10-stamp mill of the company, the bulk of it prior to the present ownership. From the 230-ft. level east of the shaft there is a block of milling ore extending to the level above, 20 in. wide, for which the management claims an average value of \$40 gold. The length of this ore shoot has not been determined. West of the shaft a winze from the 130-ft. to the 60-ft. shows throughout, of undetermined width, said to average \$9. At present the management is driving a cross-cut tunnel to tap the lead at a depth of 400 ft. This is in about 1,200 ft., and probably less than 100 ft. from the ledge. The country rock is a schist, and the ledge can be traced on the surface for 2 miles. The width of the lead in the workings varies from 3 ft. to 6 ft. The filling is quartz and serpentine. A 10-stamp mill, with 3 Frue vanners, built by Frazer & Chalmers, erected 5 years ago, requires some alteration before it is again put in commission. Richard Gies, of Great Falls, Mont., owns 2-3 of the property, and I. S. Johnson, of Baker, Idaho, 1-3. Mr. Gies is also manager. The mill and buildings are lit by electricity. The distance to the railroad at Redrock, Mont., is 50 miles.

Kittie Burton Gold Mines Company.—This property, on Indian Creek, 35 miles from Salmon, is receiving the machinery for the new stamp mill. It is hauled from the railroad at Redrock to Salmon, a distance of 70 miles, and taken to Indian Creek by boat down the Salmon. The county is now building a good road, which will probably be completed this fall. R. L. Edwards, of Ulysis, is general manager. A 5-stamp battery, which has been on the property for 3 years, is pounding away. The last brick of bullion sent out was said to contain \$3,000 gold.

Kirtley Creek Placers.—This property, on Kirtley Creek, begins about 5 miles from Salmon, at the junction of Kirtley Creek and Lemhi River, and extends up the creek for 6 miles or so, comprising 4,300 acres of patented ground. The diggings have produced fully \$250,000 by hydraulicking. A company of Colorado

men, headed by ex-Gov. Grant and Mr. Hagerman, some years ago equipped it with an extensive hydraulic plant, the water being brought in from Carman Creek, at a cost of nearly \$100,000, by a ditch and pipe line to carry 2,200 miner's inches. The company worked 3 seasons with success, when it was closed down by injunctions procured by ranch owners whose irrigating ditches were filled up by the tailings. A scheme to work the creek bottom gravel by dredging is being perfected. The average depth to bed rock is about 10 ft., with no large boulders, cement or timber to interfere.

McKinley Group.—This property is an extension of the Climax Gold Mining Company, comprising 3 claims. The ore is free milling on the surface. The group is owned by Richard Gies, of Baker, and Judge Elder, of Salmon.

Pacific Dredge.—The first clean-up from this reconstructed dredge, on Moore Creek, 20 miles from Salmon, has been sent to the mint. The dredge went in commission about July 1. A Mr. Butler, of Chicago, Ill., is in charge.

SHOSHONE COUNTY.

Frisco Consolidated.—It is stated that the mines and concentrator at Gem will resume work September 1 with about a 2-3 force.

ILLINOIS.

Illinois Coal and Coke Company.—This company, it is said, is about to be formed under New Jersey laws, capitalized at \$8,000,000, of which \$2,000,000 will be 6 per cent, non-cumulative preferred stock and \$6,000,000 common stock, to take over 23 mines. An issue of \$4,000,000 5 per cent first mortgage 30-year gold bonds will be created. The company will have headquarters in Chicago. The properties said to be in the consolidation are: Cantrall Operative Coal Company, Cantrall; Athens Mining Company, Athens; Barclay Coal and Mining Company, Barclay; Black Diamond Coal Company, Springfield; Citizens' Mining Company, No. 1, Springfield; Citizens' Mining Company No. 2, Springfield; Clear Lake Co-Operative Coal Company, Springfield; Jones & Adams Company, Springfield; Sangamon Coal Company, Springfield; Starne's Coal Company, Springfield; Springfield Co-operative Coal Company, Springfield; Wabash Coal Company, Athens; West End Coal Company, Springfield; Wabash Coal Company, Dawson; Williamsville Coal Company, Williamsville; Woodside Coal Company, Springfield; Riverton Coal Company No. 1, Riverton; Riverton Coal Company No. 2, Riverton; Riverton Coal Company No. 3, Springfield; Spaulding Coal Company, Spaulding; Taylorville Coal Company, Taylorville; Christian County Coal Company, Taylorville; Greenville Coal Company, Greenville.

SANGAMON COUNTY.

(From Our Special Correspondent.)

Newton Jackson, Philadelphia, Pa., has been in the Springfield District looking up titles to coal properties. Mr. Jackson held for 2 months a number of mine options, which expired August 1, but with a provision that allowed him to demand an extension of 30 days to examine the titles, if he agreed to take the properties at the price named. This he has done, and now the operators are wondering whether the cash will be forthcoming September 1, or whether this is like the other recent consolidation schemes.

Jones & Adams Company.—This company's mine No. 1, north of Springfield, is to add to the plant this fall a 80-k.w. generator and an 8-ton Goodman electric locomotive for the mine and a 100-h.p. boiler, and will increase the present capacity of 1,000 tons per day to 1,400 tons, making the largest mine in the Springfield District.

INDIANA.

The United States Geological Survey is investigating the coal field within the first district in Southwestern Indiana. The area covered to date embraces nearly 1,000 square miles, and includes portions of Pike, Gibson, Vanderburg, Warrick, Spencer and Dubois counties. The Survey has prepared topographic maps and geologic maps, which are being compiled by Messrs. M. L. Fuller and George H. Ashley, and will show the outcrop of the "big" or Petersburg coal vein from near the White River to the vicinity of the Ohio. Its approximate elevation above sea level will be shown both along its outcrop and beneath the surface. The locations of the mines are also shown. The outcrop of the smaller coal, designated "No. 7," by the Indiana State Survey, which occurs above the Petersburg coal, will be shown in the same manner, as will also some of the coals beneath.

GRANT COUNTY.

(From Our Special Correspondent.)

Oil Wells.—Production is increasing with the many new wells being opened. The July production was 783,931 bbls., valued at \$815,288. The shipments for the month were 961,378 bbls., valued at \$999,833. During the first seven months of the year the wells have produced 4,772,971 bbls., valued at \$4,963,890.

Taxation of Coal Land.—Heretofore the land under which are valuable veins of coal has been assessed only as real estate and the assessment has been at from \$15 to \$100 per acre, dependent entirely upon the fertility of the soil. This year the rating is based on the valuation of the mining properties and coal beneath. The Coal Bluff Mining Company, of Terra Haute, appealed to the State Board of Tax Commissioners, and was given a hearing last week. This is a test case, the other companies and land-owners depending upon the decision of the board to decide the question.

LOUISIANA.

ACADIA PARISH.

(From Our Special Correspondent.)

Northern Oil Company.—This company has purchased pipe for an 8-in. line from the field to Jennings, and 2 37,500-bbl. iron tanks are to be built at Jennings at once. Shipments are curtailed by lack of storage and the small size of the only pipe line in use. As high as 40 cars of crude have been shipped in a day, and every week sees an increase.

ST. MARTIN'S PARISH.

(From Our Special Correspondent.)

Anse Le Butte.—Moresi Brothers have not succeeded in getting the bailer out of their well. Oil men state that the well will be a big pumper, if it does not gush, after proper bailing. Permission to lay a pipe line to Lafayette has been granted. The distance is about 8 miles.

MICHIGAN.

(From Our Special Correspondent.)

The United States Steel Corporation has agents in the copper district securing men for the mines at Eveleth, Ely and other points in Minnesota. Several hundred single men have left within the past few months to seek employment in mines in Colorado, Minnesota and South Africa.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Baltic.—This mine is stamping 950 tons of rock daily. Several drilling machines have been added recently.

Calumet & Hecla.—An Overstrom diagonal concentrating table, from the American Engineering Works, of Chicago, Ill., has been placed in the Calumet stamp mill at Lake Linden for experimental purposes.

Centennial.—This company is confining work mainly to A shaft, where sinking at 2,100 ft. is in progress.

Champion.—Thirty men are clearing a site for new buildings at the stamp mill location.

Franklin.—Work at the old mine is confined to Nos. 3 and 5 shafts, which are producing 500 tons of rock daily. William T. Phillips, master mechanic, has resigned, and is succeeded by Thomas H. Bennetts, formerly at the Atlantic Mine.

Isle Royale.—This company has started diamond drill exploration work on the Dodge property in section 10.

Mayflower.—At this property the shaft is down over 400 ft., and 90 ft. east of the formation originally opened a lode has been encountered. The main lode is reached by cross-cuts.

Old Colony.—This company continues sinking in the new shaft. Drifting to open the lodes cut by the diamond drill will be started.

Oscola.—At the Kearsarge Mine several power drills have been taken out, and the decreased production has resulted in some men at the stamp mills being discharged.

Rhode Island.—Work on this property is confined to sinking No. 2 shaft, at 830 ft. Early next year the shaft will be down over 1,000 ft. and a cross-cut will be run to tap the Allouez conglomerate, which is reported opening well at the Franklin Junior.

St. Mary's Mineral Land Company.—This company has started diamond drill work on section 12, directly south of the Globe property.

Trimountain.—This company has about 600 men at work, and 200 more are employed by the various contractors.

Winona.—This company is making preparations for a trial mill run at the Atlantic Mill after the extra head is released by the Champion. Fifty men are employed and 2 power drills. The 6th level drift, south, is in 535 ft., and in the copper belt. Some mass and barrel copper is being encountered.

Wolverine.—This company has widened the gauge of the Mohawk & Travers Bay Railroad, connecting the mine and stamp mill, to standard gauge. The Snow pumping engine, at the mouth of the Tobacco River, has been found satisfactory upon test.

Wyandot.—This company has 2 diamond drills exploring the land owned and under option. The work will continue until a complete cross-section is made. Thirty men are employed.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

Mohawk.—Several car-loads of machinery for the new stamp mill will have arrived. The mill will be ready within 10 weeks.

Phoenix.—At this mine good rock has been cut on the 500-ft. level on the West vein. The machinery from the old Wolverine mill will be installed at the new mill in a short time.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Adventure.—The intake tunnel at the stamp mill is out 800 ft. Work is rendered exceedingly difficult by the porous rock letting in water.

Victoria.—This company has purchased a traction engine for hauling machinery and supplies from the railroad to the mine and mill. The heavy grades make transportation by teams slow.

IRON—MARQUETTE RANGE.

Republic Iron Company.—The Cambria Steel Company, which owns the mines of the Penn Iron Mining Company of Menominee range and 50 per cent of the stock of the Mahoning Ore and Steel Company on the Mesabi, has made a proposition to this company to buy as much stock as may be offered at \$15 a share, or at the rate of \$1,500,000 for the mine. The Republic Mine produces a high-grade specular hematite. Its output has been comparatively small of recent years, but it has produced all told about 5,000,000 tons of ore.

MINNESOTA.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

Ore is being found in explorations in section 13, T. 58, R. 20, and it may be in large quantity. Explorations in section 36, T. 58, R. 21, are not as favorable as they were and the property may be dropped. Explorations in section 4, T. 58, R. 15, have so far shown but a small quantity of ore, perhaps 400,000 tons. Explorations on section 16, T. 58, R. 19, are finding ore. Explorations in section 16, T. 57, R. 21, are not successful.

Grant.—This mine, a new property in section 20, T. 58, R. 19, belonging to the State and leased to Jones & Laughlins, is shipping and will probably send out 40,000 tons this year. It is a large ore body and will be a heavy shipper next year.

Jordan.—This mine has begun shipments to dock. It is a milling mine containing about 2,000,000 tons of ore and was bought by the present owners last winter.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

Joplin Ore Market.—Ore prices have been unchanged the past week, but demand is strong. There was little competition among the buyers, but each agent was busy gathering up ore at the lowest figures, and Saturday night there were not a thousand tons of ore in the district unsold. The movement was heavy.

The assay value of ore still continues at \$35 on a 60 per cent basis, this price being satisfactory to all producers. The anticipated advance in the better grades did not materialize, and those who held off with their high-grade ores the week before sold last week at \$38 per ton. Lead ore sold at \$49 per ton.

