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THE NEW tax of 10 per cent on net proceeds of all mines in the Transvaal has been formally announced by the colonial government. There will be some discussion over this impost, especially as it does not appear just how net earnings are to be defined. Whether they are to include only the actual surplus available for division among stockholders, or the amount remaining after deducting actual working expenses from gross receipts, will make a great difference to the companies. The fact that the tax is actually to be levied, whatever its exact terms, is of importance, as showing the intention of the Government to put a considerable part of the future burden of taxes on the mining companies.



THE SCOTCH shale-oil industry, which has passed through several crises in recent years, still survives, and most of the companies are able to pay small dividends, notwithstanding the competition of American and Russian petroleum. It is a striking illustration of the close independence of modern commercial interests, that so good an authority as the London *Economist* should say that the Scotch oil industry has been saved this time by the bounties paid on sugar by Germany and other European countries. At first sight the connection between oil and sugar is not very clear. It appears, however, that the companies have been obliged to sell their oil at a loss, and that the small profits of the last two years have been derived entirely from the sales of sulphate of ammonia, which is an important by-product of shale distillation. The heaviest buyers of this fertilizer are the German beet growers, and it has been their demand which has kept up the price and supported the Scotch companies.



CUBA HAS not been looked upon in this country as a field for mining enterprise—except for iron ore—but some of our British friends seem to think differently. Our London correspondent writes that a company called the Cuban Mining and Development Company, with a capital of £250,000, has been placed on the London market. The object of the company is to acquire, among other things, a copper property in the province of Pinar del Rio, Cuba, from Mr. F. Kohly. Fifty thousand £1 shares have been subscribed by the friends of J. Pollock & Company, a firm of London stockbrokers. Mr. William Rich, late manager at Rio Tinto, has made a report on the property, and though no details are yet available, it appears that the mine is of considerable promise. The company has also acquired other properties containing coal, petroleum, etc.



SOME OF our esteemed contemporaries have had a good deal to say about the "competition of aluminum with copper," the text for their remarks being the fact that the Shawinigan Water Power Company in Canada has closed a contract for aluminum wire for the transmission line from its power plant to

Montreal. It is quite possible that the company has been influenced in making this contract by the fact that the Royal Aluminum Company—a Canadian branch of the Pittsburg Reduction Company—has located its works near the power plant in question. Apart from this consideration, there is no doubt that aluminum can be used for transmission wire and for other electrical work. This has been proved by experience and is generally admitted. It is, however, absurd to talk about aluminum "competing" with copper, unless the production of the former metal is very largely increased. As we have heretofore pointed out, the present production of aluminum is a mere trifle compared with that of copper, and the supply seems to increase so slowly that no extensive plant could substitute it for copper even if its managers desired to do so.



THE THREE leading iron producers of the world—the United States, Germany and Great Britain—furnish together about 80 per cent of the total iron supply of the world. We have now the complete figures for those three countries, and they furnish some interesting contrasts. The total pig iron made in these three countries for two years past is shown in the table below, the figures being reduced to metric tons, to give an exact comparison:

	1900.	1901.	Changes
United States	14,099,870	16,132,408	I. 2,032,538
Great Britain	9,052,107	7,886,019	D. 1,166,088
Germany	8,351,742	7,761,830	D. 589,912
Total	31,503,719	31,780,257	I. 276,538

The large decrease in British production put Germany very close to Great Britain, the difference last year being only 124,189 tons. It will be noted that the United States made more than half the total, its pig iron production exceeding the combined output of the two other countries by 484,559 tons.

The steel made by the three great producers is shown in the following table, again in metric tons:

	1900.	1901.	Changes.
United States	10,382,069	13,689,173	I. 3,307,104
Great Britain	4,479,471	4,982,509	I. 3,038
Germany	6,645,869	6,394,222	D. 251,647
Total	22,007,409	25,065,904	I. 3,058,495

Here again we find that the United States produced more than half the total, its output exceeding that of Great Britain and Germany combined by no less than 2,312,462 tons. This was due to the great increase in our production in 1901, for in the previous year our make of steel was 1,243,271 tons less than the total of the two other great producers.



THE STATISTICS of the world's production of gold and silver in 1901 are published elsewhere in this issue. The statement shows that notwithstanding the practical elimination of South Africa, which contributed nearly \$73,000,000, or 23 per cent of the world's total gold product in 1890, the total amount of gold won last year exceeded that in 1900 by about \$38,000,000, and equalled nearly 95 per cent of the maximum year, 1899. In 1898 South Africa was the leading source of supply, with the United States second and Australasia third. In 1899 Australasia was credited with the largest output, the United States continuing in second place, and the Transvaal dropping to third. During the last two years the United States has been at the head of the list, while

owing to the war mining operations in South Africa were almost entirely suspended. Gold production in the United States has increased regularly during the last 10 years, the output last year—\$80,218,800—exceeding that of 1898 by \$15,755,800, or nearly 25 per cent, and being more than 2.4 times that of 1891. The great increase in gold production during the last decade is attributed to the advances made in the economical mining and handling of ores and to the development of the cyanide process of recovery.

The United States also continues to lead in the production of silver, with Mexico second, these two countries yielding about 70 per cent of the total world's output. The balance of the production was furnished mainly by Australasia, Germany and Bolivia in the order named. The conditions surrounding the extraction of silver from its ores are so markedly different from those attending the production of gold that the increase or decrease in the output of one metal is not necessarily reflected in the other. The great bulk of the silver output of the United States is obtained in the smelting of lead ores, the silver ores either occurring with the lead ores or are added to the smelting charge for the lead furnace. At the present time fully 85 per cent of the silver produced in the United States is derived from lead smelting, and with this in mind it is interesting to note that the production of lead in the United States during 1901 was less than in 1900. Our production of silver last year was slightly larger (about 90,000 ounces) than in 1900; but owing to the decline in price the value fell off a little over \$1,400,000.



IN THIS ISSUE we begin the abstract of an important paper on sampling and dry crushing, by Mr. Philip Argall. It refers more especially to the treatment of the telluride ores of Cripple Creek, Colorado. While Cripple Creek has not led to the evolution of any new mining methods, it has been fruitful in geological suggestion and in the modification of milling practice. Rich mining districts are not the places where one expects to find the most economical methods of exploitation; that is reserved for localities where low-grade ores call forth the necessity for the exercise of such ingenuity as leads to economy. If the mills which treat the ores of Cripple Creek had been annexed to the mines and under the same management it is probable that there would have been less advancement on the metallurgical side, because big dividends dull the financial sense, but almost from the beginning of work in the district the reduction of the ores has been in the hands of custom-mills. These bought the ore in the open market, and the consequent competition among them served as a spur to efficiency. The gladiatorial theory of existence has worked for the survival of those mills most fitted to exist amid strenuous competition, for it is a fact that the total capacity of the various reduction works has usually been ahead of the output of the districts so as to necessitate active rivalry. To be successful the mills have been compelled to improve the percentage of extraction and lessen the cost per ton, with a view to securing a profit in the face of slowly diminishing treatment charges. Mr. Argall, as manager of one of the largest of these milling establishments, took a prominent part in the competition for ore, and as a consequence contributed his share to improvements which eventually brought down the total cost of treatment, inclusive of the loss in extraction, on a telluride ore containing 1 ounce of gold per ton, from \$6 in 1898 to \$4.25 in 1902. Such a contrast speaks with the sort of eloquence which appeals to the practical man.

RESTRICTING BITUMINOUS PRODUCTION.

In order, so it is represented, to aid the anthracite miners in their present struggle the bituminous coal miners of central Pennsylvania have been ordered to suspend work two days in each week. This is to cut off the supply of soft coal which is being substituted for anthracite. Will this result be attained by such action? Let us look at some facts.

In 1899 and 1900, which were years of extraordinary activity in the coal mining industry, the average working time made by the 80,000 or 90,000 bituminous mine workers of Pennsylvania was 245 days in 1899; 242 days in 1900, or an average of 4.7 days a week. These figures include the time made by laborers inside and outside of the mine, mechanics, pit bosses, etc., who make usually a full week's work. The miner rarely averages more than four days a week even in the busiest years when there is plenty of demand for his labor. The average time made by all employees in and about the bituminous coal mines of Pennsylvania in 1898 was 4.4 days per week; in 1897, 1896 and 1895, it averaged a little less than 4. The entire suspension of work for two days in each week will have no effect on the production. On the other hand, most of the miners, if kept from work one-third of the time otherwise than by their own desire, will undoubtedly dig more coal than usual when at work, and the production will be found to increase rather than decline.

In 1897, when conditions in the anthracite fields were discouraging alike to the miner and the operator, attempts were made to restrict production by shutting down the mines from one-third to one-half the time. Instead of reducing the average time made from 33 to 50 per cent, the time lost showed a decrease of only 14 per cent, and the effect on the output was a reduction of only 3.5 per cent. The tonnage per man per day increased from 1.87 in 1896 to 2.09 in 1897. The same condition may be looked for as a result of the order closing the bituminous mines one-third the time.



THE MINERAL INDUSTRIES OF GERMANY.

The mining industry of Germany is an ancient one, operations in Saxony, the Harz and other districts dating back well into the Middle Ages. As in all other commercial countries, however, the greatest progress has been made during the past half-century, and especially during the past decade.

The leading items of the German mining industry are, of course, found in its coal and iron mines. In the output of both coal and pig iron the country is third among the world's producers, ranking below only the United States and Great Britain. In the mining of iron ore it is second only to the United States, though, like Great Britain, the demands of the blast furnaces have exceeded the home supply of ores, and imports on a considerable scale are now made. In one product Germany leads the world, the great deposits of potash salts at Stassfurt and in Hanover being the chief source of supply for both Europe and America.

Apart from these chief items, Germany is a considerable producer of zinc from the mines of Silesia; of copper from Mansfeld and some minor deposits; and of lead from various mines. The precious metals are not found to any great extent; though German metallurgical works turn out a large quantity of silver, it is chiefly from imported ores. The value of the lesser products, however, reaches a large sum in the aggregate.

German mining and metallurgy have always ranked high. The care and thoroughness which are

national characteristics are evident in the mines and reduction works. In no other country is such careful attention paid to details, to the avoidance of waste, and to the saving of all possible values. While in other countries there may be more attention given to large results and the production of great industries, we find extended use of the by-product of products are made. Thus, in the coal and iron quantities, there is none in which a greater variety coke oven some of the prominent types originating in Germany. The most extensive plants for the utilization of blast furnace gases exist there, and other economies are practiced to a greater extent than elsewhere. The application of slags from the basic iron and steel furnaces as fertilizers and in the manufacture of cement, and the making of bricks and paving blocks from slag are familiar instances of economy in the use of by-products. The treatment of the extremely complex ores mined near Freiberg was for many years a model to metallurgists, and resulted in building up in the Saxon town a school of metallurgy which was long without a rival.

It is to be regretted that the mining and metallurgical interests have been somewhat depressed for the past year as the result of a reaction from over-speculation in previous years; but there are already signs that this depression is passing away, and that the mining and metallurgical industries will soon resume their normal condition of prosperity.



MARKET CONDITIONS.

Iron and Steel.—In the iron and steel markets generally, conditions are quieter. The approach of the hot weather, the holidays and the fact that the production for the rest of the year is practically covered by contracts, have combined to produce this result. At the same time all producers are extremely busy and the market is firm. There is less pressure from belated buyers for early deliveries, except in structural steel. In this line builders, especially in the large Eastern cities, are very much behind, and it is quite probable that some work will have to be postponed. Some orders, it is reported, have been sent abroad.

The anthracite strike continues to affect a few Eastern furnaces but the reduction in output is not large. The strike of the Alabama coal miners, which is reported in our news columns this week, may interfere seriously with the production of pig iron in the South, unless it is settled soon.

Imports of pig iron and steel billets continue to increase, and those products are now quoted in Eastern markets, the range of prices being somewhat below the domestic.

The report of the United States Steel Corporation for the half-year ending with June is given on another page. The increase in earnings shown is sufficient evidence of the prosperity of the trade.

Copper.—The market is quiet, as is usual at this season, when many manufacturers are taking stock and balancing their books. Notwithstanding this, it looks as if bottom had been touched again, and consumers seem to be taking more interest. The June exports have been smaller than for any preceding month this year, but still show a large gain over last year's figures; while inquiries from abroad are more frequent.

Other Metals.—There have been few changes to report this week. Tin is still apparently tending towards lower prices. Consumption, however, remains good, and a fair current business is noted.

Lead remains unchanged in price, with a good consumption and about the usual business.

Spelter is still strong and active. Consumers are

buying steadily and smelters are not anxious to sell.

Silver has been quiet and shows somewhat lower prices. The Chinese Government, it is understood, has protested against the payment of the indemnity at the rate of exchange called for by the treaty, and has even stopped the payment of the current installment. The low prices of silver have materially increased the amount to be raised by taxation for the indemnity payments, and the Government wants some relief. The indications are that Great Britain and the United States will favor some measure of relief, but the other Powers will hardly consent.

Coal.—The Western coal markets are in better condition. Coal is now arriving freely at the Lake ports and the Lake trade is in better shape than it has been at any time this season. A June rise in the Ohio, coming on the last day of the month, has relieved conditions at Pittsburg, and has enabled the operators to make heavy shipments.

The Alabama coal miners have been unable to settle terms with the operators for the ensuing year, and struck on July 1. The miners demanded an increase of 5 cents in the maximum mining rate, making it 60 cents; semi-monthly pay-days; eight hours for a day's work and some minor changes. The Alabama rate is based on the price of pig iron, and for nearly a year past the men have been getting the maximum of 55 cents a ton. This strike is local entirely, and has no relation to the anthracite strike or the proposed movement of the bituminous coal miners. Regarding the latter, there is nothing new.

The seaboard bituminous coal trade shows no change from last week's report. The same thing may be said of the anthracite trade, though there are indications of an early attempt to resume work in the mines.



A HALF YEAR'S DIVIDENDS.

Stockholders in 132 companies identified with the mineral industry of the United States received in dividends during the past six months the enormous total of \$94,506,595. A large part of this amount was contributed by the big industrial combinations, led by the Standard Oil Company and the United States Steel Corporation.

The disbursements by 56 gold, silver and lead mining and smelting companies aggregated \$7,462,512, coming chiefly from Colorado, Utah and South Dakota properties. The largest individual payer was the American Smelting and Refining Company, with \$1,750,000, being two quarterly payments on its 7 per cent preferred stock of \$50,000,000. It is also noteworthy that a number of mines in the Cripple Creek District of Colorado and in Utah have consolidated in order to avoid costly litigation over mining rights. Unfortunately for stockholders, however, dividends have been cut in some of these cases by the expense of forming and promoting the new companies. Of course, there are exceptions where the consolidation proved immediately beneficial.

The copper companies have suffered from the low market prices for the metal which have necessitated a general reduction in dividend payments to stockholders. In all 10 properties in Michigan, Montana, California and Arizona paid \$6,337,431. The foremost payer was Amalgamated, which declares dividends according to the earnings on stock which it holds in other concerns. The amount paid by this company was \$2,308,318, which reduced the annual rate from 8 per cent paid on a capital of \$75,000,000 to 2 per cent on \$155,000,000, of which \$153,887,900 is outstanding. The Calumet & Hecla Company,

of Michigan, with a capital stock of only \$2,500,000, has paid \$1,500,000. This amount is, however, only one-half what was paid in the corresponding period last year.

Two zinc properties paid \$722,496, most of which was reported by the New Jersey Zinc Company.

Four California quicksilver mines paid \$86,500.

Of the \$79,897,646 paid by 60 industrial concerns, the greater part was contributed by the iron and steel, the petroleum and the natural gas companies. Fourteen properties in the first named group disbursed \$41,473,431, of which the United States Steel Corporation alone furnished \$28,227,732, or over two-thirds the total. The steel trust pays 7 per cent yearly on its \$510,314,100 preferred stock outstanding, and 4 per cent on the common stock of \$508,495,200. In the oil and gas section 24 companies paid \$30,811,689, headed by the Standard Oil with \$29,100,000. This company paid last year 48 per cent on its issued stock of \$97,000,000, and so far this year has declared 30 per cent. There have also been numerous smaller dividends paid in California and Texas, and in the older fields, which amount to a good total.

The coal and coke dividends have been materially added to by the heavy payments of the railroad and river coal combinations at Pittsburg and others. In all 13 companies paid \$5,082,189.

Nine chemical and mineral companies declared \$2,530,337. At the head stands the Virginia-Carolina Chemical Company, the big Southern fertilizer combination, with \$1,109,649 to its credit. This company pays annually 8 per cent on its preferred capital of \$12,000,000, and recently increased the rate on \$27,984,400 issued common stock to a 5 per cent basis.

In addition to the above mentioned dividends were paid by foreign companies in which our people are interested, as follows: \$1,090,133 by 16 Mexican properties, \$735,544 by 9 Canadian, \$90,000 by 1 Central American mine owned in New York, and \$70,760 by 1 South American, controlled in Great Britain, making a total of \$1,986,437.

Numerous other private and close corporations paid large dividends to their owners. It is, however, almost impossible to estimate the amount of such payments. However, the large dividends paid by public concerns at least indicate the profits resulting from legitimate investments in the mineral industry.



THE GOLD MINES OF THE TRANSVAAL.

The Transvaal—or rather the district known as the Witwatersrand, which includes most of the producing mines—occupies a position unique among gold mining districts. It has been differentiated from other countries by its rise in a few years to be the leading gold producer of the world; by the absence of placer deposits, from which the first great gold production of California and the Rocky Mountain States and of Australia came, and from which the gold of Siberia and the Yukon is still derived; and by the nature of its blanket deposits, which has made it possible to calculate future values and probabilities in a way which is impossible in any other known region. The gold output of the country reached its maximum at \$78,070,761 in 1899; it would have exceeded \$90,000,000 in 1900 and would probably have reached \$110,000,000 in 1901, had not the breaking out of the war stopped mining operations, which are not yet fully resumed.

The beginning of gold mining in the Transvaal was not on the Witwatersrand, but in the Lydenburg

District, where placer gold was found in 1876 and quartz veins at a somewhat later period. The De Kaap gold-field was a later discovery. These districts, however, are of comparatively small extent and value. The blanket beds of the Witwatersrand were not discovered until 1885, and the first productive work was done in 1887, when there was a small output of 23,000 ounces of gold. For some time the new district had a loubtful future. The existence of gold was undoubted, but the mines were not generally profitable. It was not until the treatment of the mill tailings by the cyanide process was introduced and a closer saving of gold thus secured that success and profit were assured.

The Transvaal has never been a "poor man's country." From the beginning the operations have been conducted on a large scale, by companies with large capital. The mills are generally large, most of them having 100 stamps or more, and the forces employed in mills and mines are correspondingly large. Moreover, the operations have generally been controlled by a few combinations of capitalists, though the stocks of the companies are widely distributed among holders in England and on the Continent of Europe, French buyers especially having invested largely in these securities. At the present time the capital invested in Transvaal mines is represented by stocks and debentures amounting in all to over \$350,000,000; and proposed new issues will increase this to about \$400,000,000. Moreover, the selling prices of these securities make their nominal or market value more than twice the par, the total running up to about \$800,000,000 at present quotations.

The mines actually producing extend a distance of about 12 miles along the reef. The whole length of the so-called outcrop is nearly 30 miles, but the eastern and western sections are not yet fully tested, and exploitation is confined to the central section. It is quite possible, however, that valuable mines may be made beyond the limit of that section. The entire belt of gold-bearing country was long ago covered by claims, and preparations were made for its working.

The older mines of the central section, which were started on claims covering the outcrop of the blanket reef, are now for the most part approaching a point where their life can be determined within a year or two. The peculiar nature of the formation has permitted the addition to these mines, however, of the so-called deep level mines, which are intended to reach and exploit the deposit at points beyond the limits of the outcrop mines. A number of the first row of deep level mines are already in operation, while work is in progress on several of the second and even the third series.

The future of the Witwatersrand lies with these deep level mines. There is no reasonable doubt that they will reach the reef, and the only questions to be answered relate to the depth to which it will be possible or profitable to work. The ore of these mines is of high grade. The best mine—the Robinson—returns about \$20 per ton; but the general average does not exceed \$10 per ton. For ore of this value to pay the cost of mining at great depths and interest on the capital sunk in putting down shafts and other dead-work, it is evident that the work must be done on a large scale and that each company must control claims enough to make a large property. In fact the work is being undertaken in this way, so that with shafts of 4,000 feet and over in depth, mills of 200 stamps and over will be the rule, with other work in proportion.

In some respects conditions are very favorable for deep mining. Mr. John Hays Hammond, who is high authority on this point says: "From present

indications the influx of excessive quantities of water is not to be apprehended. In respect to temperature, the district is especially fortunate, in that the increment of temperature with depth thus far observed has been abnormally low. In the case of the Robinson Deep mine, it is about 1° F. for 212 feet of vertical depth. With the exception of the additional cost of haulage, pumping and ventilation, there are no factors operating against mining on the Witwatersrand to a depth of at least 8,000 feet vertically. These costs will not afford any insuperable obstacle to profitable mining, provided, of course, the geological character of the deposit is not adversely changed. So reliable is the formation, from a geological point of view, as regards its mining potentialities, that engineers have felt justified in assuming the existence of payable ore at depths of 1,000 feet vertically and upwards beyond the extent in depth of any mining operations. Thus far the results of actual operations upon these areas have justified their position."

It has even been estimated by others that the depth may be extended to 10,000 or even 12,000 feet; though this depends upon conditions and appliances still to be tested.

As to the future production, Mr. Hammond's estimate is that within the limits of practicable mining there may be \$3,000,000,000 in gold to be taken from the areas of the central section; to which \$1,000,000,000 more may be added for the East and West sections, on which comparatively little has been done. To work out the whole of this vast amount will require from 30 to 40 years' time. It may fairly be assumed that within the next three or four years the production of gold from the Witwatersrand will reach \$125,000,000 yearly; and this rate can be kept up for a number of years.

The greatest immediate difficulty will be found in the supply of labor. In 1898, when approximately 7,330,000 tons of ore were mined and milled, there were employed in the mines, in round numbers, 9,500 white men and 89,000 Kaffirs. It is probable that with the rush which is likely to follow the full reopening of the Transvaal there will be no trouble in securing all the white labor needed; but the negro labor is another matter, and to obtain a sufficient number of natives for the increased extent of operations, and to keep them at work will constitute a problem which will tax the resources of the companies and the new colonial government. Even with the limited number of mines now at work, there is difficulty in getting all the native labor wanted. The Kaffir makes a good mine workman in many respects; but he lacks staying power and is not willing to remain in the mines for any extended period. Stricter regulations and even a system of peonage or semi-slavery have been suggested, but it will not be easy to carry out the latter in a British colony. Whether the labor to mine and handle 12,500,000 tons of ore can be had remains to be seen.

The metallurgy of the Transvaal ores is not a difficult proposition. Their treatment, to sum it up briefly, has consisted in crushing by stamps, amalgamating over plates, treating the tailings and slimes by some form of the cyanide process and treating a comparatively small residue of pyritic concentrates by chlorination or smelting. Approximately two-thirds of the value in gold is won by amalgamation and one-third by cyaniding. It is not probable that any serious difficulties will be encountered in the future.

The contribution of the Transvaal in the past to mining knowledge and experience as been the possibilities of the cyanide process on a large scale. Its contribution in the future is likely to be an extension of our knowledge as to the possibilities of working at great depths.

TIN PRODUCTION AND CONSUMPTION.

IN THE ENGINEERING AND MINING JOURNAL for January 4 last we referred at some length to the production of tin for eleven months of the previous year. The figures now at hand enable us to give an estimate of the world's production of that metal for the full year 1901. As we have heretofore noted, the supply of tin comes chiefly from countries in which no accurate statistics of production are kept; and estimates are necessarily based largely upon trade statistics showing the movements and consumption of the metal. The figures below are compiled chiefly from the excellent circular of Messrs. W. T. Sargent & Sons, of London, and from those of Ricard & Friewald and of De Monchy & Havelaar, of Rotterdam. These figures give approximately the production of tin for three years past, in long tons of 2,240 pounds:

	1899.	1900.	1901.
Straits to Europe and U. S.	44,501	46,058	50,382
Straits to India and China	1,480	1,800	2,650
Total Straits	45,981	47,858	53,032
Australian shipments	3,370	2,975	3,276
Banka, Billiton and Singkep	14,935	18,013	19,400
Bolivian exports	5,100	6,965	9,670
English production	4,500	4,500	4,500
Total production	73,886	80,311	89,878
Estimated deliveries	80,900	79,500	87,700
Surplus or deficit	D. 7,014	S. 811	S. 2,178
Estimated stocks	21,572	21,505	25,629

In addition to the production given above there is a small quantity of tin ore found in Germany and a little in vicinity of Guadalajara, in Mexico. These amount only to a few tons yearly, and may be neglected in the general statement as of no importance in a trade sense. In China there is a considerable output, the amount of which cannot be estimated with any approach to accuracy. Prof. Louis believed that it exceeded 10,000 tons yearly, and might possibly be as high as 20,000 tons, but he admitted the difficulty of forming any definite idea. It is all consumed in the country. Japan produces a small quantity, which is used almost entirely in making the bronze alloys for which the country is famous.

As we have heretofore noted, it is a curious fact that, with the exception of the comparatively small outputs of Cornwall and Bolivia, the world's supply of tin is mined almost entirely by Chinese labor, which is employed in the Banka and Billiton mines, as well as in the Malay Peninsula, and is even important in Australia.

The production of Straits tin—that is, the tin mined in the Malay Peninsula—is by far the most important, constituting last year 59 per cent of the total. Moreover, it is the part of the production which has shown the greatest increase in recent years. The Banka and Billiton outputs are believed to be capable of considerable development, but the actual growth has been moderate. More attention has been paid recently to the mining of tin in Bolivia, and the possibilities of that country as a producer are not fully known as yet. The Australian production does not grow, and seems to be rather neglected at present; while the mines of Cornwall, in England, are likely to decrease rather than to increase their output.

In spite of all the discoveries which have been reported from time to time, the United States is not in the list of tin producers. There are now rumors of the finding of deposits of stream tin in the Cape York region of Alaska. The first accounts seem promising, and should actual work prove them to be reliable, the field ought to be an important one. Arrangements are being made to explore it thoroughly.