During the corresponding week of 1901 the shipment was lighter by 3,520,380 lbs. of zinc and 130,500 lbs. of lead, and the value less by \$94,677. For the corresponding 32 weeks of last year the sales of lead were greater by 1,003,397 lbs., the sales of zinc less by 11,677,770 lbs., and the value less by \$907,519. The following are the shipments from the various producing camps for the week ending August 9:

	Zinc, lbs.	Lead, lbs.	Value.
Joplin	3,386,600	450,880	\$70,311
Galena-Empire	1,371,070	138,410	23,357
Webb City-Carterville	737,520	314,570	35,517
Spurgeon	190,100	78,410	4,614
Aurora	718,550	22,010	11,820
Oronogo	594,930	5,290	6,749
Duenweg	1,194,710	150,310	22,398
Prosperity	528,180	22,050	9,783
Central City	240,420	5,200	3,493
Cave Springs	211,080	.....	3,377
Carthage	329,780	.....	5,608
Neck-Alba	411,550	.....	7,202
Zincite	208,720	.....	3,653
Granby	492,000	59,000	5,285
Carl Junction	100,930	.....	1,817
Fortuna	.....	86,080	2,112
Wentworth	87,720	.....	1,053
Sherwood	40,280	.....	694
Total	11,553,820	1,327,180	\$219,889
Total, 32 weeks	332,278,750	39,666,420	\$5,765,403
Zinc value, week, \$188,403; lead, \$31,486; zinc, 32 weeks, \$4,892,288; lead, \$573,115.			

MONTANA.

BEAVERHEAD COUNTY.

(From Our Special Correspondent.)

Ajax.—This property, on the main Continental Divide, near the Idaho line, is 80 miles from the railroad at Divide Station. The nearest postoffice is Fox.

William Stansfield, A. J. Noyes, of Fox, and J. E. Morse, of Dillon, are the owners. The property has been a shipper for some months. A streak of ore carry gold, silver and lead, with some copper, occurs on one of the walls. The other wall of the lead has a body of free milling gold ore.

Dark Horse.—This property, on the main Continental Divide, near the Idaho line, was discovered last August by Peter Germain and William Farwell. A 10-ft. face in the outcrop shows 2 ft. of copper-gold ore, chiefly copper sulphide, chalcocopyrite, with some bornite. Free gold is frequently seen in the ore as mined.

LEWIS & CLARKE COUNTY.

Big Indian Company.—This company, at Winstock, has the new 60-stamp mill almost completed. The work is under the direction of Colin McIntosh.

Montana Marble and Mining Company.—This company with a capital of \$1,250,000 has these incorporators: W. Y. Pemberton, G. W. Belt, A. M. Baldwin, C. E. Russell, R. E. Embrey, R. E. Vincent and Francisco Bullivant, of Helena. The property contains marble and lies within 5 miles of Helena.

Montana Mining Company.—This company has petitioned the County Board of Equalization, claiming that the tailings which it has impounded on Silver Creek should be assessed as net proceeds and not as personal property. The assessment of the company, which operates the Drumlummon Mine at Marysville, was fixed at \$220,340. Of this amount \$127,940 was considered to be the value of the tailings.

The company says that it ran its mine last year at a loss of \$45,000, while the total proceeds from its cyanide plant was \$138,074. It maintains that the difference between its losses at the mine and the proceeds derived from the tailings, which is \$93,320, should represent the sum to be taxed as the net proceeds.

PARK COUNTY.

Bear Gulch Mining Company.—This company hopes to have machinery for its 40-stamp mill on the ground within 30 days, and to have the mill in operation by January 1. The company has also ordered machinery for a cyanide plant, to be fed direct from the plates of the mill, the machinery part of which will be put in place by F. A. Bosqui. The mill was designed by Thomas W. Fisher, and the machinery is being made at the Allis-Chalmers works, in Chicago. It will be shipped to Gardiner, the terminus of the Yellowstone Park branch of the Northern Pacific Railroad, and hauled on wagons from Gardiner to Bear Gulch, a distance of 4 or 5 miles. Water power is to be used in the mill. The Bear Gulch Company has a 20-stamp mill in operation, and the money coming from the plates is going into the new one.

SILVER BOW COUNTY.

Minnie Healey.—The order restraining F. Augustus Heinze and others from working the property has been formally issued by the clerk of the Supreme Court. After the Supreme Court refused to grant a re-hearing in the matter of the injunction granted Miles Finlen against Heinze and the appellant in the action filed a bond in the sum of \$300,000 to indemnify the respondents, in case the lawsuit involving the title is ultimately decided in favor of Heinze and the Johnstown Mining Company. While the bond was set at \$300,000, the appellant gave surety in the sum of \$600,000, divided among the following bondsmen: D. J. Hennesy, \$150,000; Henry Muller, \$100,000; A. J. Bray, \$100,000; W. A. Clark, Jr., \$125,000, and A. J. Davis, \$125,000.

Speculator.—Judge Harney recently handed down an opinion in the case of Lee Mantle vs. the Speculator, finding for the plaintiff conditionally. He granted a temporary injunction and fixed the bond of the plaintiff in the sum of \$100,000, giving 10 days to file the undertaking. While the injunction will prevent the Speculator Company from extracting any ores from the mine, it does not prevent the defendant

NEW JERSEY.

SUSSEX COUNTY.

New Jersey Zinc Company.—A drift has been run from the Parker shaft at Franklin over 1,000 ft. underground to meet another drift or tunnel from the Taylor Mine, over a mile distant. This drift will give better ventilation and facilitate mining.

OREGON.

BAKER COUNTY.

Marwell.—George L. Huntington and W. J. Johnson, of St. Paul, and C. P. Berkey, of Minneapolis, Minn., have bought from Neil J. Sorenson and others this group of 14 claims, paying the reported price of \$150,000. The development work consists of several tunnels. One of the tunnels is reported in 1,800 ft., and another 1,750 ft. A 10-stamp mill and a concentrating plant are included in the sale.

(From Our Special Correspondent.)

Big Four Group.—Since cutting the main lead in

the cross-cut, a 100-ft. drift is said to expose an ore body 13 ft. wide, with good values.

Bonanza Mining Company.—The sinking plant recently installed is now in use. The shaft is down about 700 ft. The 40-stamp mill will soon begin work.

Basche Mining Company.—Extensive developments are in progress on the Richmond group. A cross-cut tunnel has been driven 510 ft., cutting 3 veins. The property is equipped with a 10-stamp mill and hoist of 1,000 ft. capacity.

Bunker Hill & Sullivan Company.—The 100-ton concentrating plant is completed. A large force of men is driving the working tunnel, which will be 600 ft. long when completed.

Crown Point Gold Mining Company.—A new 4-drill compressor has been installed to drive the long cross-cut tunnel.

Don Juan Mining Company.—This mine is being unwatered. It is owned by N. H. Thibault, of Quebec.

Golconda Gold Mining Company.—The rich shoot is reported to continue with depth. Between the 200 and 300-ft. level it is said to be over 50 ft. The 20-stamp mill recently resumed work.

North Pole Gold Mining Company.—Alexander Baring, of London, Eng., one of the owners, has visited the property. The 10-stamp mill is being enlarged to 30 stamps.

GRANT COUNTY.

(From Our Special Correspondent.)

Alamo Consolidated Mining and Milling Company.—A 40-stamp mill will soon be installed.

Big Producer Mining Company.—The mine has been sold to W. R. Eisenhour, who is associated with John R. Cassin, the consideration being given as \$15,000.

Couger Mining Company.—This property is again to be a producer. A large force of men is at work. This company has the largest equipment in the district.

Oregon Monarch Gold Mining Company.—This company has consolidated with the Monahan & Murphy Company, adjoining on the east. The property now consists of 200 acres of ground, with 5 known ledges. A long cross-cut is planned to cut all the veins running through the property, giving a vertical depth of 1,000 ft.

Quebec Mining Company.—The best ore ever found in this property is reported opened in tunnel No. 3, which is in 900 ft. The 10-stamp mill is running day and night, and development is pushed.

Psyche Gold Mining Company.—Judge J. Fawcett, of Omaha, Neb., who owns this property, has bought the Little Giant 20-stamp mill. The machinery is being hauled to the property, where it will be installed immediately.

Standard Gold Mining Company.—A consignment of 5 tons of high-grade ore was shipped to Germany recently. This property is owned by Germans.

PENNSYLVANIA.

BITUMINOUS COAL.

Beech Creek Railroad.—Coal shipments in the 7 months ending July 31 were 3,464,281 short tons, and coke, 115,043 tons; a total of 3,579,324 tons.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Black Hills Paint Company.—The ochre mill at Custer is running full capacity, and the product is shipped to Chicago. Several shades of mineral paint are turned out, and the company is preparing to grind graphite.

Black Hills Porcelain, Clay and Marble Company.—A car-load of mica is shipped each month, the mine yielding a ton a day. The company is reported to receive \$75 the ton, f. o. b. Custer.

Copper Butte Mining Company.—The shaft is 300 ft. deep, and will go 150 ft. further before encountering the ledge. The company has a steam hoist.

North Star Mining Company.—Water is being pumped from the mine and stored in an improvised reservoir for a test run at the new stamp mill. If the run is satisfactory the company will bring water in from a spring 2 miles distant.

Saginaw Mining Company.—The new shaft is 90 ft. deep. An air compressor is in place. The shaft is being sunk under contract, and will be 500 ft. deep.

Sugar Loaf Mining Company.—A car is being loaded with copper ore at the mine on Spring Creek for shipment to the smelter at Deadwood. Drake, Barnes & Co., of Cleveland, O., are principal owners.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Belt Development Company.—The northwest drift

from the bottom of the 700-ft. shaft, at Kirk, is over 800 ft. long, and the face is reported in solid ore. The company intends to sink to 1,000 ft.

El Refugio.—J. B. Sheehan, of Galena, has taken a lease and is sacking silver-lead ore for shipment.

Hidden Fortune Mining Company.—The foundation is ready for the new mill at Deadwood, and the Elkhorn Railroad has a spur partially built to the site. A number of dwellings are being erected for employees. The Baltic tunnel is in 2,000 ft.

Imperial Mining Company.—The Bertha Mine, in Ruby Basin, and the Winnesheik and Pocahontas, at the base of Green Mountain, have been purchased, the former from R. H. Driscoll and others, of Lead, and the latter from John Greenough. The Bertha has been worked under lease by Peter Oberito for 2 years. The Greenough claims join the Dividend.

Sunday.—Six shipments have been made by C. B. Harris, of Galena, lessee. The last shipment consisted of 3 cars, and the ore averaged \$13 a ton at the Imperial cyanide plant, in Deadwood. Most of the ore so far has been taken from the old dump.

Wasp Mining Company No. 2.—An August dividend of \$2,500 has been declared. The ore occurs in a Potsdam sandstone, and is treated by a 110-ton cyanide plant.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Gertie Mining Company.—The company has started to sink the shaft 100 ft. farther, making it 520 ft. deep. An air compressor has been ordered. E. C. Johnson, of Hill City, is manager.

Ida Florence.—Machinery has been ordered with which to sink 500 ft., and the company is negotiating for a 40-stamp mill. John Sisk is in charge at Keystone.

Mount Aetna Mining Company.—A shaft house has been built and a steam hoist is being installed. The shaft is to be continued on the vein to 300 ft.

TEXAS.

EL PASO COUNTY.

(From Our Special Correspondent.)

Black Shaft Mining Company.—This company's property, near the Hazel Mine, has not marketed any ore as yet, though a considerable tonnage is on the dump. The company contemplates putting up a small smelter.

Copper Plate.—This claim, 3 miles from Excelsior, is owned by Marvin & Judson, of El Paso, and is reported to show a vein of copper ore 4 to 6 ft. wide. Machinery is to be installed.

Hazel.—This property, 125 miles from El Paso, is owned by Fitzgerald & Kelly. It produces silver and copper ores.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Beaumont Oil Wells.—Crude oil for shipment remains scarce, and sales at 30c. f. o. b. Gladys have been made. There are 280 wells on Spindletop, and of these about 50 are producing by means of air compressors, steam-head or standard pumping rigs. Many more will be in operation by the end of August.

The following statement shows that less than half the tankage of the field is filled, and that while the tankage has steadily increased during the past two months the oil in store has decreased very perceptibly. Decreased shipments during August and more pumps in operation will tend to change this, providing the producing capacity of the wells hold up to 800 or 900 bbls. each per day.

It is stated that some wells in Blocks 37 and 38 are bringing up salt water with the oil; most operators consider this very unfavorable to the prospects for a long term pumping proposition.