Although it is not a producer, the United States is the largest consumer of tin. During 1901 the total imports of the metal into this country—which are practically the consumption—were 33,286 long tons, or 37 per cent. of the world's production. The tin which comes here is chiefly Straits tin, part being imported directly, though a considerable share is received by way of British ports. Some Banka tin also comes here, chiefly by way of Holland.

Great Britain is the second largest consumer of tin, while Germany is the third. Holland, while it transacts a large trade in tin, consumes only a small

quantity, most of the metal received from the East by the Dutch ports being sold and re-exported to other countries.

The stocks of tin in sight, including those in transit amount usually to from 25 to 30 per cent of a year's output. In the past three years they have decreased for various reasons. For some three years previous to 1900 the estimated consumption of tin was somewhat less than the production. In 1899 the conditions were nearly balanced; while in 1900 and 1901 the production was slightly in excess. The estimate stocks on hand at the close of each of the past three years are given below, in long tons:

	1899.	1900.	1901.
In store and float, U. S. and Europe	16,522	15,480	17,523
Banka and Billiton reserves	4,500	5,530	7,251
Bolivian unsold	550	495	846
Total stocks	21,572	21,505	25,620

It will be noted that the stocks reported at the close of last year were greater than for several years past. The active demand for tin during the first four months of the current year have reduced these accumulations somewhat, and the current supply is hardly equal to the demand. The peculiar conditions of the tin trade require the existence of a large supply, either in first hands or in transit.

The active speculation in tin, which was so prominent in 1900 and 1901, has subsided in part, and the market has more nearly approached conditions based on supply and demand. The limited production of tin and the opportunities for covering the supplies have made it a more speculative article than any other metal, as has been shown during the past two years.

IRON AND STEEL EXPORTS AND IMPORTS IN MAY.

The exports of iron and steel from the United States in May were valued by the Bureau of Statistics of the Treasury Department at \$8,392,108, against \$10,255,599 in May, 1901; a decrease of \$1,863,491, or 18.2 per cent. The chief items of these exports were as follows, in long tons:

	1901.	1902.	Changes.
Pig iron	1,569	1,673	I. 104
Bars	3,552	3,983	I. 431
Rails	42,530	8,031	D. 34,499
Sheets	3,364	2,523	D. 841
Structural steel	7,077	3,530	D. 3,547
Wire	7,305	11,012	I. 3,707
Nails	3,266	4,123	I. 857

The comparison is with a month of last year in which exports had already begun to fall off, as compared with previous months. Except in rails and structural material, changes were small.

The total value of iron and steel imported in May was \$3,263,331, against \$1,557,638 in May, 1901. Included in the imports this year were 30,708 tons pig iron, against 4,817 tons in 1901; and 24,383 tons of steel billets, against 711 tons last year.

Imports of iron ore for the month were 153,558 tons in May and 489,404 tons for the five months ending May 31, against 100,857 and 257,260 tons, respectively, last year. The increase for the five months was 232,204 tons.

IRON AND STEEL EXPORTS AND IMPORTS.

According to the Bureau of Statistics of the Treasury Department, the exportation of manufactures during the 11 months of the current fiscal year ending with May 1902 is greater than that of any preceding year, except in iron and steel. The total exports of manufactures for the 11 months ending with May amount to \$371,647,609, against \$378,533,496 in the 11 months of 1901, or only \$6,885,887 less than those of last year. The exports of iron and steel manufactures for the 11 months are \$90,780,571, against \$109,483,827 in the corresponding months of last year, a reduction of \$18,703,256. From this it would appear that the exports of manufactures other than iron and steel are \$11,817,369 greater than in the corresponding months of the preceding year. The exports of manufactures other than iron and steel are, for the 11 months ending with May, 1902, \$230,867,038. For the 11 months ending with May, 1901, they were \$269,049,669. For the 11 months ending with May, 1900, they were \$283,050,704, but when it

is remembered that these figures included the exports to Porto Rico and Hawaii, which are not included in those of 1901 and 1902, it becomes apparent that the exports of manufactures other than iron and steel in the present fiscal year are greater than those for the same period in any preceding year in the history of our commerce.

While the exports of iron and steel have been decreasing, importations of iron and steel have been increasing. The following table shows the imports and exports of iron and steel manufactures in 11 months of each of the fiscal years 1900, 1901 and 1902:

11 Months.	Imports.	Exports.
1900.....	\$18,689,857	\$110,038,875
1901.....	16,408,996	109,483,827
1902.....	23,544,325	90,780,571

From this it will be seen that the importations of iron and steel manufactures have materially increased during the three years, and the exportations of iron and steel materially decreased. The cause of this change in the condition of the foreign commerce in iron and steel is found in the extraordinary home demand for iron and steel products, which has not only left no surplus for export, but has required imports of some foreign products.

In the 11 months of the current fiscal year the exports of iron and steel constituted 24.4 per cent of the exports of manufactures, and 7.2 per cent of the total exports; against 28.9 and 8.1 per cent, respectively, for the corresponding period in the preceding year.

THE GEOLOGICAL SURVEY AND THE WESTERN MINER.

By T. A. RICKARD, DENVER, COLO.

The mine owners of the Cripple Creek District have recently made a joint request that the United States Geological Survey take up the examination of that gold-field again with a view to the preparation of a supplementary report. This incident is of interest. It emphasizes the value set on the work of the Survey by business men, it is a well-deserved compliment to Messrs. Whitman Cross and R. A. F. Penrose, who were the authors of the report which appeared in 1895, and it brings out the fact that the Cripple Creek mining area has been developed beyond the limits recognized at the time the officers of the Survey made their first investigations.

Cripple Creek underwent examination early. As a consequence the official report upon its geological structure was timely and serviceable. It has not always happened thus. Many of the publications of the Survey have been so long in making their appearance that when finally they have been sent out from Washington they have been in the nature of belated obituaries or overdue post-mortems. Timeliness is essential to the practical utility of a geological report. In a community where posterity is unregarded and immediate profit is the object of exploitation, mines are bound to be short-lived; mining districts rise and wane like South American republics, and the geologist must commence his studies as soon as sufficient development has taken place to afford the necessary data, in order that his diagnosis may be in time to aid the operation of mining.

Timeliness is of two kinds, that of examination and that of publication. It is generally known that several of the geological investigations of the Survey have been made punctually enough, but, on account of departmental red tape, the reports themselves have been permitted to become overdue. Examples of official tardiness are easy to mention: the Comstock monograph was a monumental obituary, the Silver Cliff bulletin appeared ten years after that district had been forgotten, while the Rico treatise, recently published, resembles a tribute to a friend who has been so long dead that it is cruel to remind his relatives of their loss. Such productions find an honored place among the archives of science, but they are dusty before they are catalogued, and they

fail altogether in giving that assistance to the local mining industry which is the basal cause of their preparation.

Occasionally, on the other hand, a mining region proves sufficiently long-lived to outstay departmental dilatoriness, the geologist's work receives useful application in the locality he has investigated and his interpretations of structure arrive in time to help the miner. Leadville and Emmons, Eureka and Curtis, Grass Valley and Lindgren, Cripple Creek and Penrose, and (to refer to a quite recent work of great merit) Silverton and Ransome are linked by pleasant association, because, in these instances, the map of the geologist has become a chart for underground exploration. In the case of Leadville, more especially, the debt of the mining community to the Geological Survey is measurable in millions of dollars; it is doubtful if anywhere else on the globe has geology been demonstrated to have so great a commercial value in its application to the unraveling of the intricacies of ore deposition.

The Government geologists had a difficult task in preparing the Cripple Creek report; the peculiar complexity of vein-structure, the manifold petrography and the incompleteness of the evidence obtainable eight years ago, were all factors which militated against success. Nevertheless, the labors of Cross and Penrose brought out the salient features of the local geology in such a manner as to be of great service to the mine managers, and now, their work having been tried and found good, there comes an earnest demand for a supplementary report; it is suggested that these geologists be sent again to collect the large store of new data accumulated in the wake of very extensive mining development, so that this fresh evidence may be embodied in a report which shall give further guidance to those who have the difficult task of opening up the deeper horizon recently reached by the workings of the mines.

I trust this will be done. Any action which brings the Survey and the mining community into closer touch is a great gain to both. A good deal can yet be done toward promoting mutual good will and understanding. There is hardly enough co-operation between mining men and official geologists; the former often make preliminary studies of the districts in which they live; they collect many data which they are only too willing to place at the service of science; sometimes they succeed in making so thorough an investigation of a limited area as to render the official examination almost unnecessary and certainly easy. The government official who comes along afterwards does not always recognize the difficulties of unaided research made during the intervals snatched from active mine management; he may fail to make the personal acquaintance of such men and thus miss the chance of promoting good-fellowship; he may refer to the work done by them only for the purpose of minor disagreement. Such things have happened, and they are now mentioned only because the writer desires to help on the good cause of co-operation between all those who are working for a common beneficent purpose. In this connection, it will not be out of place to refer to the fact that Mr. Emmons and Mr. Weed, for example, in their studies of celebrated mining centers, have, somehow, succeeded in winning the hearty goodwill of professional engineers to such an extent that most of the latter feel it to be a great pleasure to aid them in any little way within their power.

Geology has gained ground, of late, among mining engineers. The need for deciphering the complexities of new districts, the impetus given by printed discussions upon ore deposits and the exchange of opinions with members of the Survey have all contributed to this result. The American Institute of Mining Engineers has helped to bring together the official and professional men amid conditions favorable to a mutually good understanding. More can be done; but the initiative is with the Survey. This incident at Cripple Creek has its suggestiveness. The recent supplementary investigations of Mr. Emmons at Leadville are also to the point. In the case of a growing and productive mining district it may not

be possible for the Survey to keep in close touch with developments by maintaining a corps of investigators continually in the field: that is obviously too expensive for a department whose financial resources are already overtaxed; but would it not be practicable to make arrangements with mining engineers resident in the locality for the collection of new data and the maintenance of surveys such as are essential to the comprehension of the structural features of the local geology? If this were done, it would need but a small amount of time on the part of the official geologists to prepare a supplementary report, which could then be published, with a promptitude rendering it immediately serviceable for guidance underground. As matters are now managed an examination is made by a government geologist; after the report is issued the district is left more or less severely alone until, years afterwards, the mining community clamors for a supplementary report; in the intervening period a great deal of valuable evidence is lost, irrevocably, unless some studious mining engineer happens to record it. Mine workings do not stay open indefinitely, and, as a consequence, much of the testimony obtainable from them is entirely lost to science.

Considerations such as these derive some point from the action of the Cripple Creek mine owners.

There can be no question that there is a much greater interest in the work of the Survey than heretofore; this is due to the excellent work it has done and the recognition of the practical value of that work. Let it be made more timely and it will be increasingly appreciated.

THE UNITED STATES STEEL CORPORATION.

The United States Steel Corporation has made public a statement of its operations for the half-year ending June 30, the earnings for the month of June being partly estimated. The net earnings show the balance remaining after deducting, besides working expenses each month, the expenditures for ordinary repairs, renewals and maintenance of plants, also interest on bonds and fixed charges of the subsidiary companies. These net earnings were as follows:

January	\$8,901,015
February	7,678,583
March	10,135,858
April	12,320,766
May	13,120,930
June	12,250,000
Total, six months.....	\$64,407,151
Sinking funds, subsidiary companies.....	240,428
Depreciation and reserve funds.....	6,556,028
Interest on bonds, six months.....	7,600,000
Sinking fund on bonds.....	1,520,000
Total charges.....	\$15,916,456
Net balance.....	\$48,490,697

From this balance there were paid dividends on stocks as follows: Preferred stock, 3½ per cent, \$17,860,335; common stock, 2 per cent, \$10,166,633; outstanding stocks of subsidiary companies, \$106; total, \$28,027,074, leaving a balance of \$27,463,623 undivided profits. This balance may be applied to new construction, or to increase the reserve or surplus funds.

As the United States Steel Corporation was not organized until April, 1901, and its reports begin with that month, a full comparison for the half-year cannot be made. For the three months from April 1 to June 30, the net earnings by months compare as follows:

	1901.	1902.	Changes.
April	\$7,356,744	\$12,320,766	I. \$4,964,022
May	9,612,349	13,120,930	I. 3,508,581
June	9,394,747	12,250,000	I. 2,855,253
Totals	\$26,363,840	\$37,691,696	I. \$11,327,856

The gain in net earnings for the quarter was 43 per cent. The figures show sufficiently well the condition of the iron and steel industry.

THE DRY CRUSHING OF ORE.

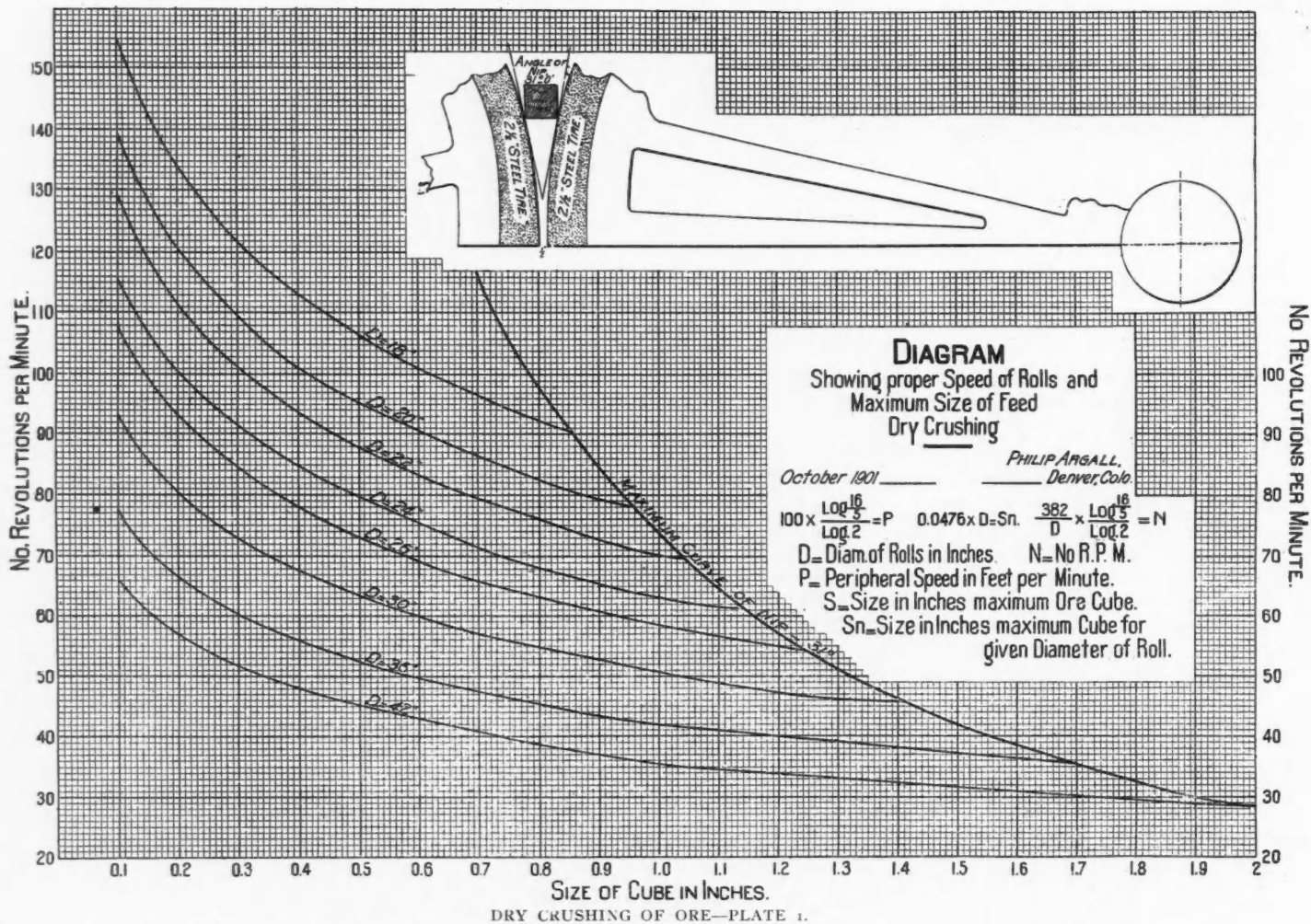
The dry crushing of ore, usually to a considerable degree of fineness, is the necessary preliminary to a large number of metallurgical processes; but notwithstanding the antiquity of the subject and the extent to which it is practiced, millions of tons of ore being crushed annually, there has been apparently but little effort to deduce the engineering data which are necessary for guidance in the design and operation of ore crushing plants, although the scientific principles have been investigated and discussed by various writers. For this reason the paper on "Sampling and Dry Crushing in Colorado," by Mr. Philip Argall, read before the Institution of Mining and Metallurgy, at London, February 20, 1902, is an especially important contribution to metallurgical literature. Its value is enhanced by the facts that

own rule is never to exceed the ratio of 4:1; that is, 16-inch pieces may be broken to 4 inches, and the latter to 1 inch in another operation, but he would preferably provide three machines; for example, reducing from 16 inches to 5 inches by the first breaker, from 5 inches to 1.5 inches by the second, and from 1.5 inches to 0.5 inch by a set of rolls. The capacity of the various machines must of course be considered, so that under average working conditions each will be kept fully supplied with ore. The coarse breaker may be followed by two fine breakers, and these by one or more roughing rolls, while in small plants it may be more convenient to sacrifice efficiency by making the breaker reduce more than 4:1, to avoid the complication of a second machine for a small capacity. Mr. Argall does not go into the details of coarse crushing. He states, however, that a

hand, the method of fractional selection—that is, the reservation of shovelfuls at regular intervals when the pile of ore is being handled for other purposes—is not only more convenient, but also is far more accurate. Automatic machine sampling is, however, superior in all respects to hand-sampling. This is now the general consensus of opinion. In sampling ores containing 10 to 15 ounces gold per ton, Mr. Argall has found the following ratio between the average size of the ore cubes and the proportional weight of the sample to give accurate results:

Average size, inch.....	1.0000	0.2500	0.0625	0.0171
Proportion of sample %.....	20	1.25	0.0785	0.0050
Pounds from 100 tons.....	40,000	2,500	157	10

In practical work, however, larger quantities of the fine material would be taken, simply as an extra precaution. The following system of sampling proved to be quite successful: The ore leaving the breakers



Mr. Argall is a recognized authority on this subject and the data now presented by him are deduced largely from his experience at the works of the Metallic Extraction Company at Cyanide, Colo., a plant designated and operated very successfully for seven years by him, where the fine crushing of the hard Cripple Creek ore was practiced on a large scale. His keenness in investigation, clearness of perception and originality in overcoming difficulties have led to results which another might have failed to obtain. In presenting the following abstract of Mr. Argall's paper, advantage will be taken of the opportunity to refer to an also important paper entitled "Notes on Dry Crushing," by Mr. N. F. White (published in the Transactions of the Australian Institute of Mining Engineers, Vol. VI., pages 37 to 62) wherein valuable data of the results obtained at Mt. Morgan, Queensland, are described. Mr. White's paper, although much less comprehensive and original than Mr. Argall's, treats of the subject in the same practical way.

Mr. Argall considers that in crushing material of which the pieces are smaller than 2-inch cubes, rolls are preferable to breakers. It is false economy and bad practice to attempt a great reduction in size in one operation or by means of one machine. His

12 by 20-inch breaker, reducing to a maximum size of 1.7 inches will easily have a capacity for 25 tons per hour of ordinary quartzite ores, but in case the ore is mostly in large pieces, say 12-inch cubes or larger, two breakers should be used in series with a screen between. Talcose and very wet ores give trouble; in bad cases they should be dried before going to the breakers. In referring to the capacity of crushing machines, it should be remarked how important a consideration the specific gravity of the ore is. The Cripple Creek ore, for example, is andesite, phonolite and granite, occupying in lump form about 25 cubic feet per ton and averaging 23 cubic feet after reduction to 30 mesh size. In crushing such an ore, as compared with many sulphides, the mineral is not only harder, but its volume is much greater.

Mr. Argall discusses at considerable length the methods of ore sampling, which are naturally performed in connection with the crushing operation; in fact, a good deal of ore is crushed with that object alone in view. In this branch of his subject we shall attempt only to summarize his conclusions. He condemns unreservedly the antiquated method of quartering and ably points out its likelihood of introducing errors. If the work must be done by

was of about 1 inch average size. From 100 tons (200,000 pounds) 40,000 pounds were cut out as the first sample. This was crushed to 0.25 inch size and 4,000 pounds was cut out by the second sampler. This was reduced to 8 mesh size (0.0625 inch) and cut down by riffling to 250 pounds, which was dried and crushed to about 30 mesh (0.0171 inch) and then riffling down to 15 pounds. The last sample was pulverized to 90 or 100-mesh and riffling down to 1 pound, which was ground on the bucking-plate to pass a 120 mesh (0.004 inch) sieve and divided into samples for assay. If the work were well done a half assay ton from any of the 120-mesh pulps would check within 0.02 ounce (40 cents) per ton. When the final samples were passed only through a 100-mesh sieve there was often difficulty in obtaining duplicate assays that would check. For cutting out the large samples the excellent apparatus designed by Mr. H. A. Vezin, of Denver, which is now in general use in Colorado, was employed. It will be observed that the cutting down of the small samples was done entirely by riffling.

Mr. Argall remarks the following as some of the important points to be remembered in machine sampling:

- (1) Take out a sufficient quantity in the first cut

to represent accurately a thorough sample at that size.

Where the ores are of low grade, or very uniform in composition, a small sample will suffice. Take iron ore, for example, or fluxing ores for blast furnace work, where it is important to keep them as coarse as possible, 10 per cent of ore as coarse as 6-inch cubes can be taken out by the Vezin sampler, if necessary, and, reduced proportionally, will give an accurate sample. When the ores are to be used in stamps or roller mills, and reduced to an ultimate state of fine division, it is preferable to reduce them finer for the first cut, and as a matter of precaution take out say 20 per cent for the first sample.

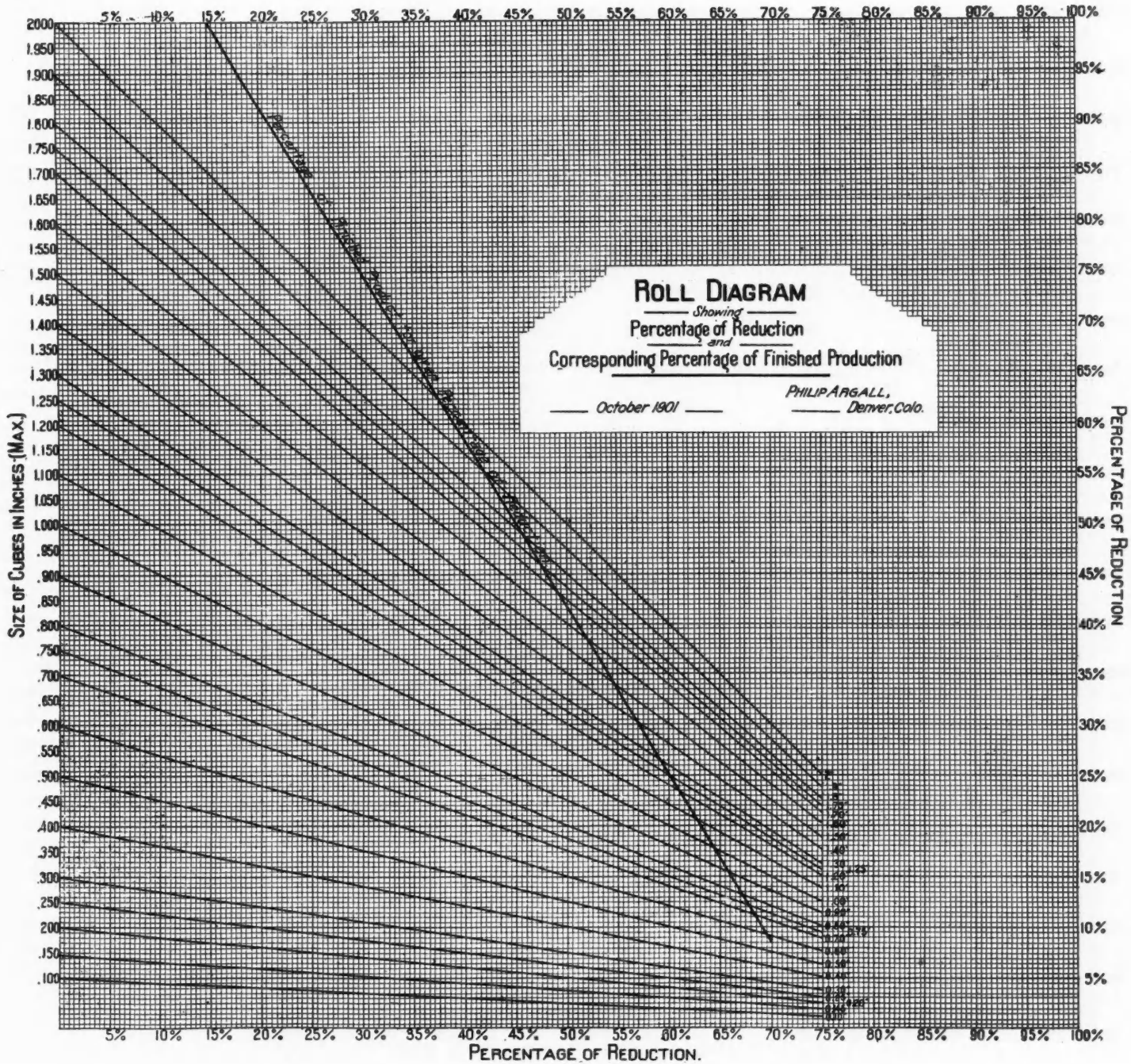
(2) Always crush and thoroughly mix the ore

as accurate a sample at 1/4 inch as 50,000 at 1 inch; or if the ore is all crushed to 1/4 inch, 3,125 pounds will do for first cut; and further, that on a reduction to 1-16 inch, 195 pounds bears the same ratio between size of cube and weight of sample as the 50,000 pounds did to 1 inch cubes, and hence will give a correct sample.