TANKAGE CAPACITY BEAUMONT FIELD AUG. 1.	
	Completed.
Iron	6,196,000
Earthen	2,585,000
Wooden	200,000
Total	8,981,000
	Unfinished.
Iron	537,500
Earthen	3,435,000
Total	3,772,500
OIL STORED AUG. 1, 1902.	
	Barrels.
In iron tanks	3,420,000
In earthen tanks	645,000
In wooden tanks	35,000
Total	4,100,000
PRODUCTION OF FIELD TO JULY 31, 1902.	
	Barrels.
Production for 1901	4,190,000
Shipments Jan. 1, 1902, to June 30, 1902	3,768,000
Shipments July, 1902	850,000
Increased oil stored over 1901	3,109,000
Estimated waste, 1902	350,000
Total	12,258,000
Decreased oil in store June and July	480,000

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlements.—The banks report the following settlements for week ending August 9: American bullion, \$115,600; gold bars, \$12,000; gold, silver, lead and copper ore, \$220,200.

BEAVER COUNTY.

(From Our Special Correspondent.)

Frisco Shipments.—For the week ending August 9 the Horn Silver reports 2 cars ore sent to Salt Lake Valley smelters.

Ben Harrison.—Orders have been placed for an equipment consisting of an 80-h.p. boiler and hoist for depth of 800 ft.

Majestic Company.—It is announced that a contract for a 350-ton smelter has been closed with the Colorado Iron Works Company, of Denver, Colo. R. Ayers, of the Colorado Iron Works, will be the constructing engineer. The plant will be located about 2½ miles southwest of Milford, near the Tadpole Spring.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Shipments.—During the week ending August 9 shipments were: Mammoth, 9 cars ore; Bullion Beck, 7 cars ore; Rabbit Foot, 1 car; Grand Central, 9 cars; Showers Consolidated, 1 car; Carisa, 7 cars; Eagle & Blue Bell, 1 car; Gemini, 5 cars; South Swansea, 3 cars; Eureka Hill, 10 cars; May Day, 2 cars concentrates; Alaska, 1 car; Yankee Consolidated, 6 cars; Ajax, 2 cars.

Mammoth.—It is stated that the lead shoot on the 1,300 ft. level has opened into a body of gold-bearing quartz. The values are not given.

Uncle Sam.—At a regular monthly meeting of the directors it was decided to equip the property with a 50-ton concentrating mill. J. M. Callow, who made tests on the ores, will get out the specifications. The new mill will cost about \$10,000. Water supply will be secured of the Bullion Beck and Centennial Eureka companies.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Alta Shipments.—Shipments for the week ending August 9 were: City Rock, 1 car; Grizzly and Lavinia, 1 car ore; Maxfield, 2 cars ore.

Bingham Shipments.—During the week ending August 9 the following shipments were made: Niagara, 1 car ore; Ben Butler, 2 cars ore; Petro, 1 car ore; Bingham Consolidated Gold, 1 car ore.

Bingham Consolidated.—Water flowing about 300 gals. per minute has been struck in the west heading of the Dalton & Lark tunnel. It is thought that this will drain the Dalton & Lark group. The management has decided to make a 26-ft. addition to the converter house at the company's smelter as soon as material can be had. The fourth furnace will go in commission as soon as the addition is completed.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—For the week ending August 9 shipments were as follows: Ontario, 1,406,950 lbs. ore; Daly West, 3,738,720 lbs. ore; Anchor, 436,410 lbs. ore; Silver King, 1,980,850 lbs. ore.

TOOELE COUNTY.

(From Our Special Correspondent.)

Stockton Shipments.—During the week ending August 9 the following lots were sent to the samplers in Salt Lake Valley: Ophir Hill, 22 cars concentrates; Hidden Treasure, 2 cars ore; Stockton, 1 car ore.

WASHINGTON.

FERRY COUNTY.

(From Our Special Correspondent.)

Mountain Lion.—Nothing has been made in the mine since last fall.

Princess Maud.—The mine is being unwatered and the machinery overhauled.

San Poil.—An assayer has been engaged for this company and the Black Tail. Ten men are employed.

Silver Dollar.—The machinery has been erected. The water tank and connections are finished. Guides are being put in to resume work in the shaft.

Washington & Great Northern Railway.—James J. Hill, president of the road, accompanied by a staff of officials, visited Republic August 4. Mr. Hill said he thought the best interests of the camp, as well as of the railroad, would be found, principally, in mining low-grade ores, and that a \$5 rate for freight and treatment could be had on a large tonnage. It is announced that the road will be turned over to the operative department August 15.

WYOMING.

CARBON COUNTY.

North American Copper Company.—This company has begun work on a 1,000-h.p. electric plant on the south fork of Encampment River, 4 miles from Encampment. Water will be piped from the dam to the concentrator and smelter at Encampment. The dam will be 32 ft. high.

FOREIGN MINING NEWS.

AUSTRALIA.

QUEENSLAND.

The Mine Department reports the gold production for June at 68,860 oz. crude, equal to 50,762 oz. fine gold. For the 6 months ending June 30 the gold output was 388,224 oz. crude, showing an increase of 4,648 oz., as compared with last year. The three largest producers are Charters Towers, Gympie and Mount Morgan, all good dividend payers.

VICTORIA.

The Chamber of Mines reports for May that the total gold production of the State was 66,150 oz. crude, equal to 61,605 oz. fine gold. For the 5 months ending May 31 the total was 277,563 oz. crude, against 290,006 oz. in the corresponding period last year, a decrease of 12,443 oz., or 4.3 per cent.

The dividends paid by public gold mining companies for the 5 months this year amounted to \$143,086.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Snowshoe.—At this mine, at Phoenix, the first half of a 30-drill compressor is being put in, and 2 80-h.p. boilers have been installed. The new 3-compartment working shaft, some 300 ft. deep, is being timbered. A large tonnage of ore is exposed, but shipments have been suspended temporarily owing to the Greenwood smelters being without coke. Anthony J. McMillan is managing director.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Crow's Nest Pass Coal Company.—The strike of the miners at Fernie was settled August 4 by the agreement that the men return to work on an 8½-hour day, day to begin and end at lamp station, which is half way in to the faces. All men to be past this station by 7 a. m., and not pass out before 3:30 p. m. The only condition attached to this agreement is that in the event of the men being dissatisfied after 2 months' trial they will go back to a straight 8-hour day, without half an hour off for lunch. The men struck for an 8-hour day, with time reckoned from the mouth of the mine. The settlement is of importance to West Kootenay and the Boundary Districts, where smelting operations have been tied up for several weeks through the coke shortage, and hundreds of men have been out of employment.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Output.—The output for the week ending August 2 and for the year to date, according to the Rossland Miner, is as follows:

	Week.	Year.
Le Roi	2,925	136,561
Le Roi No. 2	1,470	39,777
Centre Star	150	4,460
War Eagle .....	...	420
Rossland Great Western .....	...	2,400
Giant	150	500
Cascade .....	...	300
Columbia-Kootenay .....	...	30
Bonanza .....	...	60
Velvet .....	...	250
Spitzee .....	...	20
Totals	4,695	189,631

The output for the week was lower than for the preceding week because of the suspension of work at the Le Roi Mine, following the death of Superintendent Dunkle.

NOVA SCOTIA—CAPE BRETON.

Dominion Coal Company.—This company reports shipments of coal for July at 311,390 tons, the largest ever made in one month. For the five months of the fiscal year from March 1 to July 31 the total was 1,219,944 tons, against 1,014,329 tons for the corresponding period last year; 845,600 tons in 1900, and 615,135 tons in 1899.

MEXICO.

(From Our Special Correspondent.)

Greene Consolidated Copper Company.—The company states that the concentrator erected for it at La Canana by H. W. Hardinge, of Denver, Colo., has started work, and all the machinery running well. The company states that it is producing 3,000,000 lbs. of copper bullion monthly, that the concentrator will increase the capacity of its works fully one-third, and that within 30 days, with the entire plant completed and in operation, the maximum production will be over 5,000,000 lbs. of copper bullion monthly.

MINING STOCKS.

(Complete quotations will be found on pages 234 and 235.)

New York Aug. 14.

Copper shares are quiet. Amalgamated fluctuated between \$65½@86%, while Anaconda was again invisible. The curb coppers lacked support, as their "friends" are on a vacation. Greene, of Mexico, weakened to \$26½, and British Columbia to \$6½, but later recovered to \$7¼. Montreal & Boston, of British Columbia, held at \$2¼@2½, while White Knob, of Idaho, sold at \$19¼, following the report that operations on the property have commenced.

A sale of Ontario Silver, of Utah, was made at \$9.

Alice, of Montana, is soft, selling down to 33c. In the Comstock list only the favorites show sales. Among these is Consolidated California & Virginia, with dealings at \$1.30; Ophir, \$1.25, and Mexican, 48c. So far 5 companies have levied assessments of 3c. to 10c. per share, aggregating \$41,440 for collection during this and next month. The prospect of other assessments coming forward has unfavorably influenced speculation in these shares.

Cripple Creek, Colo., gold stocks are featureless, and prices continue at low ebb. Portland, with its mill suit in progress, hangs heavy around \$1.75, while Elkton is feverish at 37c., owing to water trouble at the mine.

Colorado Springs Aug. 8.

(From Our Special Correspondent.)

The mining stock market has gradually improved during the week, until it is in much better condition than for many weeks past. There seem to be real grounds for the hope that bedrock has been reached on Cripple Creek shares, as the shares gradually strengthen as the days go by. Elkton, always a leader, has, after a period of several months, when it was notoriously weak, apparently touched bottom, and gives some indications of stable improvement. The stock sold at 34c. a week ago and 40c. on the 6th, dropping off to 38½c. to-day. The strike in the 7th level, reported in this letter a week ago, has been officially confirmed, and is much greater than first announcements made it. Elkton still has much to overcome, for, though the company may not have to negotiate the loan of \$100,000, the company is still but barely paying expenses.

El Paso advanced from 52¼c. to 60c., closing at 59c. to-day. The gain appears to be warranted by the gradually improving condition of the mine and the adding of large ore reserves. Within a month the property will resume deep mining with the new \$50,000 surface equipment. Isabella sold from 25½c. to 26¾c., the high price being reached to-day. Developments in the 11th and 12th levels on the Campbe. vein were the cause of the improvement.

Portland sold from \$1.78½@1.87½ during the week, closing at \$1.78 bid, with \$1.85½ asked. The improvement was due in part to the general condition of the market and also to the outcome of the inspection of the new chlorination mill at Colorado City by local mining men during the past week. The mill is proving a decided success, and will permit a considerable saving in handling Portland ores. Vindicator was strong all the week, selling at 95c. Golden Cycle was listless around 60c. Reports from the mine indicate that the ore is not running as rich as several months ago, necessitating a larger tonnage to yield the same amount of net profits.

The board of directors of the Doctor-Jack Pot Company is considering leasing the 7th level workings, with a proviso that the shaft be sunk to 800 ft. and a level at the new depth run. This will prove whether the celebrated ore shoot has played out or has simply faulted, going into an adjoining property.

Well-established rumors have it that the Mary McKinney, Last Dollar and Modoc mines are being sold at figures ranging from \$750,000 to \$1,750,000. The recent litigation started against the Mary McKinney by the Morning Glory Mining Company has in all probability broken up the negotiations on the Mary McKinney.

San Francisco Aug. 9.

(From Our Special Correspondent.)

Speculators were free sellers, no doubt because they are weary of holding in a feeble market. Prices show signs of weakness. Some sales were made of Consolidated California & Virginia at \$1.22½@1.25; Ophir, \$1.20; Caledonia, 96c.@91c.; Mexican, 47c.@41c.; Hale & Norcross, 20c.@18c., and Best & Belcher, 17c.

Oil shares were dull. Home, a regular dividend-payer, sold at \$3@3.05; Sterling, \$1.42½; Monte Cristo, \$1.90, and Junction, 16c.

London July 29.

(From Our Special Correspondent.)

The weak condition of the South African mining market and the continued adverse reports coming over from the Rand are causing some worry to the issuing houses and the financial people here. It must be said, however, that most of the men capable of

influencing the markets are in England at present with their hands full of political business, and matters in South Africa are entirely in the hands of the technical staffs, who have no time to attend to market requirements. I understand that several leading men—Mr. Beit, for example—are about to proceed to South Africa in order to make things a bit more lively.

The West Australian market is also very dull and depressed, partly in sympathy with South Africans, but chiefly because the public are quite tired of speculation in this direction. The position of Lake View Consuls is rapidly becoming critical, and is to a large extent the cause of the trouble in this market. When Messrs. Bewick, Moreing & Co. took over the management of the mine some months ago they warned shareholders that previous reports had been valueless, and intimated that the mine was being exhausted with depth, and that the present rate of output could not be maintained for long. Developments since made have not opened up any ore bodies of importance, and the ore reserves are now only sufficient for three months or so. The directors consider it best to anticipate the obvious future by issuing 100,000 new shares at £1 5s. each to provide money for extensive development at depth. If money is not provided in this way, the position of the company at the end of the year would be practical bankruptcy, and a reconstruction would be necessary to carry on work; the shares would then be of little value, whereas under the proposed scheme there need be no serious diminution in their market value. The current quotation of the £1 share is over £2, which, though a poor show after the £12 and £14 of a year or two ago, is, after all, not so bad, considering the present condition of the mine. Shareholders may be induced to buy new shares at £1 5s. as a bargain, so as to even up with the high prices paid before. The proposition is a very shrewd one, and reflects great credit on the originator. If additional capital is to be raised to carry on the mine, it is obvious that the subscriptions should be optional, and that shareholders who acquired their holdings at high figures should have an opportunity of averaging the cost of the shares. In reconstruction neither of these conditions obtain. There is hardly any doubt that shareholders will agree to the proposition.

I am sorry to have to record that the public prosecutor has decided not to take any steps against Mr. Whitaker Wright and his colleagues who were responsible for the transactions of the London & Globe, the British America Corporation and the other companies of this ill-starred group. In the proceedings connected with the compulsory liquidation of the companies, the judges made strong comments on several occasions, and it was hoped that the law would not allow the perpetrators of such frauds on the public to go scott-free, and the disinclination of the public prosecutor to move is viewed with regret by those people who desire to preserve a high standard in financial transactions. It must be said, however, that by the ordinary law it is very difficult to single out the arch conspirator from the inexperienced directors who innocently carried out his instructions. It is possible that some reason of this sort has made the law officers of the crown hesitate to undertake a prosecution.

COAL TRADE REVIEW.

New York Aug. 13.

ANTHRACITE.

A few more mines and washeries are working, but the total production of anthracite is but a very small fraction of normal figures. The strike leaders are concentrating their efforts on those districts where the men have shown most dissatisfaction at the prolonged idleness and are using their most effective speakers to hold the men in line. These efforts have not been without result, and the strike may last longer than seemed likely a few weeks ago. The operators maintain the position they took at the beginning of the strike, and newspaper clamor is not likely to move them. As they have frequently pointed out, they stand for effective discipline at the mines—something that the experience of the past two years has shown cannot be had so long as the men feel that the union and not the operators should control all questions of employment.

Trade all over the country is very light, and supplies at some points are getting down to the vanishing point. Consumption is always small during the summer, and along the Atlantic seaboard buying for winter use rarely starts before October, so that the situation is not likely to become acute unless the mines are still idle late in September. Even at New York City, where the newspapers are now talking of a coal famine, matters are not as bad as reported. Large hotels and restaurants are using screenings and soft coal mixed, some are burning soft coal altogether, while oil and gas stoves are used by families. When the mines start with full forces, provided no great concessions are made the miners, work will go with a rush, and the production will be the heaviest recorded. Should the strike last till October, it is quite possible that by January the output, with sufficient car supply, will be

more than adequate for all needs. The output in June is officially given as 83,100 tons, and in July as 182,000.

At the head of the lakes very little coal is changing hands, as supplies on the docks are about cleaned up. In Chicago territory demand has strengthened. Possibly half of the docks are now bare of anthracite, and shipments by rail to out-of-town points have almost stopped, while orders for future delivery are refused. It is believed, however, that if retail dealers are conservative there will be no real stringency until after Christmas. Milwaukee is worse off than Chicago as regards supplies of anthracite. Along the lower lakes and in the all-rail trade the substitution of bituminous or coke for anthracite is becoming more marked. Along the Atlantic seaboard supplies are more plentiful some distance from New York than near the city, as New York dealers have been picking up all the coal they could get at points not too remote. At Boston trade is light, both wholesale and retail. At Philadelphia public buildings are to burn bituminous, and its use is increasing.

The following retail prices are noted: Duluth, Minn., \$7.50 for domestic sizes and \$6.50 for pea; Battle Creek, Mich., \$8; Houghton, Mich., \$7.25; Sioux City, Ia., \$10; St. Louis, Mo., \$8.50, with Arkansas semi-anthracite, \$6.75; Bath, Me., \$8; New York City \$9, pea \$6.50, with dealers claiming to pay \$8.25 and \$8.50 alongside, for domestic sizes; Philadelphia, \$9 for broken, \$8 for egg and stove, and \$6 for pea; it is said best screened Welsh anthracite has been offered at Philadelphia for \$6.68 delivered. At Richmond, Va., prices have not advanced, and dealers ask \$6 for domestic sizes. At Norfolk \$8 is asked, and at Raleigh, N. C., \$8.50.

BITUMINOUS.

A comparatively easy market prevails in the Atlantic seaboard soft coal trade. There have been wash-outs along the railways, resulting in shortages of car supply at the mines and slow transportation to tide-water. The interruption to traffic was merely temporary, however, and as soon as flood damages are repaired things move along fairly well. The general speculative market on the lower grades of coal is easy, prices ranging around \$3 f. o. b. New York Harbor shipping points for Clearfield, gas slack selling for a little less and the better grades for a little more. The best grades of coal are very hard to get and sell at full prices. We have heard of some large blocks of Nova Scotia coal being contracted for at points beyond Cape Cod at prices under \$3 per ton delivered. Trade in the far East is fairly easy; most producers have their contracts for that territory well in hand, and we hear of one or two contracts cleaned up for the year. Along Long Island Sound consumers are calling for coal, and some distress is reported. Shippers are trying to get coal forward to such concerns, as Long Island Sound consumers have felt the car shortage more than those in any other territory. The New York Harbor trade is calling for considerable coal, and shippers the past week have had all they could do to attend to the demand, particularly on the better grades. All-rail trade has been easy, though slow transportation has called for tracers being put on cars in certain cases.

Car supply at the mines is variable, ranging from 40 to 90 per cent, as wash-outs have affected some regions more than others. Transportation from the mines to the tidewater shipping ports is slow, coal coming through in from 4 days to a week longer than formerly. In the coastwise vessel market large craft are in good supply, but the supply of small and medium-sized vessels is limited. We quote current rates from Philadelphia as follows: Providence, New Bedford and Long Island Sound, 50@60c.; Boston and Salem, 60c.; Portland, Portsmouth and Bath, 65@70c.; Wareham, 75c.; Lynn, 75@80c.; Newburyport, 80@85c.; Gardiner, 70@75c. and towages; Bangor, 75@80c. Rates from the further lower ports are 5@10c. above these figures.

Notes of the Week.

The strike of the coal miners that had stopped production at all the mines in Bay and Saginaw counties, Michigan, for several months ended on August 11, when the men voted to accept the proposition made by the operators and approved by President Mitchell, of the United Mine Workers, several weeks ago. The matter over which the men held out—pushing cars—is to be taken up again by next spring. The strike was chiefly remarkable for the men rejecting terms of settlement approved by the head of their union.

Birmingham Aug. 11.

(From Our Special Correspondent.)

There are few coal miners idle in Alabama now, and the output is satisfactory. The mines at Coalburg, in Jefferson County, owned and operated by the Sloss-Sheffield Steel and Iron Company, which are now worked by convicts, will hereafter use free labor. The Lehigh Coal Company, opening new mines in Blount County, will begin shipping coal early in September. All mines in Bibb County are again busy. The Aldrich mines are idle, though it is stated that

non-union men will be given employment there. The production of coke is improving. Coke is bringing a good price, with supply unequal to demand, causing purchases elsewhere by manufacturing interests.

The Pratt Coal Company, recently organized in New Jersey, with capital of \$3,000,000, has acquired 12,000 acres of coal lands in the western part of Jefferson and eastern portion of Walker counties, and will continue the development started by three or four little companies which were absorbed. T. T. Hillman is president of the company; Erskine Ramsey, vice-president, and H. E. McCormack, general manager. The company expects to work up an output of 2,000 tons daily, and will also erect coke ovens.

Cleveland. Aug. 13.

(From Our Special Correspondent.)

The coal trade continues to be troubled by a lack of cars to move the product from the mines to the lake ports. The shortage is beginning to be very serious. It is not only preventing the lake shippers from getting all of the coal up to the Northwest that they have contracted to move, but is also preventing domestic dealers from laying up a surplus of coal during the summer. Last week was a poor one generally in the lake trade, and the movement to the lake ports from all mines was very light, in many instances the receipts amounting to no more than 50 per cent of the usual supply. Boats have been abundant, although the oversupply has not been so marked as heretofore, as other trades are taking more of the tonnage. It is continually more and more apparent that the movement of coal this season will be far short of requirements, and that upper lake consumers will have to find other sources of supply than those afforded by the lake routes. The supply of coke is also short, and many consumers are running on a hand-to-mouth supply. Producers lately have advanced the price to \$3.50 at the oven.

Pittsburg. Aug. 13.

(From Our Special Correspondent.)

Coal.—The freight congestion is more pronounced, and as a result the production of the railroad coal mines on Monday and Tuesday was not more than 60 per cent of the capacity of the mines. The Baltimore & Ohio Railroad and the Monongahela division of the Pennsylvania Railroad are in the worst shape, and but few mines along those lines are in operation. The Pittsburg Coal Company is operating but one mine on the Baltimore & Ohio. The Pittsburg & Lake Erie and the Pittsburg, Cincinnati & St. Louis railroads are able to take care of coal shipments fairly well. The operators say the railroads are using all the available locomotives for loaded cars, and cannot return empties. The Pittsburg Coal Company is refusing new business daily, and is rushing coal to the lakes. It will have a strong rival for the lake trade next season in the Youghiogheny & Ohio Coal Company, and is making great efforts to fill all contracts. The railroad coal operators in the Pittsburg District have decided to advance the price of coal furnished the railroads on September 1. W. R. Woodford, of the Pittsburg Coal Company; John H. Jones, of the Pittsburg & Buffalo Company, and W. H. Shinn, of the Mansfield Coal and Coke Company, have filed the request with the railroads, and a favorable answer is expected.

Connellsville Coke.—Production is greater, and stocks in the yards are increasing. While the principal producer continues to quote \$2.25@2.50 for furnace and \$2.75@3 for foundry coke premiums of \$1 and more are readily obtained for prompt shipment. In the *Courier* the production of the previous week is given at 250,238 tons, a gain of 623 tons. The shipments aggregated 11,537 cars, distributed as follows: To Pittsburg and river tipples, 3,558 cars; to points west of Pittsburg, 5,661 cars; to points east of Connellsville, 2,354 cars. This was a decrease of 204 cars.

Foreign Coal Trade Review Aug. 14.

Exporters are awaiting the settlement of the anthracite coal strike, as it is impossible to guarantee deliveries in any specified time. Of course there are still a few charters being booked on future business, but the tonnage is small. Ocean freight rates are easy, and to some European ports show weakness.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of July 26 that the Welsh coal market is considerably firmer for all descriptions. Quotations are: Best Welsh steam coal, \$3.90@4.02; seconds, \$3.84; thirds, \$3.54; dry coals, \$3.60; best Monmouthshire, \$3.42@3.48; seconds, \$3.24; best small steam coal, \$2.22; seconds, \$2.04; other sorts, \$1.66.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2.5 per cent discount.

Although a considerable amount of chartering has been done, Mediterranean rates have declined still further. Some rates quoted from Cardiff are: Marseilles, \$1.15; Genoa, \$1.08; Naples, \$1.08; Singapore, \$3.00; Las Palmas, \$1.50; St. Vincent, \$1.74; Rio de Janeiro, \$2.94; Santos, \$3.24; Buenos Aires, \$3.24.

IRON TRADE REVIEW.

Birmingham. Aug. 11.

(From Our Special Correspondent.)

The withdrawal of furnace companies in the South from the pig-iron market because of sales for delivery as late as June, 1903, is announced. This is in line with predictions that spot iron in a few weeks will be so scarce as to warrant a price of \$25 per ton. There is little spot iron to be had, even at a good price. Sales have been made at \$22. The scarcity of spot has caused some uneasiness among smaller buyers. The Sloss-Sheffield Steel and Iron Company announces that it is out of the market. The company now has 6 furnaces in blast, and before the end of 3 weeks No. 3 North Birmingham Furnace will be ready to start up. The company is preparing to run all of its 7 furnaces steadily. During the past week a contract was given for the construction of 200 coke ovens at Flat Top Mountain by the Sloss Company, and it is announced that another 100 will be constructed elsewhere.