Mixing comes next in importance, more especially for spotted ores; for unless the sample is well mixed it will require a greater number of cuts to give accurate results; that is, the speed of the cutter must be greater or the number of scoops increased.

When the sample is crushed in rolls and elevated to the cutter, the mixing is found to be sufficient, provided there is a steady feed to the rolls so that a

if it be quite dry, but when hot they screen as well as hard, gritty ores. Mr. Argall employs the well-known 4-tube revolving dryer, invented by himself. This dryer is in principle the same as the ordinary cylindrical dryer, the products of combustion from the fire-place at the discharge end passing through the tubes, over the ore, but it has the advantages that the ore is divided into four thin streams and the hot gases are brought more closely in contact with the ore. The Argall 4-tube dryer is made in two sizes, No. 1 having a capacity of 80 to 100 tons of ore per day, and No. 2, 150 to 200 tons; the 6-tube dryers



DRY CRUSHING OF ORE—PLATE 2.

between each cut, unless it is already quite fine, and in this case the greatest possible care must be exercised in thoroughly mixing before making the second cut.

The very essence of ore sampling is never to cut or reduce the ore a second time without first crushing to a degree of greater fineness. A moment's reflection will show the necessity of this. We will assume a lot of ore crushed to cubes of 1 inch average size, and that 20 to 25 per cent is necessary to give a correct sample at this size, the latter (25) per cent being of course taken as a matter of precaution. Now it is obvious that if this sample is reduced 50 per cent without re-crushing, it simply amounts to taking out 12 1/2 per cent in the first cut, which with 1-inch cubes we have found to be 50 per cent too small to give a correct sample. It follows, therefore, that if 50,000 pounds are taken as the first cut from a 100 ton lot of 1 inch average cubes, and these are then crushed to 1/4-inch average, 3,125 pounds will give

uniform stream passes the cutters without intermission or break. When the ore is very fine, two or more cuts can of course be taken before crushing finer, but it is not nearly so safe a method as that previously described—solely on account of the difficulty in retaining a homogeneous mixture, more particularly when the ore is very dry.

(3) Use riffles for reducing the size of samples after leaving the last automatic sampler. Abandon all forms of "coning and quartering," mixing samples on floors, scraping and sweeping up samples, etc., and thus eliminate these sources of error and labor-wasting devices.

In the fine crushing of ore it is essential to dry it down to a content of no more than 1 per cent water, and also if the ore be clayey to raise its temperature to about 250° F. Cold ore of that class lies dead on the screens and has a tendency to choke them, even

have 50 per cent more capacity. The efficiency of these dryers is shown in the following table:

Name and location of mill	No. of dryer.	% Water		Tons ore dried per 24 hours	Tons coal used.	Remarks.
		Before	After			
Bessie, Telluride, Colo.	2	8.06	1.22	177	2.65	a
Cyanide, Leadville, Colo.	1	10.00	1.00	70	1.00	b
Metallic, Cyanide, Colo.	2	4.00	1.00	..	....	c

a Coal, poor quality of slack, burned with Jones underfeed stoker; ore clayey.

b Coal of fairly good quality, hand-fired; ore talcose and clayey; cylinders inclined 0.75 inch per foot and driven at 2 revolutions per minute.

c Coal good, burned with American stokers; ore siliceous.

The above data show an evaporation per pound of coal of 4.54, 6.3 and 9.00 pounds of water respectively. In making such comparisons, however, it is necessary to remember not only the difference in the grades of the coal, but also that clayey ores require a higher temperature and are more difficult to dry than sandy or porous ores.

The cost of drying ore is comparatively little. Assuming an evaporative effect of 7 lb. water per pound of coal, the cost of drying 100 tons of ore containing 6 per cent water, leaving 1 per cent in the product, is as follows: 1,430 pounds coal @ \$3.00=\$2.14; labor, \$2.00; repairs and lubricants, \$0.43; motive power, etc., \$0.25; total, \$4.82, or approximately 5 cents per ton.

Mr. Argall calls attention, as we have done repeatedly, in this journal, to the inaccuracy of specifying the size of wire cloth by the number of meshes per linear inch, the diameter of the aperture, which depends upon the gauge of the wire from which the cloth is woven being the important thing. Ordinarily the heaviest standard wire to be had for any given mesh is employed in ore milling, but there are cases where the opposite is the better practice. As a general thing the heavier wire is the better for coarse gritty ores, but for soft, clayey ores, likely to choke up the screens, the finer wire is preferable in a dry crushing mill. For coarse screening, say down to 0.25 inch openings, perforated steel plate trommels of circular section give the best service. From 0.25 to 0.10-inch wire cloth trommels, also of circular section, are preferable. For the finer meshes the hexagonal form of screen, of light construction so that the weights or hammers, when they fall, will throw the whole sheet into vibration, and thus tend to keep the meshes open are most advantageous. Heavy, rigid screens are a mistake.

The proper peripheral speed of fine hexagonal screens is about 180 feet per minute. The angle of slope should not exceed 10° from the horizontal. Ample screening capacity should be provided, making proper allowances for the inferior efficiency of dry sifting screens as compared with wet work. In crushing to 30 mesh (0.0171 inch) Mr. Argall has found that in general work 1 square foot of screen will deliver about 6 cubic feet of product per 24 hours, but with clayey ore the ratio is likely to fall to 1:5. Large screening surface not only means greater output, but also less repairs. In crushing 99,270 tons of ore, the cost of maintenance of screens was 2 cents per ton. With respect to housing the screens the following suggestions are offered:

The screening process is usually a dusty one, in fact the most dusty in the mill. If, however, the screens are grouped on each floor and completely housed in, not in boxes, but in a room large enough for men to enter and walk freely around the screens, to change and clean them, there will be no trouble from dust escaping, particularly if the room is connected with an exhaust fan, as it should be. Such a screen room would be closed everywhere air-tight, and have at most but two doors, one on each side: it could be wired for electric light, to be used only when the screen men are in the room. The heads of the elevators should be connected with this room, or rooms, and in fact all points in the mill requiring exhaust ventilation. The discharge from the exhaust fan should be conveyed into a bag-house, and forced through cotton bags, leaving the ore particles inside. The bags should be shaken every second day to detach the dust, and thus prevent the pressure against which the fan delivers the dust-laden air, from increasing above 2 ounces. A volume of 20,000 cubic feet of air per minute would require 5,000 square yards of filtering fabric.

For the purpose of fine crushing Mr. Argall is unequivocally in favor of rolls, except in connection with amalgamation processes, for which he recommends them only as an intermediate machine between the breaker and the stamps. He considers that the latter application would be advantageous, inasmuch as reducing the 2 inch stuff from a breaker to 0.75 inch size by means of rolls, and feeding the product of the latter to the stamps, the capacity of the stamps will be, in many cases, increased about 25 per cent, while the wear and tear on them will be

reduced. In crushing for the cyanide and chlorination processes, in which a granular product is desired, stamps would hardly receive consideration at all in modern practice. Aside from rolls, about the only standard type of machine available is the ball-mill, the merits of which Mr. Argall discusses later on. In ore-dressing works rolls can be used in wet crushing down to 20 mesh with very good results, and with fair results down to 40 mesh if there is not much clayey matter in the ore. In considering the questions pertaining to the design and operation of modern rolls, as to which Mr. Argall is a high authority, it is best to use his own language:

"Rolls are usually described as belted or geared. Geared rolls of high speed are an abomination, even in coarse crushing. Belt wheels of ample size to transmit the necessary power should in all cases be used, with the result of a saving in power, a great saving in repairs, better and more uniform work, and almost entire absence of the noise and jar inseparable from the use of geared rolls.

"Rolls as usually built have many defects, which in ordinary work are for a time, while the machine is new, passed over; but in fine crushing they immediately give trouble, and soon become intolerable. The first and most serious of these defects is separate journal boxes for the sliding roll, each held in place with its own tension rod and spring. In this arrangement, it is impossible to keep an even pressure on the rolls; as, for example, one side or pair of journals may be held up to the crushing position with a spring pressure of say 30 tons, while the opposite side may have but one-half the pressure, the result being unequal opening of the roll across its face, inferior crushing, end thrust and hot boxes. Any lack of parallelism between the rolls results in end thrust and tendency towards wearing away of the collars, and allowing the rolls to pass each other, setting up flanging, and greatly augmenting end thrust. As an alleged cure for this state of affairs, we sometimes find one roll 2 or 3 inches wider than the others, so that the narrower one can wear into its fellow, forming a flange on either side. This is a palliative nearly as bad as the disease, and is in no sense a cure. It does, however, increase the friction, decrease the capacity of the roll and increase its repair bill.

"Rolls should not only open parallel across the face under all conditions of service, but should also remain truly level; that is, a plane passing through the center of the fixed roll shaft should always intersect the center of the swinging or moving roll shaft. Any departure from this plane also tends towards end thrust, flanging, and greatly increasing frictional resistance of the machine. When the moving roll is mounted on any pin-jointed lever arrangement, these exact conditions are not fulfilled, while a slight wear of a pin joint disturbs the horizontality of the axis, and increases the friction. Therefore, it is apparent that the movable roll is best mounted in a sliding device, with large anti-friction surfaces. Where the roll is mounted on pin-jointed levers, I consider it bad practice to have them unequal except the shorter movement is given to the spring; in other words, the opening of the roll should not be multiplied on the spring, but, if possible, reduced, so as to ensure smooth running and lessening of shock. All rolls should have swivel or ball and socket journal boxes. The application of more power to the fixed than to the movable roll is not based on any good reasoning. Attempts to run one roll faster than the other are objectionable for several reasons; while catalog cuts showing an 8-inch belt on a 3-foot pulley running the movable roll 101 revolutions per minute, against the fixed roll with a 14-inch belt on a 7-foot pulley at 100 revolutions, are perhaps not more absurd than some other attempted roll practices, yet it has always struck me as very humorous.

"There is a wide variation in practice as to the speed of rolls, ranging, as they do, from the 30 or 40 feet per minute of the old Cornish roll, to the 800 to 1,000 feet of the modern high-speed rolls. In discussing speed, one very seldom hears of graduating it in accordance with the size of the ore to be

acted on; yet this is, in my opinion, a fundamental principle. A careful series of experiments has convinced me that there is a speed for each size of material which gives the maximum capacity with the minimum power. These speeds were correlated, and from them the formula and diagrams presented herewith were deduced. I do not wish to be understood as saying that these are the only correct speeds at which rolls should be operated; but I do say they are the speeds I have found to give the best results; that they are safe and reliable, and the engineer who conforms his practice accordingly will not be disappointed.

"In reducing coarse ore with rolls, I never exceed a ratio of over 4:1, crushing, say, from 2 inches to ½ inch, ½ inch to ¼ inch, and so on. In the diagram (Plate 1) I assume a roll is set with ½-inch opening between tires, and crushing from 2 inches to ½ inch, and so on proportionally for the other rolls. In each case the space between the rolls is equal to the mesh to which the roll is crushing. There is also, or rather there should be, a relative proportion between the diameter of the rolls and the size of the particles fed to them, more particularly in crushing the larger cubes, as it is manifest that if the size of the ore cubes materially exceed the "angle of nip," they will merely dance around and will not be drawn down and crushed. This phenomenon is more pronounced in the high-speed rolls.

"In my diagram the speed curves of the various size rolls are terminated on the right by another curve, which we may call the curve of nip. Taking the speed curve for a 42-inch roll, we find it terminated by the curve of nip on the 2-inch cube line at the twenty-eighth ordinate, showing that to crush 2-inch cubes we require a 42-inch roll, and that its proper speed is 28 revolutions per minute. Taking a 26-inch roll, we find the maximum sized feed 1.25 inches, the speed for these cubes 55 revolutions per minute, while for ½-inch cubes the speed is 73 revolutions, for 0.25-inch cubes, 88, and for 0.05 inch, 108 revolutions per minute.

"The theoretical capacity of rolls might be described as the number of cubic feet per hour that would be rolled out in a ribbon, the length being the peripheral travel of the roll in one hour, the width that of the roller faces, the thickness being the distance between the rolls; this we may express mathematically as $[P \times W \times S \times 60] \div 1728 = C$, where in P represents the peripheral speed in inches per minute, W width of the roll face in inches, S space between rolls in inches, C capacity in cubic feet per hour. Such a ribbon could not of course be homogeneous; it would have spaces and cavities unfilled, and would consist of particles of every size from the largest that could pass through the space between the rolls down to the finest dust.

"Let us take the case of a 26 by 15-inch roll, 60 revolutions per minute, crushing from 1 inch to ¼ inch. The theoretical capacity is by the formula at once found to be 589 cubic feet per hour, taking the mean diameter of the roll at 24 inches. But how shall we find the actual capacity of these rolls in cubic feet per hour of finished product? It is perhaps best to be frank and state that we cannot, as there are too many variables to be taken into consideration; but we can closely approximate it.

"Following up the case I have taken, the maximum size cubes are 1 inch, the minimum just a little coarser than ¼-inch as fed to the roll. Now, as different varieties of ores do not break alike, one sort may have as much as 15 per cent more of say ½-inch cubes in the feed than another, and would consequently give a larger percentage of finished product after passing through the rolls, and so on. My experiments have, however, shown that there is a very close relation between the percentage of reduction and the amount of finished product for any given ore. By percentage of reduction I mean an inch cube reduced to ¾ inch is 25 per cent reduction; to ½ inch, 50 per cent and to ¼ inch, 75 per cent.