Conditions with other companies in Alabama are also satisfactory. The deal whereby the Tennessee Coal, Iron and Railroad Company was to sell to the Oxmoor Furnace Company its 2 Oxmoor furnaces is said to be off, and the Tennessee Company will repair the furnaces.

The Southern Iron Committee, composed of the various railroads handling the products of the blast furnaces, rolling mills, etc., has made its report of shipments for the year ending June 30, 1902. The total shipments of pig iron, steel and cast-iron pipe amounted to 1,843,343 tons, of which 162,387 tons were cast-iron pipe and 1,680,956 tons were pig-iron. The exports were not great, but 3,946 tons pig iron and 3,061 tons cast-iron pipe. The shipments by districts were as follows for the year:

Districts.	Pig Iron.	Cast-Iron Pipe.
Anniston	225,164	38,957
Birmingham	842,809	79,453
Chattanooga	223,960	43,977
Middlesboro	46,244	.....
Nashville	113,699	.....
Sheffield	229,080	.....
Totals	1,680,956	162,387

The steel billet shipments for the year amounted to 56,330 tons.

The following quotations are given: No. 1 foundry, \$18; No. 2, \$17@18; No. 3, \$16@16.50; No. 4, \$15; gray forge, \$14.50; No. 1 soft, \$18; No. 2, \$17@18.

It is announced that the North Birmingham Land Company has offered to donate to the Messrs. Schuler 200 acres of land on which to erect a steel plant. The offer has not been accepted.

Buffalo. Aug. 12.

(Special Report of Rogers, Brown & Co.,)

In all grades of foundry iron sales for next year's delivery continue at a healthy rate, and the market needs no stimulus, notwithstanding the fact that the vacation period is upon us, and this time of the year is generally one of inactivity.

Active work has been begun on the construction of two large new blast furnaces at this point.

For delivery during the balance of the present year we quote on the cash basis, f. o. b. cars: No. 1 strong foundry coke iron, Lake Superior ore, \$25.75; No. 2, \$25.25; Southern soft, No. 1, \$23.50@24.50; No. 2, \$23@24.

Cleveland. Aug. 13.

(From Our Special Correspondent.)

Iron Ore.—The movement of ore down the lakes continues rapid and steady. Boats are still plentiful. The movement is limited only by the capacity of the lower lake docks. Rates remain at 75c. from Duluth; 65c. from Marquette, and 55c. from Escanaba. Prices hold nominally at \$4.25 for bessemer old range; \$3.25 for non-bessemer old range and bessemer Mesabi, and \$2.75 for non-bessemer Mesabi.

Pig Iron.—The market is quieter, with few sales either for spot delivery or for next year, but consumption is as heavy as ever. Spot prices range about \$24 for No. 2 in the valleys, and those on material for first and second quarter delivery of next year have been boosted to \$21.50 to \$22 for No. 2 in the valleys. Many producers are now facing the possibility of a shortage of iron for the first half of next year that may be quite as serious as that which has existed for the last half of this year. Basic producers are selling a few lots of off iron at \$20.50 valley furnace, and are holding for \$20 for standard iron for future delivery. Bessemer Association furnaces are selling no iron for either spot or future delivery, and their price policy has not been announced.

Finished Material.—Plate sales have continued to lead the market. Very little material is sold for immediate shipment, and the supply of the Steel Corporation mills for first quarter delivery, especially universal sizes, is about sold up. The independent mills have plenty of uncovered capacity, but as they are holding for prevailing prices buyers are waiting until assured that there is no hope of getting steel at the lower prices quoted by the corporation. The

larger mills are adhering to the association price of 1.60c. Pittsburg, while the independent mills are asking 2c. to 2.10c. at the mill for boiler plate and tank plate. The Corporation has some uncovered capacity in this grade, and the small mills are not doing much business. Some orders, however, of universal plates at premiums of from \$8 to \$10 have been taken for first quarter of 1903 delivery. Structural steel is selling well for next year, and there is a large demand for immediate shipment, which cannot be met. The price is now 2.50c.@3c. either at the mill or out of stock, according to who makes the sale. Steel bars are in good demand, and the product for this year has about been sold up. On iron bars very little is being done. The price has not dropped much below the agreed price of early summer. The quotations are 1.60c. Pittsburg on bessemer, 1.70c. Pittsburg on open-hearth and 1.75c. on bar iron. The sheet trade continues the one weak spot in the market with no change of prices.

Philadelphia. Aug. 13.

(From Our Special Correspondent.)

Pig Iron.—A good deal of foreign iron is arriving, and orders have just been placed for large lots for delivery during the next 60 days. There seems to be a disposition to purchase abroad for remote deliveries as home furnaces are either not able to guarantee deliveries at fixed prices or do not care to. All kinds of iron are very high. There is more or less inquiry constantly for No. 1 and No. 2 foundry, and there would be more did not consumers know the iron is either not to be had at all or very hard to get. There are some negotiations pending for bessemer iron, but prices have been nominally advanced 50c. per ton, and contemplating buyers are halting. Attempts have been made to get iron from Southern furnaces for fall delivery, but without any immediate success. There appears to be no actual occasion for much anxiety at present, as nearly all the consumers are pretty well supplied, but there is trouble for small consumers who have permitted time to slip by without providing for autumn needs. Quotations are given: No. 1, \$24.50; No. 2, \$22.50; plain, \$22; standard gray forge, \$21; basic, \$21; low phosphorus, \$23.50; Middlesboro, \$22; Scotch iron, \$22.50.

Billets.—Inquiries for billets seem to have fallen off. Foreign are quoted at \$29; bessemer, \$35 for American open-hearth. It is probable that a good deal of business will be closed within the next week or 10 days.

Bar Iron.—All the mills are busy and capacity is strained. Early deliveries are practically impossible. Prices are high, and for urgent deliveries special quotations are made. Quotations are 2.10@2.20c., and very few orders can be placed for early delivery.

Steel Plate.—Reports from Eastern plate mills show they are quite satisfied with the situation, and are not making concessions to get new business. On all the small business placed within the week the highest figures have been quoted. Bridge work is taking most of the production. Quotations are given at 2.10@2.20c. for 1/4-in.; universals, 2.05c.; flange, 2.10@2.15c.; fire-box, 2.20@2.30c.

Structural Material.—Considerable importations of foreign material, with rumors that large quantities are contracted for, have had a weakening effect upon quotations for late delivery. As to early deliveries, prices are practically where they were. There is quite a wide range of prices.

Scrap.—The market is said to be weaker, although all the transactions placed have been closed at the customary full prices. Heavy steel scrap is asked for to-day by several parties, and the asking price is about \$21. Low phosphorus scrap is quoted as high as \$30; machinery scrap, \$18 to \$18.50.

Pittsburg. Aug. 13.

(From Our Special Correspondent.)

The week has been the duller of the year in the iron and steel markets as to sales, but not a mill in the Pittsburg District is idle or running part time from lack of business. The shortage of motive power on the railroads is interfering with shipments, and in some cases mills are unable to run full capacity from not receiving full requirements of raw material. Coke shipments have been impeded, and furnaces have suffered. Railroads are promising better service, as many locomotives now undergoing repairs will soon be out of the shops, and the summer excursion business, which is unprecedented this year, will soon be over, and more engines will be available for freight. Despite the depression in tin plate, sheets and wire all the plants are run full time. A careful estimate of the business booked for 1903 shows that the mills are sold up for 5 months on steel rails, from 3 to 4 months on plates and from 2 to 3 months on structural material. The pig iron market is extremely quiet, although there are frequent inquiries for prompt bessemer iron, and a few odd lots were sold for fourth quarter delivery at a trifle more than for shipment during the first half of next year. The heavy demand for foundry iron has eased up, as foundries are well covered for future requirements. The furnaces have

almost fully their output of No. 2 for the second half, and for the first quarter have but little left. It is reported that a large tonnage of Southern foundry iron for 1903 shipment has been contracted for, No. 2 being sold at \$17@17.50, Birmingham. The freight to Pittsburg is \$4.15, but all prices for future delivery are made at Birmingham, as the freight rate is likely to be advanced on January 1.

The steel market is easier, and except for prompt delivery prices are not as firm as a week ago. Premiums continue on all early shipment of finished products. Several Western railroads have placed orders for steel rails. It is estimated that the tonnage booked for next year aggregates fully 1,300,000 tons, and it is believed that about 400,000 tons will be carried over from this year's orders. The shipbuilding interests have been heavy purchasers of plates lately, and as a result the mills are crowded, and premiums for early shipment have stiffened. Base prices for plates, steel bars and structural material are still quoted for next year. The Cambria Steel Company, which was one of the first to go out of the market, is now accepting orders for fall delivery, as it expects to have its new plate mill in operation by October 1. No new orders for foreign steel have been placed, and imports are on the decline.

The tin plate situation is becoming interesting. Although the members of the tin plate lodges of the Amalgamated Association voted against the proposition of the American Tin Plate Company to cut wages 25 per cent in order to get the foreign trade of the Standard Oil Company and the Armour and Swift packing interests, a powerful influence is being brought to bear on the men to reconsider the vote. The tin plate combine has closed a number of its mills, alleging lack of business, and this has caused reports that the move is for the purpose of forcing the men to agree to a cut in wages. Of three labor trade papers here, two are advocating the favorable consideration of the proposition that will secure 1,500,000 boxes annually or 6 weeks more work for all the mills. The *National Labor Tribune*, one of the oldest labor papers in the country, opposes the movement. The American Tin Plate Company owns 274 mills. Of this number 129 have been closed and 145 are in operation. Of those running 74 are on a non-union basis and 71 employ union men.

Pig Iron.—A few odd lots of bessemer pig iron have been sold for delivery in the fourth quarter at \$21@21.25, valley furnaces, and a few small sales were made for earlier shipment at \$21.50@21.75. Gray forge is very quiet, and quotations for future delivery range from \$20.75 to \$21.25, Pittsburg. Foundry No. 2 is quoted at \$21.75@22.25, Pittsburg, for next year.

Steel.—The steel market is easier, and bessemer billets are offered at \$32 for late delivery, but a few small lots have been sold at \$34 for prompt shipment. Plates for quick delivery are much firmer, and it is now impossible to do better than 2.25c., but the price for next year continues at 1.60c. For delivery later this year 1.70@1.85c. is quoted.

Sheets.—The market for black sheets quiet, but the price of 3c. for No. 28 gauge is well maintained. The market for galvanized sheets is very irregular, but the American Sheet Steel Company continues to quote 75 per cent off, which is equivalent to 4.25c. for No. 28 gauge.

Ferro-manganese.—The market continues quiet. No sales of domestic 80 per cent are noted, and the price is nominally \$52.50.

New York. Aug. 13.

Pig Iron.—The demand for foundry pig for spot and early delivery is very strong, though sales are limited by the scant supply. Imports of Scotch and Middlesboro iron, however, help consumers in this territory. We quote for Northern irons, tidewater delivery: No. 1X, foundry, \$23@25; No. 2X, \$22@23; No. 2 plain, \$22@24. For Southern iron on dock, New York, No. 1 foundry, \$22.75@23.25; No. 2, \$21.75@22.25; No. 3, \$21.25@21.75. Scotch iron is offered at \$20@23; Middlesboro No. 3, at \$18.75@19.25. Spot Scotch is selling at \$22@25, ex-ship.

Bar Iron and Steel.—Demands continue strong, and the market is very firm. We quote large lots on dock: Refined bars, 1.95@2.05c.; common, 1.90@2c.; soft steel bars, 2@2.10c.

Plates.—Demand shows no let-up, and the mills are very independent as regards prices. We quote for tidewater delivery in car-loads: Tank, 1/4-in. and heavier, 2.05@2.30c.; flange, 2.15@2.40c.; marine, 2.25@2.50c.; universal, 2.05@2.25c.

Steel Rails.—There is no change in quotations, in spite of the heavy tonnage already placed. Standard sections are quoted at \$28, f. o. b. mills for 1903 delivery; light rails, \$30@35, according to weight.

Structural Material.—Consumption is apparently going to be heavy for months to come. Prices show no particular change. We quote for forward delivery on large lots at tidewater as follows: Beams and channels, 2@2.30c.; tees, 2@2.25; angles, 2@2.25c.

Cartagena, Spain. July 26.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Shipments since our last report have been 3 cargoes, aggregating 6,330 tons, of which 1,930 tons were manganese ore. Operations of both buying and selling have been somewhat restricted, due, no doubt, in many cases, to the holidays. A few new sales are reported for shipment to America, and these are based on the prospect of obtaining cheap tonnage: 8s. 6d. is reported as having been paid from the coast to Philadelphia, and buyers are basing their sales on being able to charter at 8s. from Cartagena to the United States. Calasparra magnetic ore is in good demand, and 6d. per ton is being asked and paid over and above last month's quotation.