"Referring to diagram, Plate 2, on the left, an inch is divided by horizontal lines into 100 parts, the scale extending 2 inches in height; next there is a series

of diagonal lines to give the percentage of reduction at the given sizes; and lastly a heavy diagonal line marked "Percentage of finished product for given percentage of reduction." This curve of finished product I have fixed from actual experiments with quartzose ores of medium crushing qualities. I consider it, therefore, correct for average conditions with first-class rolls. A few experiments, however (say three), will enable the engineer to plot this curve for any particular ore, and thereafter he can quite closely determine the actual capacity of any given roll on that particular ore.

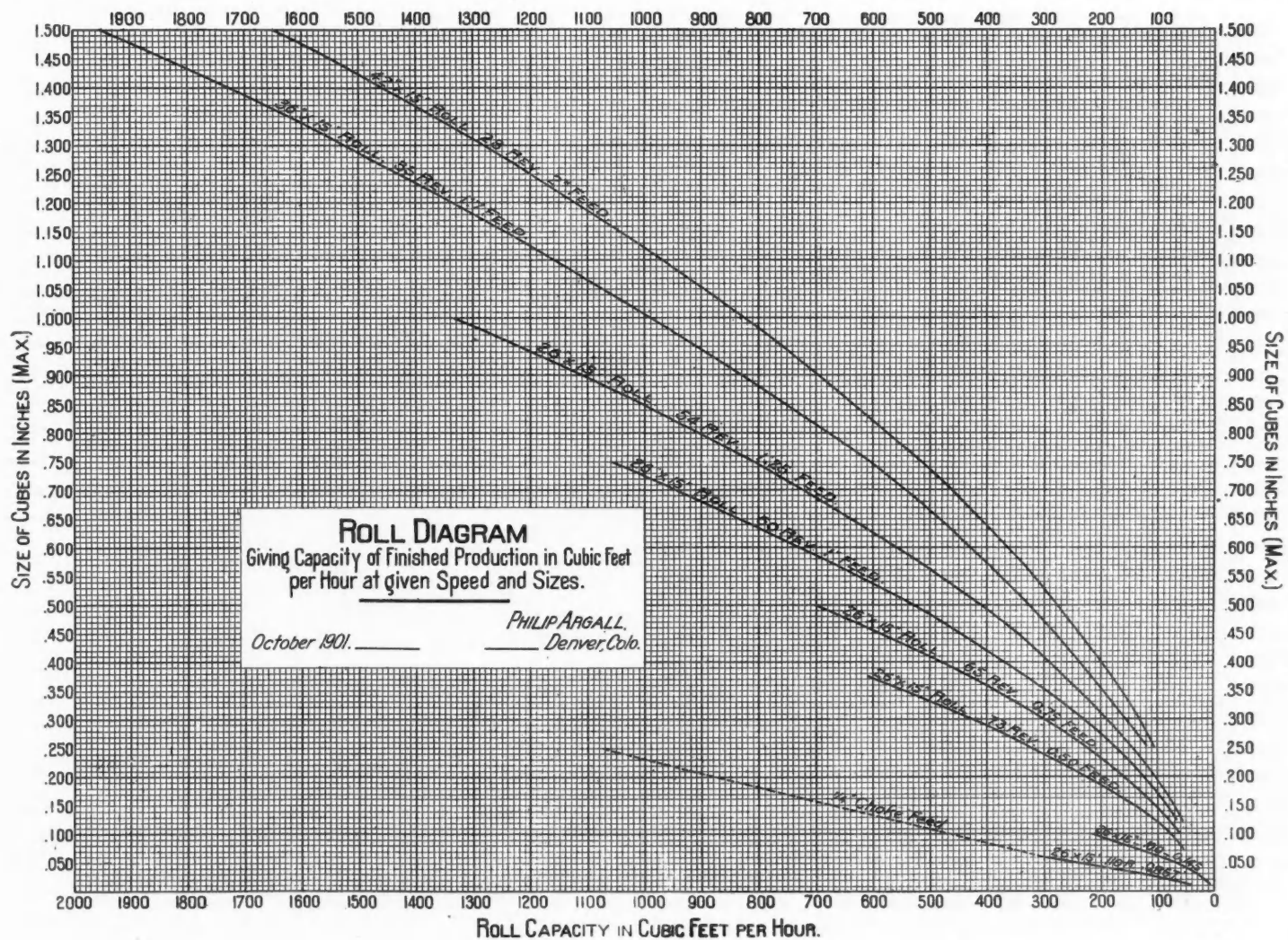
"Applying this diagram to our specific case, 1 inch to 1/4 inch. Following the diagonal line from 1 inch on the left, we find it intersects the 1/4-inch horizontal line at the ordinate marked 75 per cent reduction, showing that the maximum reduction in the crushing process has been 75 per cent. Taking 75 per cent reduction on the right hand of the diagram, and following the horizontal line, we find it intersects the

excellent rolls designed by himself. He states that one set of these, which has been in hard service for nearly two years, day and night, has neither developed defects nor suggested improvements. For six months it was operated at a speed of 900 feet per minute, crushing from 0.1 to 0.02 inch, but was afterward reduced to a speed of 750 feet to conform to the practice of that particular mill. All rolls, except coarse or roughing rolls, taking the ore from the breakers, should be provided with mechanical feeders. From 0.25 inch upwards, the stream should not exceed in thickness the maximum faces of the cubes; below this size, however, thicker streams can be used, on the principle that Mr. Argall calls "choke feed," so that the ore particles are crushed upon each other in passing the point of contact, and the capacity of the rolls is very much increased. A 26 by 15-inch roll at 110 revolutions, crushing from 0.1 to 0.02 inch, has a theoretical capacity of only 86 cubic feet per hour, about 30 cubic feet of finished product, whereas

ceding half year 46,000 tons were crushed for a tire cost of \$0.0256 per ton; the average was therefore \$0.0181 per ton crushed, or 3.62 ounces.

Babbit is better for roll bearings than bronze; it is also much cheaper. Where ball and socket, or swivel boxes are used, as they should be on all rolls, the boxes are preferably re-babbited each time the tires are changed. It is important to have but one size of rolls, so that fewer stores are required, and one extra set of shafts and shells with swivel boxes can be used in any of the rolls. In this way shells can be changed, turned up, and boxes babbited at leisure; and every time a change is made in the mill, the shafts have new babbit bearings to run in. The adoption of this method obviates all trouble from hot boxes.

Mr. Argall emphasizes the importance of gradual comminution by means of a series of rolls, with screens interposed between each set, as a fundamental principle in the fine crushing ore, and criticises



ROLL CAPACITY IN CUBIC FEET PER HOUR.

DRY CRUSHING OF ORE—PLATE 3.

curve of finished product at the 30 per cent ordinate, showing that for 75 per cent reduction the finished product per hour is 30 per cent of the theoretical. The latter we have previously seen is 589 cubic feet per hour, 30 per cent of which gives the cubic feet per hour of finished product as 176 cubic feet, and so on for any ratio of reduction shown of the diagram.

"Diagram Plate 3 shows the capacity in cubic feet per hour of various size rolls, running at the speeds most suitable for the size of the feed they are assumed to receive, compiled from Diagrams 1 and 2.

"These diagrams are figured in cubic feet per hour, which, in my opinion, is the only correct basis of comparison between ores. It is obvious that a roll crushing 5 tons of ore per hour, weighing 85 pounds per cubic feet in the crushed or finished state, would manifestly crush 10 tons per hour of material weighing 170 pounds per cubic feet, assuming the crushing condition of both ores is the same."

Mr. Argall gives some interesting data as to the

if run with choke feed 0.25 inch thick, its capacity will be 75 cubic feet per hour to 0.02 inch, using in each case first-class rolls. The space between the boxes of the movable and fixed rolls on either side should be filled up solid with chuck plates of different thickness, and one wedge plate to give the fine adjustment. The rolls are next spaced to about the size of the finished cubes, say 0.02 inch; the tension rods are then screwed up to the crushing pressure desired. This pressure does not come on the journals, but on the chuck plates; the rolls can then be revolved without touching each other, but immediately the 0.25 inch "choke feed" is turned on, they are forced apart against the accumulating spring pressure, and the ore is crushed upon itself, and also against the faces of the rolls. Mr. Argall used rolled steel tires 2 1/2 inches thick, giving 2 inches of wear. They cost 8 cents per pound, or rather averaged 8 cents per pound during a period when 40,000 tons were crushed, the cost per ton for tires being \$0.0107=2.14 ounces per ton crushed; during the pre-

the so-called unit system described by Mr. John E. Rothwell in *The Mineral Industry*, Volume IX, page 360, pointing out that it is more expensive in first cost, operation and maintenance than a system designed for gradual comminution, and is not after all a complete unit, it being admitted of course that the unit system is a good thing if carried out in its entirety. However, the mill designed for gradual comminution is capable of such a development, and in fact in large installations is commonly so arranged.

(To be Continued.)

FIRE-BRICK FROM WASTE GLASS-SAND.

—The *Clay Record* says that William Simpkins, foreman of the bent glass department at the Pittsburg Plate Glass Works in Kokomo, Ind., claims to have made the discovery of a process whereby waste sand can be utilized in the manufacture of fine clay brick. The company has been piling up sand in the bottoms for 12 years, until it covers an area of 12 acres 7 feet deep.

THE WORLD'S PRODUCTION OF GOLD AND SILVER DURING 1901.

By JOSEPH STRUTHERS, PH.D.

The production of gold and silver in the world during 1901 is given in the subjoined tables which, with the diagrammatic charts of the annual output of each metal in the principal countries of the world, presents very clearly the recent progress that has been made in the precious metal industry. The detailed statistics of the world's production for the years 1899 and 1900 are also given in order that the year's progress in each country may be compared with the development in the two years immediately preceding. The diagrammatic charts present an interesting object lesson of the production of the precious metals in the world from the year 1875 to 1901 inclusive, and give a study of the comparative progress during the closing quarter of the nineteenth century. The statistics here presented have been collected for the forthcoming Volume X. of *The Mineral Industry*, now in course of preparation, and I wish to acknowledge my indebtedness to my former assistant, Mr. D. H. Newland, for kind assistance rendered in the preliminary work of compilation.

GOLD.

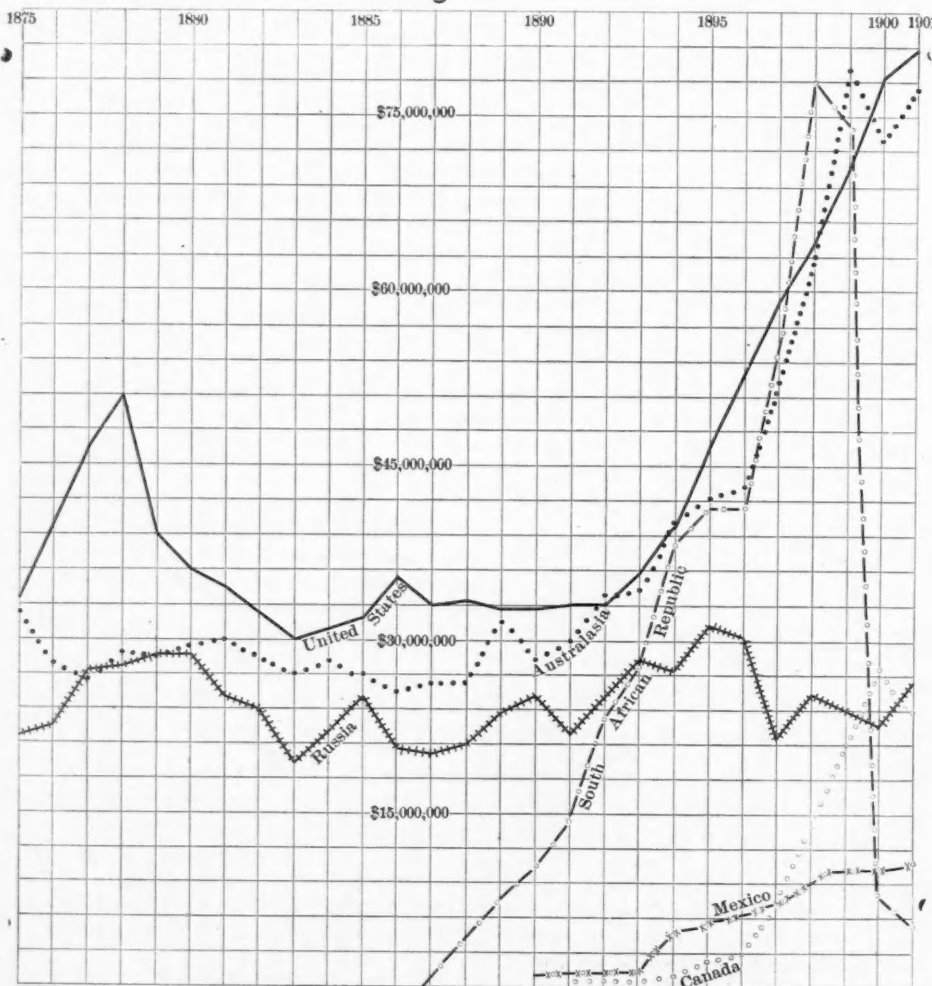
There was a slight increase in the quantity of gold produced in the world during 1901 over that of the preceding year, the respective statistics being 12,812,790 fine ounces, valued at \$264,840,477, as compared with 12,614,633 fine ounces, valued at \$260,743,830 in 1900. The quantity of gold produced in 1899 was the largest production on record, amounting to 15,139,140 fine ounces, valued at \$312,911,383.