Quotations are per ton, f. o. b. shipping port: Ordinary 50 per cent iron ore, 6s. 6d.@6s. 9d.; special low phosphorus ore, 50 per cent iron, 7s.@7s. 6d.; special ore, 50 per cent iron, 3 per cent manganese, 6 per cent silicon, 8s. 6d.; specular ore, 58 per cent iron, 9s.; magnetic ore, 60 per cent iron, 5 per cent silicon, 11s. 6d. for lumps and 9s. 6d. for smalls. For manganiferous ores quotations are: No. 1, 20 per cent iron and 20 per cent manganese, 14s. 3d.; No. 1 B, 25 iron and 17 manganese, 11s. 3d.; No. 2, 30 iron and 15 manganese, 10s. 3d.; No. 3, 35 iron and 12 manganese, 9s. 6d. All grades of manganiferous ores are rated at 11 per cent silicon and under 0.03 phosphorus. Iron pyrites are quoted at 11s. on basis of 40 per cent iron.

CHEMICALS AND MINERALS.

(See also wholesale prices-current on page 236.)

New York Aug. 14.

Heavy Chemicals.—Inquiries are more frequent for alkali and caustic soda, but orders are comparatively small in volume, as the larger consumers are still out of the market. Bleaching powder shows little interest. Sal soda is experiencing an improved demand, owing to the warm weather. Domestic chemicals, we quote, per 100 lbs., f. o. b. works, as follows: Highest alkali, in bags, \$2 1/2c.@87 1/2c., for prompt shipment, and 75c.@77 1/2c. for forward; caustic soda, high-test, \$1.90@1.95 for early delivery, and \$1.85@1.87 1/2 for futures; bicarb. soda, ordinary, 95c., and extra, \$3; sal soda, 65c.; chlorate of potash crystals, \$8.25, and powdered, \$8.50; bleaching powder, off-test, \$1.35—best grades mostly under contract. For foreign goods we quote per 100 lbs. in New York: Alkali, high-test, 90c.@92 1/2c.; caustic soda, high-test, \$2.25; sal soda, 67 1/2c.@70c.; chlorate of potash, \$10.25@10.75; bleaching powder, prime brands, Liverpool, \$1.75; Continental, \$1.60@1.65.

Acids.—Sulphuric and muriatic are in good request. Blue vitriol moves quietly for the foreign market.

Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars) delivered in New York and vicinity.

Blue vitriol	\$4.60@5.00	Oxalic, com'l....	\$4.60@5.00
Muriatic, 18 deg.	1.50	Sulphuric, 50 deg.,	
Muriatic, 20 deg.	1.02 1/2	bulk, ton.....	13.50@15.50
Muriatic, 22 deg.	1.75	Sulphuric, 60 deg.	1.05
Nitric, 36 deg....	4.00	Sulphuric, 60 deg.,	
Nitric, 38 deg....	4.25	bulk	18.00@20.00
Nitric, 40 deg....	4.50	Sulphuric, 68 deg.	1.20
Nitric, 42 deg....	4.87 1/2	Sulphuric, 66 deg.,	
		bulk	21.00@23.00

Brimstone.—Sales from store are reported at \$22.75 @23 per ton for best unmixed seconds. Abroad the syndicate is meeting dissidents by easing prices, but there is little benefit to be derived by the American consumers. With a control of over 85 per cent of the brimstone production in Sicily, the syndicate is in a position to keep prices at a high level. Nevertheless another heavy curtailment in consumption such as has been experienced in France will undoubtedly influence the policy of the syndicate and lower prices. To-day importers are asking \$22 per ton for best unmixed seconds, and about \$1.50 less for thirds, for shipment.

Pyrites.—Sellers are being benefited by the continued high price for brimstone. So far this year the business done by pyrites importers is fully 13 per cent larger than last year, and the probability is that more orders will be booked in the future.

Quotations are f. o. b. Mineral City, Va.: Lump ore, \$5 per ton, and fines 10c. per unit; Charlemont, Mass., lump, \$5, and fines \$4.75. Spanish pyrites, 12 1/2c.@13 1/2c. per unit, New York and other Atlantic ports. Spanish pyrites contain 46 to 51 per cent of sulphur; American, from 42 to 44 per cent.

Sulphate of Ammonia.—Immediate delivery gas liquor is in short supply, and commands \$2.95@3 per 100 lbs. Shipments are offered at \$2.90@2.95.

Nitrate of Soda.—Indications point to a firmer market, and prices tend upward. Importers are not anxious sellers, as the Chilean market has been strengthened by further buying for the European season. Producers are holding for higher prices. The freight market also shows an improvement. Sellers of nitrate of soda for this year's arrivals ask \$1.85 per 100 lbs., and for 1903, \$1.82 1/2.

Concerning the Chilean nitrate of soda market, Messrs. Jackson Brothers, of Valparaiso, write under

date of July 19 as follows: European advices still announce an extreme dullness in this article, and a considerable fall in prices for both spot and future arrivals, so that exporters have shown no disposition to operate; whereas, producers, on the other hand, are only prepared to accept a small reduction on former prices. A few transactions were made during the early part of the fortnight at 6s. 4 1/2d.@6s. 4d. alongside for 95 per cent, prompt delivery; at 6s. 6d.@6s. 5 1/2d. alongside for 96 per cent. For January-February delivery 6s. 3d. has been paid for 95 per cent, closing with sellers at 6s. 2 1/2d. alongside for February-March delivery. Exports for the first six months this year have been 13,056,000 qtls., against 12,285,000 qtls. for the corresponding period last year. We quote 95 per cent July-August, 6s. 3d.; September-December, 6s. 3 1/2d., and 96 per cent, July-August, 6s. 6d.; September-December, 6s. 4 1/2d.@6s. 5d., all ordinary terms. The price of 6s. 3d., with an all-round freight of 17s. 6d., stands in 7s. 10d. per cwt., net cost and freight, without purchasing commission.

Phosphates.—The buying season will soon commence abroad. How profitable it will be to sellers depends on a revision of prices, since present quotations yield little in a fluctuating freight market. The exports of high-grade Florida rock from Savannah and Fernandina, the two leading ports, from January 1 to July 31, aggregated 212,245 long tons, against 170,112 tons last year, showing an increase of 42,133 tons, or about 25 per cent. The average c. i. f. price this year was \$10.62 per ton, which is over \$1 less than was quoted last year. Part of this decrease is attributed to lower ocean freight rates this year. The Tennessee shipments through Pensacola in the 7 months ending July 31 were 56,432 tons, showing a heavy falling off as compared with the corresponding period last year. The average c. i. f. price of export rock was \$9.84 this year, as against \$10.78 last year, a decrease of 94c. per ton. Ocean freight rates to Great Britain and the Continent were somewhat lower this year than last. Comparatively little South Carolina rock is being exported, as competition is keen with the Florida pebble and Algerian rock. England and France are the best customers for South Carolina phosphates, paying this year on an average \$5.98 c. i. f., against \$7.27 last year, a decrease of \$1.29.

Mining is active in nearly all sections, as weather is fair. Occasionally trouble is experienced with a short labor supply, but production is not materially affected thereby.

Recent charters from Tampa, Fla., to German ports have been booked on a basis of 15s. (\$3.60), August sailing.

Phosphates.	Per ton F. o. b.	United Kingdom or European Ports.	
		Unit.	Long ton.
*Fla. hard rock (78@80%)	\$6.50@7.00	6 1/2@6 1/4d.	\$9.68@9.58
*Fla. land pb. (68@73%)	3.00@3.25	4 1/2@5d.	6.50@7.00
Fla. Peace River (58@65)	2.25@2.50	4 1/2@5d.	5.70@6.00
†Tenn., (78@82%) export..	3.25@3.50	5 1/2@6d.	8.58@9.36
†Tenn., 78% domestic.....	3.00		
†Tenn., 75% domestic.....	2.75@3.00		
†Tenn., 73@74% domestic....	2.40		
†Tenn., 70@72% domestic...	2.10@2.25		
‡So. Car. land rock.....	3.25	4 1/2@5d.	5.67@6.30
‡So. Car. river rock.....	2.75@3.00		
Algerian (63@68%).....		5 1/2@6 1/4d.	7.15@8.13
Algerian (58@63%).....		5 @5 1/2d.	6.00@6.90
Algerian (63@58%).....		4 1/2@5d.	5.32@5.58

*Fernandina, Brunswick or Savannah.
†Mt. Pleasant. ‡On vessels, Ashley River.

Liverpool. Aug. 6.

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

A fair export business has been reported in several of the leading lines of heavy chemicals, but quotations are without change. Soda ash, nearest spot range, is about as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s@£6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces. Soda crystals are in good demand at generally £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special terms for certain export quarters. Caustic soda prices are well maintained as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash.

Bleaching powder continues slow of sale, but £6 12s. 6d.@£6 15s. per ton, net cash, is still nominal range for hardwood, with special quotations for Continent and a few other export quarters.

Chlorate of potash is more active. Price remains firm at 3d. per lb., net cash, but there is now little offering for prompt delivery.

Bicarb. soda is quoted at £6 15s. per ton, less 2 1/2 per cent for the finest quality in 1 cwt. kegs; with usual allowances for larger packages, also special quotations for a few favored markets.

Sulphate of ammonia is quiet, and if anything a shade lower at about £12 5s.@£12 7s. 6d. per ton, less 2 1/2 per cent for good gray 24@25 per cent in double bags f. o. b. here.

Nitrate of soda attracts little attention from buyers, and £8 12s. 6d.@£8 15s. per ton, less 2 1/2 per cent, is about nominal spot range for double bags f. o. b. here, as to quality.

METAL MARKET.

New York. Aug. 14.

GOLD AND SILVER.

Gold and Silver Exports and Imports.

At all United States Ports in June and Year.

Metal	June.		Year.	
	1901.	1902.	1901.	1902.
Gold:				
Exports....	\$5,344,844	\$3,750,750	\$29,491,226	\$20,400,504
Imports....	3,290,743	1,414,316	15,927,969	10,618,867
Excess. E.	\$2,054,101	E. \$1,059,598	E. \$13,563,257	E. \$9,880,637
Silver:				
Exports....	\$4,598,905	\$3,250,068	\$28,434,062	\$22,534,024
Imports....	1,934,357	1,802,853	15,135,186	12,351,131
Excess. E.	\$2,634,548	E. \$1,447,215	E. \$13,298,876	E. \$10,182,893

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending August 14 and for years from January 1:

Period.	Gold.		Silver.		Total Excess Exports or Imports.
	Exports.	Imports.	Exports.	Imports.	
Week ...	\$78,976	\$716,334	\$32,873	E. \$604,455	
1902.....	24,034,088	1,521,145	15,739,324	\$07,964 E. 37,414,303	
1901.....	25,733,318	1,819,822	20,029,894	2,466,262 E. 41,557,128	
1900.....	33,338,195	1,673,926	24,966,284	2,862,137 E. 55,168,416	

There were no gold exports this week; the silver went chiefly to London. Imports were from the West Indies and South America.

FINANCIAL NOTES OF THE WEEK.

Business continues generally quiet, as is usual in vacation season. The speculative markets are unattractive, although the Government report of good crops manifests influence with the industrial securities. Anticipation of stiffer call money, however, prevents heavy trading in these shares. A feature this week was the listing on the New York Stock Exchange by J. P. Morgan & Co. of 2,310,000,000 roubles (over \$1,000,000,000) 4 per cent bonds of the Russian Government. Gold exports have practically ceased for the present.

The statement of the New York banks, including the 63 banks represented in the Clearing House, for the week ending August 9, gives the following totals, comparison being made with the corresponding weeks of 1901 and 1900:

	1900.	1901.	1902.
Loans and discounts....	\$808,046,400	\$886,455,000	\$926,494,800
Deposits	897,409,400	965,381,000	959,643,000
Circulation	27,411,300	30,553,200	31,880,200
Specie	177,029,800	153,065,500	171,468,400
Legal tenders	75,443,500	79,202,700	77,473,900
Total reserve	\$252,478,300	\$262,298,200	\$248,942,000
Legal requirements	224,352,350	241,345,250	239,910,750
Balance surplus	\$28,125,950	\$20,952,950	\$9,031,250

Changes for the week this year were increases of \$6,823,200 in loans and discounts, and \$2,497,500 in deposits; decreases of \$303,900 in circulation, \$1,975,500 in specie, \$2,107,000 in legal tenders and \$4,706,875 in surplus reserve.