From 1893 to 1899, inclusive, the three principal gold-producing countries were the United States, Australasia and the South African Republic. During this period they contributed from 65 per cent of the total output in the first year, to 74 per cent in 1899. In 1900 the Boer war caused the output of the South African Republic to drop to comparatively insignificant figures, but 348,760 fine ounces, valued at \$7,208,869, having been produced, and in 1901 a further decrease was made to 238,991 fine ounces,

THE PRODUCTION OF GOLD IN THE WORLD DURING 1899, 1900 AND 1901.

Countries.	1899.			1900.			1901.		
	Fine Ounces.	Kilo-grams.	Value.	Fine Ounces.	Kilo-grams.	Value.	Fine Ounces.	Kilo-grams.	Value.
AMERICA, NORTH:									
United States..	3,391,196	105,471.0	\$70,096,021	3,781,310	117,604.6	\$78,159,677 (h)	3,880,578	120,691.0	\$80,211,545
Canada	1,018,371	31,674.6	21,049,730	1,350,176	41,992.4	27,908,153	1,183,465	36,807.4	24,462,222
Newfoundland.	2,600	80.9	53,742	2,400	74.6	49,608	2,110	65.6	43,613
Mexico (a)....	448,832	13,960.1	9,277,351	455,204	14,158.3	9,409,063	499,725	15,554.2	10,329,316
Can. America..	25,402	790.0	525,034	38,703	1,203.7	800,000	49,831	1,549.8	1,030,000
AMERICA, SOUTH:									
Argentina	3,628	112.8	675,000	2,112	65.7	43,655	2,112	65.7	43,655
Bolivia	7,256	225.6	1,125,000	7,256	225.6	1,125,000	8,466	263.3	1,175,000
Brazil	107,644	3,348.1	2,225,000	127,820	3,975.4	2,642,060	145,138	4,514.0	3,000,000
Chile (b)	46,110	1,434.1	953,100	43,541	1,354.2	900,000	21,771	677.1	450,000
Colombia	111,272	3,462.2	2,300,000	111,272	3,462.2	2,300,000	100,145	3,114.7	2,207,000
Ecuador	6,047	188.1	125,000	9,676	300.9	200,000	12,700	394.9	262,500
Guiana (Br.)..	108,269	3,367.5	2,238,040	110,640	3,441.0	2,286,918	92,032	2,862.3	1,902,301
Guiana (D.)..	26,972	838.9	577,532	27,082	842.3	559,793	28,938	900.0	598,140
Guiana (Fr.)..	80,072	2,490.5	1,655,088	68,353	2,126.0	1,412,857	58,055	1,805.6	1,200,000
Peru	41,636	1,295.0	860,616	58,357	1,815.0	1,206,249	80,369	2,499.6	1,661,234
Uruguay	1,961	61.0	40,540	2,283	71.0	47,187	2,411	75.0	49,845
Venezuela	49,191	1,530.0	1,016,838	49,194	1,530.0	1,016,838	49,194	1,530.0	1,016,838
EUROPE:									
Austria	2,434	75.7	50,310	2,279	70.9	47,120	2,279	70.9	47,120
Hungary	98,677	3,069.0	2,039,657	105,143	3,270.1	2,173,308	105,143	3,270.1	2,173,308
France	8,681	270.0	179,442	6,527	203.0	134,914	6,527	203.0	134,914
Germany (d)..	3,601	112.0	74,435	3,601	112.0	74,435	3,601	112.0	74,435
Italy	3,643	113.3	75,301	1,849	57.5	38,215	1,849	57.5	38,215
Norway	74	2.3	1,539	86,813	2,700.0	1,794,420	86,812	2,700.0	1,794,420
Portugal	7	0.2	159	84	2.6	1,728	84	2.6	1,728
Russia	1,139,214	36,056.3	23,963,016	1,072,434	33,354.2	22,167,201	1,253,592	38,988.5	25,911,744
Spain	387	12.4	8,000	377	11.7	7,800	370	11.2	7,648
Sweden	3,414	106.2	70,580	3,414	106.2	70,580	2,845	88.5	58,817
Turkey	375	11.6	7,751	375	11.6	7,751	643	20.0	13,292
U. Kingdom..	2,845	88.5	58,810	12,760	396.8	263,749	9,664	300.6	199,754
AFRICA:									
Transvaal	3,529,826	109,782.6	72,961,501	348,760	10,846.9	7,208,869	238,991	7,432.9	4,939,944
Abyssinia	20,126	626.0	416,000	33,865	1,053.3	700,000	33,865	1,053.3	700,000
Rhodesia	54,241	1,687.0	1,127,170	79,354	2,468.0	1,640,251	148,753	4,626.4	3,074,730
Soudan	2,701	84.0	55,830	2,701	84.0	55,826	2,701	84.0	55,826
West Coast....	33,978	1,005.7	702,327	36,284	1,128.5	875,000	30,000	933.0	620,100
Madagascar ..	11,060	344.0	228,622	33,471	1,041.0	691,849	36,284	1,128.5	875,000
Mozambique....	5,416	168.4	111,918	8,475	263.6	175,176	12,377	384.9	255,840
ASIA:									
Borneo (Br.)..	11,168	347.3	230,850	19,873	616.9	410,038	21,771	677.1	450,000
China	273,246	8,501.4	5,650,000	208,031	6,470.1	4,300,000	145,138	4,514.0	3,000,000
E. Indies (D.)	7,234	225.0	149,527	26,609	827.5	550,000	43,541	1,354.2	900,000
India (Br.)...	457,021	14,214.0	9,446,624	512,710	15,946.0	10,597,712	455,870	14,178.2	9,422,850
Japan	53,998	1,679.4	1,116,129	68,485	2,130.0	4,415,598	73,952	2,300.0	1,528,385
Korea	70,954	2,206.9	1,466,690	87,885	2,733.3	1,816,525	111,272	3,466.7	2,300,000
Malay Peninsular.	16,459	512.0	340,200	17,048	532.2	352,382	18,000	559.8	372,060
Australasia (f).	3,810,130	118,500.0	78,755,372	3,568,279	110,978.5	73,756,325	3,728,057	115,947.8	77,058,938
Unspecified (g)	21,771	677.1	450,000	21,771	677.1	450,000	21,771	677.1	450,000
Totals	15,139,140	470,808.7	312,911,383	12,614,633	392,331.8	260,743,830	12,812,792	398,507.0	\$264,840,477

(a) Figures based on exports of ores, matte, etc., and coinage. (b) Computed from exports. (c) As reported by the *Statistique de l'Industrie Minière*. (d) Production from domestic ores. (e) Estimated. (f) Includes six States and New Zealand. (g) Includes Serbia, Persia, British New Guinea and Philippine Islands. (h) Estimate furnished by Mr. George E. Roberts, Director of the United States Mint.
NOTE.—The value of gold is \$20.67 per ounce, which is equivalent to \$664.60 per kilogram.



THE WORLD'S PRODUCTION OF GOLD.

valued at \$4,939,944. In 1900 and 1901 the United States and Australasia together produced respectively 58 and 59 per cent of the total output of gold in the world. The production of gold in Russia during the past 25 years has varied from the lowest output recorded, of \$18,500,000 in 1883, to the highest, \$30,500,000, in 1895, the average yearly output being about \$25,000,000.

The remarkably large increase in production of gold in the world during the past decade has resulted from the rapid development of the art of mining, or better, of the science of profitable mining which has resulted from the better knowledge of ore deposition, from the increased efficiency of mine management, and from the cheapening of mining and treatment costs due to the introduction of mechanical appliances to replace hand labor. Steam drills in mines, electric underground and surface haulage and gravity conveyance of ore to mill, are all items of economy of exact value in the calculation of dollars and cents. The most potent factor in the large increase in the production of gold in the world during the past decade has been the application of the cyanide process as an adjunct to the milling and amalgamation process for the treatment of many ores and tailings in the United States, Australasia and South Africa. Apart from the chemical principles involved, the development of this process has been mainly in the mechanical handling of the product by conveyors to transport the ore from the mine to the mill and the material from the dump to immense steel or cement vats sometimes of 1,400 tons capacity each in which the chemical extraction of the gold is accomplished. In like manner, the removal of the leached product has been accomplished by such mechanical devices as special conveyors, or sometimes, by sluicing out the spent ore through exit doors in the bottom or sides of the vats by a powerful stream of water.

It is interesting to note the quantity of gold produced annually by continents, and the subjoined

table, which so classifies the world's output during 1901, shows that North America contributed practically 44 per cent of the total output.

Production of Gold by Continents.

	Fine Ounces.	Value.	Per Cent.
North America.....	5,615,709	\$116,076,696	43.2
South America.....	601,331	12,429,513	4.5
Europe.....	1,473,409	30,455,395	11.3
Africa.....	502,971	10,396,440	3.6
Asia.....	869,544	17,973,495	6.6
Australia.....	3,728,057	77,058,938	29.2
Unspecified.....	21,771	450,000	1.6
Total.....	12,812,792	\$264,840,477	100.0

The ratio of the quantity of gold produced in the world during 1901 (12,812,792 ounces) to that of

ounces, or \$78,159,677, in 1900. The output for 1901 is the largest in the history of the country. Previous to 1875, the earliest year given on the accompanying chart, the largest quantity of gold produced was in 1853, when the reported production was 3,144,654 fine ounces, or \$65,000,000.

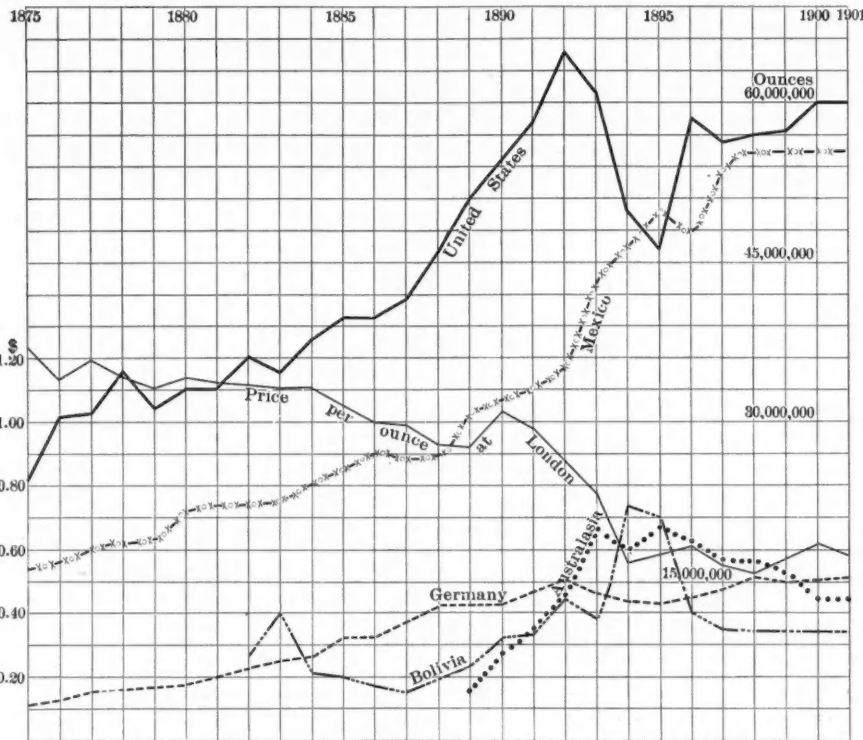
Australasia.—The production of gold in Australasia during 1901 amounted to 3,724,996 fine ounces, valued at \$76,995,660, as compared with 3,569,844 fine ounces, valued at \$73,788,918 in 1900, an increase of 155,152 fine ounces and \$3,206,742. Western Australia and New Zealand alone show increased yields of gold, the remaining States recording declines,

lurid ores of the Kalgoorlie mining district accounts in great measure for the increased gold yield of Australasia, and as these plants are being rapidly installed it may be safely predicted that the year 1902 will show a still greater gold production than that of 1901. The following table gives the detailed production of gold in Australasia during 1900 and 1901:

Australian States.	1900.	1901.		
Fine Ounces.	Value.	Fine Ounces.	Value.	
New South Wales..	281,207	\$5,812,539	216,874	\$4,482,785
Queensland.....	676,029	13,973,736	576,920	11,924,936
South Australia..	25,713	531,498	21,939	453,472
Tasmania.....	73,578	1,520,867	52,627	1,087,800
Victoria.....	760,142	15,712,140	743,467	15,367,463
Western Australia..	1,414,273	29,233,933	1,700,980	35,159,257
Total Australia..	3,230,982	\$66,783,815	3,312,777	\$68,475,713
New Zealand....	338,902	7,005,103	412,189	8,519,947
To'tals Australasia	3,569,844	\$73,788,918	3,724,996	\$76,995,660

(a) Including 18,028 oz. from the Northern Territory.