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

N. Y. Ass'd.	1901.		1902.	
	Gold.	Silver.	Gold.	Silver.
England	\$183,095,500	\$171,468,400	.....	.....
France	182,650,565	182,590,530	.....	.....
Germany	490,445,320	\$224,007,995	\$23,516,870	\$224,807,400
Spain	169,975,000	69,425,000	186,345,000	68,925,000
Neth Ids	70,015,000	84,735,000	71,015,000	97,025,000
Belgium	31,253,000	27,973,500	24,250,000	33,378,500
Italy	15,480,000	7,740,000	15,433,335	7,716,085
Russia	79,345,000	9,681,500	80,725,000	10,138,000
.....	351,110,000	37,295,000	373,465,000	45,055,000

The returns of the Associated Banks of New York are of date August 9 and the others August 7, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

In July the exports of domestic specie from San Francisco were \$213,531 in gold and \$826,853 in silver, making a total of \$1,040,384. Of the gold Japan received \$207,006, and of the silver the British East Indies got \$728,703. There was also exported during the month \$12,821 in foreign silver coin, principally to Hong Kong.

The market continues quite steady without any special feature. Considerable silver has been shipped from China to Bombay, and consequently the India demand in London has not been so large.

The United States Assay Office in New York reports receipts of 71,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to July 31 are reported by Messrs. Pixerley & Abell's circular as follows:

	1901.	1902.	Changes.
India	£4,575,210	£3,750,945	D. £815,265
China	376,908	112,380	D. 263,628
The Straits.....	79,978	70,550	D. 9,428
Totals	£5,031,194	£3,942,875	D. £1,088,319

Arrivals for the week were £79,500 from the United States, £4,500 from Chile, and £3,500 from Australia; total, £87,500, all in bar silver. Exports were £48,500 to Bombay, £15,000 to Calcutta, £2,500 to Madras, and £25,500 to Hong Kong; total, £91,500 bar silver.

Indian exchange in the absence of any special demand remains at 15.97d. per rupee for Council bills offered in London.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	\$0.40 3/4	\$0.42
Peruvian soles and Chilean pesos.....	38 3/4	42
Victoria sovereigns.....	4.86	4.88
Twenty francs.....	3.86	3.88
Twenty marks.....	4.75	4.80
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

August	Silver			Copper			Spelter			
	Sterling E change	N. Y. Cts.	London Pence.	Lake Cts. per lb.	Electrolytic per lb.	London £ per ton.	Lead per lb.	N. Y. cts.	St. L. cts.	
8	4.87 3/4	52 3/4	24 7/8	11 3/4	11 3/4	52 3/4	28 3/4	4.05	5.37 1/2	5.20
9	4.87 3/4	52 3/4	24 7/8	11 3/4	11 3/4	52 3/4	28 3/4	4.05	5.37 1/2	5.20
11	4.87 3/4	52 3/4	24 7/8	11 3/4	11 3/4	52 3/4	28 3/4	4.05	5.37 1/2	5.25
12	4.87 3/4	52 3/4	24 7/8	11 3/4	11 3/4	52 3/4	28 3/4	4.05	5.37 1/2	5.25
13	4.87 3/4	52 3/4	24 7/8	11 3/4	11 3/4	52 3/4	28 3/4	4.05	5.37 1/2	5.25
14	4.87 1/4	52 1/4	24 7/8	11 3/4	11 3/4	51 3/4	28 3/4	4.05	5.37 1/2	5.25

London quotations are per long ton, 2,240 lbs., standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures.

Copper.—The market remains extremely dull, while consumption is very good, but manufacturers are not buying, preferring to work up their stocks rather than enter the market now. This is due to the fact that some of the larger sellers have appeared anxious to effect sales and have reduced their quotations. However, the time is soon approaching when buyers generally will have to replenish their supplies. The demand from Europe is also not brisk. Buyers are influenced there by the decline in the London speculative market, which has been subject to some pressure. We have cable reports to the effect that consumers have about used up the stocks bought at the low prices of last winter, and that more business can soon be looked for from that quarter.

We quote Lake, at 11 1/2@11 3/4c.; electrolytic, at 11 3/4@11 1/2c., in cakes, wirebars and ingots; in cathodes, at 11 1/2@11 1/4c.; casting, at 11 3/4c.

The London market for speculative sorts, which closed last Thursday at £52 11s. 3d. for spot, and £52 15s. for 3 months, held at these figures until Tuesday, when it declined to £52 2s. 6d. for spot, and £52 6s. 3d. for 3 months; on Wednesday it was down to £51 16s. 3d. for spot, and £52 for 3 months, and on Thursday, £51 10s. for spot and £51 15s. for 3 months.

Refined and manufactured sorts we quote: English tough, £55 10s.@£56; best selected, £56@£56 10s.; strong sheets, £68 10s.; India sheets, £66 10s.; yellow metal, 6d.

Exports of copper from Atlantic ports in the week ended August 14 are reported by our special correspondents as follows: Great Britain, 55 tons; Germany, 190; Holland, 520; Belgium, 20; Russia, 50; Cape Breton, 27; total, 862 tons. Imports were 754 tons from Great Britain, Germany and Mexico.

Tin.—During the week under review the market was exceedingly dull. In consequence of the declining tendency in London, buyers here held off until Thursday, when the London market reacted and a fair demand set in on this side. Opinion is divided as to the cause of the London decline, but it appears to be due to bear sales. The statistical position of the metal continues very good. We quote spot tin at 28 1/4c.; August delivery, 28c.; September, 27 3/4c.

The foreign market, which closed last Thursday at £127 2s. 6d. for spot, and £125 for 3 months, declined on Tuesday to £126 10s. for spot and £124 5s. for 3 months; on Wednesday, £124 10s. for spot and £122 7s. 6d. for 3 months; on Thursday it closed at £124 15s. for spot and £122 10s. for 3 months.

Lead.—There is a good demand at last prices. We quote: St. Louis, 3.97 1/2@4.05c.; New York, 4.05@4.10c. The foreign market is unchanged at £11 1s. 3d.@£11 3s. 9d. for Spanish; English lead, 5s. higher.

St. Louis Lead Market.—The John Wahl Commis-

sion Company telegraphs us as follows: Lead is firm but unchanged; Missouri brands, 4c., and argentiferous, 4.05c.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of July 26 as follows: The lead smelters in the Sierra have been on strike since July 23, but several furnaces are being run with men from the mines. The price of silver during the week has been 13.25 reales per oz. The exchange has gone up by 4 centimos, making it 34.55 pesetas to £1. The local quotation for pig lead on wharf has been 62.50 reales per qtl., which on above exchange is equal to £10 2s. 11d. per ton of 2,240 lbs., f. o. b. Cartagena. Exports of pig lead have been 374,397 kilos to Marseilles. Other exports included 5,088 tons blende to Antwerp.

Spelter.—The scarcity of metal for early delivery continues, and demand for shipment within the next 60 days is unabated. Considerable business has been done, and we quote: St. Louis, 5 1/4c.; New York, 5 3/4@5 1/2c. The foreign market is unchanged, good ordinaries being quoted at £18 12s. 6d; specials, 5s. higher.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter continues scarce as ever, particularly spot metal, which is selling quietly on the basis of 5.25c.

Silesian Spelter Market.—Herr Paul Speier writes from Breslau, Germany, under date of July 28, that the market is firmer in tendency, and there are signs of better demand. Current prices are 18.75 to 19.15 marks per 50 kilograms, f. o. b. cars Breslau, which is equivalent to 4.08c. per lb. Imports and exports in Germany for the 6 months ending June 30 were as follows, in metric tons:

	Imports.		Exports.	
	1901.	1902.	1901.	1902.
Spelter	18,129	22,660	39,719	71,012
Zinc sheets	294	118	13,022	17,137
Zinc scrap	825	881	1,196	1,856
Zinc white	3,687	3,397	13,849	20,865
Lothopone	31	30	6,371	7,988
Zinc ores	81,860	63,783	38,929	5,061

The production of spelter in the Upper Silesian District for the first quarter of the year is reported at 28,698 metric tons, against 26,365 tons in the first quarter of 1901, showing an increase of 2,333 tons, or 8.9 per cent, this year.

Antimony.—Is unchanged. We quote Cookson's at 9 3/4c.; Hallett's, 8 1/4c.; Italian, Hungarian, Japanese and United States Star at 8c.

Nickel.—The price is now quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firmer. Ingot platinum in large lots brings \$19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities is worth 73 1/2c. per gram.

Quicksilver.—The New York price continues \$48 per flask for large orders, with a slightly higher figure for small lots. In San Francisco prices are steady, and the quotations are \$45.50@46.50 per flask for domestic orders. For export orders \$44.50 per flask is quoted. The London price remains £8 15s. per flask, with the same figure quoted from second hands.

Exports of quicksilver from San Francisco in July are reported by our special correspondent as 20,975 lbs. to Mexico, 7,650 lbs. to Honduras, C. A., and 1,153 lbs. to Alaska; total, 29,778 lbs., valued at \$17,165.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

	Per lb.	Per lb.
Aluminum.....	.....	.....
No. 1, 99% ingots.....	33@37c.	Ferro-Tungsten (37%).....28c.
No. 2, 90% ingots.....	31@34c.	Magnesium
Rolled sheets.....	4c. up	.....\$2.75
Alum-bronze	20@23c.	Manganese, pure (N. Y.).....60c.
Nickel-alum	33@39c.	Mangan's Cop. (20% Mn) 30c.
Bismuth	\$1.50	Mangan's Cop. (Best).....35c.
Chromium, pure (N. Y.).....	80c.	Molybdenum (Best).....\$1.82
Copper, red oxide.....	50c.	Phosphorus
Ferro-Molyb'dum (50%).....	\$1.25	.....50c.
Ferro-Titanium (10%).....	90c.	American
Ferro-Titanium (20@25%.....	.....	.....70c.
N. Y.).....	55c.	Sodium metal.....
		.....50c.
		Tungsten (Best).....
		.....62c.

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

Average Prices of Metals per lb., New York.

Month.	Tin.		Lead.		Spelter.	
	1902.	1901.	1902.	1901.	1902.	1901.
January	23.54	26.51	4.000	4.350	4.27	4.18
February	24.07	28.08	4.075	4.350	4.15	4.01
March	26.32	28.08	4.075	4.350	4.28	3.91
April	27.77	25.93	4.075	4.350	4.37	3.88
May	29.85	27.12	4.075	4.350	4.47	4.04
June	29.88	24.80	4.075	4.350	4.96	3.90
July	28.38	27.85	4.075	4.350	5.27	3.85
August .....	.....	26.78	.....	4.350	.....	3.80
September .....	.....	25.51	.....	4.350	.....	4.00
October .....	.....	26.62	.....	4.350	.....	4.23
November .....	.....	26.67	.....	4.350	.....	4.20
December .....	.....	24.36	.....	4.153	.....	4.31
Year .....	.....	26.54	.....	4.354	.....	4.09

Average Prices of Copper.

Table with columns for Month, Electrolytic (1901, 1902), Lake (1901, 1902), and London Standard (1901, 1902). Rows include January through December and a Yearly average.

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Table with columns for Month, London (1901, 1902), N. Y. (1901, 1902), and Y. Y. (1901, 1902). Rows include January through December and a Yearly average.

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

DIVIDENDS.

Table with columns: Name of Company, Date, Latest Dividend (Per Share, Total), and Total to Date. Lists various mining and industrial companies with their respective dividend details.

*Monthly. †Quarterly. ‡Semi-annual.

ASSESSMENTS.

Table with columns: Name of Company, Location No., Delinq., Sale, and Amt. Lists companies and their assessment details.

STOCK QUOTATIONS.

NEW YORK.

Table of stock quotations for New York, listing Company and Location, par value, and prices for Aug. 6, 7, 8, 10, 11, 12. Includes sales figures.

Total sales, 423,226 shares. *Per cent.

Coal, Iron and Industrial Stocks.

Table of stock quotations for Coal, Iron and Industrial Stocks, listing Company and Location, par value, and prices for Aug. 7, 8, 9, 11, 12, 13. Includes sales figures.

Total sales, 232,375 shares.

BOSTON, MASS.*

Table of stock quotations for Boston, Mass., listing Name of Company, par value, Shares listed, and prices for Aug. 7, 8, 9, 11, 12, 13. Includes sales figures.

* Official Quotations Boston Stock Exchange. Total sales, 74,777 shares.

PHILADELPHIA, PA. ‡

Table of stock quotations for Philadelphia, Pa., listing Name and Location of Company, par value, and prices for Aug. 7, 8, 9, 11, 12, 13. Includes sales figures.

‡Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 9,006 shares.

†Ex-dividend.

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.*

Table of stock quotations for Colorado Springs, Colo. with columns for Name of Company, par value, and sales for various dates from Aug. 4 to Aug. 9.

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 181,560 shares.

Colorado Springs (By Telegraph.)

Table of stock quotations for Colorado Springs (By Telegraph) with columns for Name of Company, par value, and sales for various dates from Aug. 7 to Aug. 13.

MEXICO.

Aug. 2.

Table of stock quotations for Mexico with columns for Name of Company, Shares, Last Div'd, Price, and Bid/Ask.

ST. LOUIS, MO.* Aug. 11.

Table of stock quotations for St. Louis, Mo. with columns for Name, Shares, Par Val., Bid., Ask., and Sales.

SPOKANE, WASH.* Aug. 7.

Table of stock quotations for Spokane, Wash. with columns for Name of Company, Par Val., H., L., and Sales.

Total sales 49,000 shares. *Reported by Hunner & Harris.

LONDON.

Aug. 2.

Table of stock quotations for London with columns for Name and Country of Company, Authorized Capital, Par value, Last dividend, and Quotations.

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

PARIS.

July 24.

Table of stock quotations for Paris with columns for Name of Company, Country, Product, Capital Stock, Par value, Latest divs., and Prices.

SALT LAKE CITY.* Aug. 9.

Table of stock quotations for Salt Lake City with columns for Name of Company, Shares, Par Val., High, Low, and Sales.

TORONTO, ONT. Aug. 12.

Table of stock quotations for Toronto, Ont. with columns for Name of Company, par val, High, Low, and Sales.

Total sales, 4,000 shares.

All mines are in Utah. *By our Special Correspondent. Total sales, 193,983 shares.

CHEMICALS, MINERALS, RARE EARTHS, ETC. CURRENT WHOLESALE PRICES.
(See also Market Reviews.)

Abrasives—			Barium			Graphite—Am. f.o.b. Prov-			Paints and Colors—		
	Cust. Meas.	Price		Cust. Meas.	Price		Cust. Meas.	Price		Cust. Meas.	Price
Carborundum, f.o.b. Niagara Falls, Powd., F. F. F. F.	lb.	\$0.08	Oxide, Am. hyd. cryst.	lb.	\$0.0234	dence, R. I. lump	sh. ton	\$8.00	Metallic, brown	sh. ton	\$19.00
Grains	"	.10	Sulphate (Blanc Fixe)	"	.02	Pulverized	"	30.00	Red	"	16.00
Corundum, N. C.	"	.07@.10	Barytes—			German, som. pulv.	lb.	.0134@.0134	Other, Am. common	"	9.25@10.00
Chester, Mass.	"	.0434@.05	Am. Crude, No. 1	sh. ton	9.00	Best pulverized	"	.0134@.02	Best	"	21.25@25.00
Barry's Bay, Ont.	"	.0734@.0934	Crude, No. 2	"	8.00	Ceylon, common pulv.	"	.0234@.0334	Dutch, washed	lb.	.0434
Crushed Steel, f.o.b. Pittsburg	"	.0534	Crude, No. 3	"	7.75	Best pulverized	"	.04@.08	French, washed	"	.0134@.0134
Emery, Turkish flour, in kegs	"	.0334	German, gray	"	14.50	Italian, pulv.	"	.0134	Orange mineral, Am.	"	.0734@.08
Grains, in kegs	"	.05@.0534	Snow white	"	17.00	Gypsum—Ground	sh. ton	8.00@8.50	Foreign, as to make	"	.0834@.1134
Naxos flour, in kegs	"	.0334	Bauxite—Ga. or Ala. mines:			Fertilizer	"	7.00	Paris green, pure, bulk	"	.12
Grains, in kegs	"	.05@.0534	First grade	lg. ton	5.50	Rock	lg. ton	4.00	Red lead, American	"	.0534@.06
Chester flour, in kegs	"	.0334	Second grade	"	4.75	English and French	"	14.00@16.00	Foreign	"	.0634@.08
Grains, in kegs	"	.05@.0534	Bismuth—Subnitrate	lb.	1.40	Infusorial Earth—Ground			Turpentine, spirits	gal.	.4034@.47
Peekskill, f.o.b. Easton, Pa.	"	.0134	Subcarbonate	"	1.65	American, best	"	20.00	White lead, Am., dry	lb.	.0434@.0434
flour, in kegs	"	.0234	Bitumen—"B"	"	.0634	French	"	37.50	American, in oil	"	.0534@.0534
Grains, in kegs	"	.0234	"A"	"	.05	German	"	40.00	Foreign, in oil	"	.07@.0934
Crude, ex-ship N. Y.: Ab-			Bone Ash	"	.0234@.0234	Iodine—Crude	100 lbs	2.45	Zinc, white, Am., ex dry	"	.0434@.0434
bott (Turkey)	lg. ton	26.50@30.00	Borax	"	.0734@.0734	Iron—Muriate	lb.	.05	American, red seal	"	.0634
Kuluk (Turkey)	"	22.00@24.00	Bromine	"	.40	Nitrate, com'l.	"	.0134	Green seal	"	.07
Naxos (Greek) h. gr.	"	.26.00	Cadmium—Metallic	"	1.40	True	"	.04	Foreign, red seal, dry	"	.0534@.0634
Garnet, as per quality	sh. ton	25.00@35.00	Sulphate	100 lbs.	2.00@2.50	Oxide, pure copperas col.	"	.05@.10	Green seal, dry	"	.0634@.0634
Pumice Stone, Am. powd.	lb.	.0134@.02	Calcium—Acetate, gray	"	1.30	Purple-brown	"	.02			
Italian, powdered	"	.0134	" brown	"	.90	Venetian red	"	.01@.0134			
Lump, per quality	"	.04@.40	Carbide, ton lots f.o.b. Niagara Falls, N. Y. or Jersey City	sh. ton	75.00	Scale	"	.01@.03			
Rottenstone, ground	"	.0234@.0434	Carbonate, ppt.	lb.	.05	Kaolin—(See Clay, China.)					
Lump, per quality	"	.06@.20	Chloride	100 lbs.	.75@.90	Kryolith—(See Cryolite.)					
Rouge, per quality	"	.10@.30	Cement—			Lead—Acetate, white	"	.0734@.08			
Steel Emery, f.o.b. Pittsburg	"	.07	Portland, Am., 400 lbs.	bb. l.	1.70@1.90	Brown	"	.06			
			Foreign	"	1.65@2.25	Nitrate, com'l.	"	.0634			
			"Rosendale," 300 lbs.	"	.75	" gran.	"	.0834			
			Slag cement, imported	"	1.65	Lime—Com. abt. 250 lbs.	bb. l.	.80			
			Ceresine—			Finishing	"	.90			
			Orange and Yellow	lb.	.12	Magnesite—Greece.					
			White	"	.1334	Crude (95%)	lg. ton	6.50@7.00			
			Chalk—Lump, bulk	sh. ton	2.50	Calcined	sh. ton	17.50@18.00			
			Ppt. per quality	lb.	.0334@.06	Bricks	M	170.00			
			Chlorine—Liquid	"	.30	Am. Bricks, f.o.b. Pittsburg	"	175.00			
			Water	"	.10	Magnesium—					
			Chrome Ore—			Carbonate, light, fine pd.	lb.	.05			
			(50% ch.) ex-ship N. Y.	lg. ton	24.75	Blocks	"	.07@.09			
			Bricks, f.o.b. Pittsburg	M	175.00	Chloride, com'l.	"	.0134			
			Clay, China—Am. com., ex-			Fused	"	.20			
			dock, N. Y.	lg. ton	8.00	Nitrate	"	.60			
			Am. best, ex-dock, N. Y.	"	9.00	Sulphate	100 lbs.	.75@.95			
			English, common	"	12.00	Manganese—Powdered.					
			Best grade	"	17.00	70@75% binoxide	lb.	.0134@.0134			
			Fire Clay, ordinary	sh. ton	4.25	Crude, pow'd.	"	.0134@.0234			
			Best	"	6.00	75@85% binoxide	"	.0134@.0234			
			Slip Clay	"	5.00	85@90% binoxide	"	.0234@.0334			
			Coal Tar Pitch	gal.	.08	90@95% binoxide	"	.0334@.0534			
			Cobalt—Carbonate	lb.	1.75	Carbonate	"	.16@.20			
			Nitrate	"	1.50	Chloride	"	.04			
			Oxide—Black	"	2.26@2.30	Ore, 50%, Foreign	unit	1.1@1.19			
			Gray	"	2.28@2.40	Domestic	"	.30			
			Smalt, blue ordinary	"	.06	Mercury—Bichloride	lb.	.77			
			Best	"	.20	Mica—N. Y. gr'nd, coarse	"	.03@.04			
			Copperas	100 lbs.	.4234	Fine	"	.04@.05			
			Copper—Carbonate	lb.	.18@.19	Sheets, N. C., 2x4 in.	"	.30			
			Chloride	"	.25	3x3 in.	"	.80			
			Nitrate, crystals	"	.35	3x4 in.	"	1.50			
			Oxide, com'l.	"	.19	4x4 in.	"	2.00			
			Cryolite	"	.0634	6x6 in.	"	3.00			
			Explosives—			Mineral Wool—					
			Blasting powder, A	25 lb. keg	2.65	Slag, ordinary	sh. ton	19.00			
			Blasting powder, B	"	1.40	Selected	"	25.00			
			"Rackarock," A	lb.	.25	Rock, ordinary	"	32.00			
			"Rackarock," B	"	.18	Selected	"	40.00			
			Judson R. R. powder	"	.10	Nickel—Oxide, No. 1	lb.	1.00			
			Dynamite (20% nitro-glycerine)	"	.13	No. 2	"	.60			
			(30% nitro-glycerine)	"	.14	Sulphate	"	.20@.21			
			(40% nitro-glycerine)	"	.15	Oils—Black, reduced 29 gr.:					
			(50% nitro-glycerine)	"	.1634	25@30, cold test	gal.	.0934@.1034			
			(60% nitro-glycerine)	"	.18	15, cold test	"	.1034@.1134			
			(75% nitro-glycerine)	"	.21	Zero	"	.1134@.1234			
			Glycerine for nitro (32-2-10° Be.)	"	.1234@.13	Summer	"	.0934@.0934			
			Feldspar—Ground	sh. ton	8.00@9.00	Cylinder, dark steam ref.	"	.0834@.1034			
			Flint Pebbles—Danish, Best.	lg. ton	14.75	Dark, filtered	"	.1134@.1534			
			French, Best	"	11.75	Light filtered	"	.1434@.1734			
			Fluorspar—			Extra cold test	"	.2134@.2634			
			Am. lump, 1st grade	sh. ton	\$14.40	Gasoline, 86°@90°	"	.16@.21			
			2d grade	"	13.90	Naphtha, crude, 68°@72°	bb. l.	9.05			
			Gravel and crushed, 1st gr.	"	13.40	"Stove"	gal.	.12			
			2d grade	"	12.40	Linseed, domestic raw	"	.63@.67			
			Ground, 1st grade	"	17.90	Bolled	"	.09			
			2d grade	"	16.50	Calcutta, raw	"	.85			
			Foreign, lump	"	8.00@12.00	Osokerite	lb.	.1134			
			Ground	"	11.50@14.00	Paints and Colors—					
			Fuller's Earth—Lump	100 lbs.	.75	Chrome green, common	"	.05			
			Powdered	"	.80	Pure	"	.16			
						Yellow, common	"	.1034			
						Best	"	.1034			
						Lampblack, com'l.	"	.0434			
						Refined	"	.07			
						Litharge, Am. powd.	"	.0434@.0534			
						English flake	"	.0834@.0834			
						Glassmakers'	"	.0734@.08			

THE RARE EARTHS.

	Cust. Meas.	Price
Boron—Nitrate	lb.	\$1.50
Calcium—Tungstate (Scheelite)	"	.60
Cerium—Nitrate	"	10.00
Didymium—Nitrate	"	35.00
Erbium—Nitrate	"	40.00
Glucinum—Nitrate	"	20.00
Lanthanum—Nitrate	"	30.00
Lithium—Nitrate	oz.	.60
Strontium—Nitrate	lb.	.0634@.07
Thorium—Nitrate 49@50%	"	4.50
Uranium—Nitrate	oz.	.25
Yttrium—Nitrate	lb.	40.00
Zirconium—Nitrate	"	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.