Transvaal.—Although the British army has been in control since May, 1900, but little progress was made in reopening the mines in the Rand District during 1901. A few companies resumed operations until at the close of the year about 11 mines were partly reopened and in operation with a total of 600 stamps, as compared with 5,762 stamps operated in 1899. It is within the range of probability that the output of the Rand will steadily increase from now on until all of the mines are in full operation, when the production rate will approximate a value of \$100,000,000 per year. According to Mr. John Hays Hammond there are no factors against mining to a depth of 8,000 feet vertically except the increased cost of haulage, ventilation and pumping which will not be prohibitive. The reefs of the district have been estimated to yield \$50,000,000 for every mile in the strike and 6,000 feet on the dip, and the available gold in the ore extractable within a mining depth of 6,000 feet on the Rand has been estimated at \$3,000,000,000, to which \$1,000,000,000 should be added to include the product of the east and west portions of the Rand. Mr. Hammond has expressed the opinion that the future duration of profitable operations on a large scale in the district will be less than 25 years.



THE WORLD'S PRODUCTION OF SILVER.

THE PRODUCTION OF SILVER IN THE WORLD DURING 1900 AND 1901.

Countries.	1900.			1901.		
	Ounces. Troy	Kilograms.	Commercial Value.	Ounces. Troy	Kilograms.	Commercial Value.
North America:			61.33c. per oz.			58.95c. per oz.
United States.....	59,561,797	1,852,564.4	\$36,529,250	59,653,788	(f) 1,855,425.6	\$35,165,902
Canada.....	4,468,225	138,976.2	2,740,362	5,078,318	157,952.1	2,993,668
Mexico (a).....	55,804,420	1,735,697.7	34,224,851	55,152,340	1,725,416.0	32,512,304
Central America.....	1,446,795	45,000.0	887,319	1,072,095	33,345.6	632,000
America, South:						
Argentina.....	383,561	11,930.0	235,238	383,561	e11,930.0	226,109
Bolivia.....	10,432,685	324,490.4	6,398,366	9,329,941	e290,191.3	5,500,000
Chili (b).....	5,772,791	179,552.4	3,540,453	5,772,789	e179,552.4	3,403,059
Columbia.....	2,800,000	87,089.0	1,717,240	2,520,000	78,380.1	1,485,540
Ecuador.....	81,000	251.9	49,677	84,818	2,638.1	50,000
Peru (a).....	6,590,955	205,000.0	4,042,433	6,655,257	e207,000.0	3,923,274
Europe:						
Austria.....	1,272,279	39,572.0	780,289	1,272,279	39,572.0	750,008
Hungary.....	649,511	20,201.9	398,345	649,511	20,201.9	382,887
France.....	452,268	14,067.0	277,376	452,268	e14,067.0	266,612
Germany (c).....	5,412,589	168,349.0	3,319,028	5,412,589	e168,349.0	3,190,721
Greece.....	1,011,856	31,472.0	620,571	1,011,856	e31,472.0	596,489
Italy.....	1,002,115	31,169.0	614,597	1,002,115	e31,169.0	590,746
Norway.....	147,895	4,600.0	90,704	147,895	e4,600.0	87,184
Russia.....	112,175	3,489.0	68,797	112,175	e3,489.0	66,127
Servia.....	18,386	570.0	11,276	18,386	e570.0	10,803
Spain.....	5,909,418	183,802.0	3,624,246	5,909,418	e183,802.0	3,483,602
Sweden.....	61,955	1,927.0	37,997	61,955	e1,927.0	36,522
Turkey.....	429,280	13,352.0	263,233	429,280	e13,352.0	263,233
United Kingdom.....	190,850	5,936.0	117,048	190,850	e5,936.0	117,048
Asia:						
Dutch East Indies....	73,690	2,292.0	45,194	73,690	e2,292.0	43,440
Japan.....	1,895,398	58,953.0	1,162,448	1,895,398	e58,953.0	1,117,337
Australasia.....	14,063,244	437,412.3	8,624,988	10,848,420	337,420.9	6,395,144
Other countries.....	48,226	1,500.0	29,577	48,226	1,500.0	28,429
Totals.....	180,093,364	5,599,216.2	\$110,451,012	174,851,391	5,438,443.2	\$103,074,891

(a) Statistics compiled from exports and coinage. (b) Exports of silver in all forms. (c) Silver produced from domestic ores only. (d) The output is mostly from China and Persia. (e) Estimated. (f) Estimate furnished by Mr. George A. Roberts, Director of the United States Mint. Note.—Unless specified to the contrary, the statistics have been taken from official sources or have been collected directly from the producers by *The Mineral Industry*. The average commercial value of silver for 1900 was 61.33c. per ounce, which is equivalent to \$19.718 per kilogram. The value for 1901 was 58.95c. per ounce, equivalent to \$18.953 per kilogram.

silver (174,851,391 ounces) is as 1 to 13.65, while the ratio of value of the gold (\$264,840,477) to that of the silver (\$103,074,891) is as 1 to 0.413. Owing to the limited space at disposal, the reviews of the production of gold and silver by individual countries are necessarily restricted to the chief producers.

The United States.—The United States continues to occupy the foremost position in the world as a precious metal producer—both of gold and silver—and during 1901 contributed 3,880,578 fine ounces, of gold, or \$80,211,545, as compared with 3,780,310 fine

principally due to the extended drought which greatly restricted mining operations. It is interesting to note that the Australian mining journals have departed from their former practice of reporting the gold yield in crude ounces, and now use fine ounces, which is in conformity with the world's standard for such statistics. The percentage of fine gold contained in the crude bullion obtained from the various Australasian mines differ so greatly in amount that a lengthy process of translation from crude to fine ounces is now avoided. The general success of the sulphide reduction processes for the gold tel-

SILVER.

The production of silver in the world during 1901 amounted to 174,851,391 ounces, valued at \$103,074,891, as compared with 180,093,364 ounces, valued at \$110,451,012 in 1900, which shows a decrease in production of 11,151,391 ounces and \$10,859,723 in value. In connection with the value assigned to the product during 1900 and 1901 it should be remembered that the average commercial value of the metal for the respective years at New York has been taken—58.95 cents per ounce during 1901 and 61.33 cents per ounce during 1900. The variation in price during the past 26 years is shown in the chart of the world's production of silver; for convenience the price per ounce is given for the London market in United States currency.

In 1875 the average price per ounce was more than \$1.20. From that time it declined gradually to the lowest price recorded in recent years—58.26 cents in 1898. In 1899 it was 59.58 cents; in 1900, 61.33 cents, and in 1901, 58.95 cents.

The subjoined tables give the average prices of silver per month in New York and London for the years 1899, 1900 and 1901, as computed by THE ENGINEERING AND MINING JOURNAL. The higher average in 1900 was due chiefly to the demands for silver coinage in the East.

Month.	1899.		1900.		1901.	
	London Pence.	New York Cents.	London Pence.	New York Cents.	London Pence.	New York Cents.
January.....	27.42	59.36	27.30	59.30	28.97	62.82
February.....	27.44	59.42	27.49	59.76	28.13	61.06
March.....	27.48	59.64	27.59	59.81	27.04	60.63
April.....	27.65	60.19	27.41	59.59	27.39	59.29
May.....	28.15	61.23	27.56	59.96	27.43	59.64
June.....	27.77	60.43	27.81	60.42	27.42	59.57
July.....	27.71	60.26	28.23	61.25	26.96	58.46
August.....	27.62	60.00	28.13	61.14	26.94	58.37
September.....	27.15	58.89	28.85	62.63	26.95	58.26
October.....	26.70	57.98	29.58	63.83	26.62	57.59
November.....	27.02	58.67	27.66	64.04	26.12	56.64
December.....	27.21	58.99	29.68	64.14	25.46	55.10
Year.....	27.44	59.58	28.17	61.33	27.11	58.95

NOTE.—The New York prices are per fine ounce; the London quotations are per standard ounce, which is .925 fine.

UNITED STATES MINERAL EXPORTS.

As shown by the accompanying table, the total exports of domestic mineral products and their manufactures from the United States in the five months ending May 31 fell off only a little over 1 per cent as compared with last year. Considering the heavy decrease in the exports of iron and steel and the lower prices of this year for such important articles as copper, a reduction of \$1,205,967 in values of total shipments representing \$111,543,960, is a small amount. In fact, judging from the increased exports of numerous leading manufactures, the foreign trade of the United States is in reality growing, especially to the far Eastern countries and to Mexico and South America. Better transportation facilities are being provided with these countries, thus enabling us to compete to greater advantage with British and German manufacturers.

Of the \$111,543,960 exported, \$41,655,387, or about

as against 43,130,622 pounds in 1901. There were also shipments of fine copper to British North America, Mexico, and other countries, but they amounted to only 1,388,621 pounds. The copper ore exported this year went chiefly to England. The decrease of 16,174,654 pounds in the quantity of copper sulphate exported this year is due principally to the smaller demand in Italy.

It is noteworthy that the falling off in iron and steel is chiefly in articles that are heavily contracted for at home and which must even be imported from Great Britain, Germany and Belgium to satisfy the domestic demand. These products include steel rails, which show decreased exports equal to fully 65 per cent in quantity; steel billets, 97 per cent; steel rods, 46 per cent; steel sheets, 65 per cent, and pig iron, 64 per cent. The exports of wire have, however, increased 26 per cent in quantity, structural material 39 per cent. Machinery exports were valued at \$21,-

AMERICAN EXPORT ORDERS.

Numerous inquiries of a tentative nature from foreign sources for various kinds of machinery and supplies used in the mineral industry are being received here, but comparatively few are being considered by manufacturers, owing to the continued good domestic demand. South African and other far Eastern markets are choosing certain classes of American products in preference to British or German manufactures. The business doing in South Africa, especially with the Transvaal mines, is on the increase since the ratification of peace. Orders recently booked for this market included air compressors, pipe, electrical hoisting equipment and drilling machinery, nearly all for mining companies in which considerable British capital has been invested. One evidence that this trade is promising is the increase in shipping facilities from New York. Before the war the United States was the second largest seller to South Africa, and in recent years has been gaining steadily on Great Britain.

Japan continues to buy much from us. Lately that country has sent experts to America to study our industries, with the result that American ideas are being introduced in various trades there. The United States already leads other exporting countries in electrical apparatus, mining machinery, etc., sent to Japan. In fact, the demand for American manufactures is growing most encouragingly. Several good-sized orders have been recently taken for pneumatic tools and equipment for government work, while inquiries are in hand for other articles.

Chinese trade is gaining slowly. It is interesting to note, however, that in May, 2 steel canal boats, valued at \$20,000, were sent to Hong Kong, being the first shipment of the kind from New York.

In Europe demand is mostly for labor-saving machinery, although some large orders are being filled for electric traction roads, especially in Great Britain. Spain is purchasing machinery for making bricks and cement in large quantity on the American plan. The brick plant will be erected at Madrid, and American portland cement will be made at Barcelona. In Italy the consumption of American coal is growing so rapidly that reports have been current of the purchase by the government of a large acreage of undeveloped coal land in the Pocahontas field, of West Virginia. At present the ocean freight rate from Norfolk or Newport News, Va., to the west coast of Italy. This rate is considerably less than was paid a year ago.

Mexican business is good, and in South America we are gaining new ground. To facilitate shipments to northern Brazil from New York, a new steamship line has been organized, which will make monthly sailings until freight offerings justify additional boats. The first boat will leave New York on July 3. This service is controlled by the Hamburg-American Steamship Company. In Bolivia American capital is more abundant than it has been in a long while, and, according to a newly formed syndicate which owns two concessions granted to a British explorer, the mineral industry is to be developed on a large scale. This country is already producing quantities of gold, silver, copper and tin, and though good discoveries of other minerals have been made, the absence of sufficient capital has prevented their successful development.

A GERMAN IRON PLANT.—The Kraft Iron-works at Stettin last year produced 122,817 tons of pig iron, as against 104,444 tons in 1900 (20,600 tons of which were exported to the United Kingdom and 3,900 tons to the United States); 122,914 tons of coke, as against 103,976 tons; 30,889 tons of cement, as against 25,788 tons; 3,612,000 bricks, as against 4,203,000; and 3,281,000 bricks (made of slag), as against 2,737,000. Of the raw materials used, 160,099 tons of coal came from the United Kingdom; 9,984 tons of limestone from Denmark; while iron ore was imported from British India (14,800 tons), Spain (84,500 tons), Sweden (36,000 tons), Algeria (1,850 tons), and Newfoundland (16,700 tons).

United States Exports of Domestic Mineral Products and their Manufactures.

Articles.	Jan. to May, 1901.		Jan. to May, 1902.		Changes, 1902	
	Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
Aluminum and manufactures of.....		\$53,102		\$25,358	D.	\$27,744
Brass and manufactures of.....		785,675		689,105	D.	96,570
Bricks, building and fire.....		252,416		191,521	D.	60,895
Cement, bbls.....	129,188	246,924	141,367	223,539	I.	23,385
Chemicals: Acids.....		84,679		108,583	I.	23,904
Asbes, pot and pearl, lbs.....	651,989	33,389	906,105	40,606	I.	7,217
Copper sulphate, lbs.....	44,262,538	2,019,433	28,087,884	1,125,668	D.	893,765
Lime, acetate, lbs.....	26,576,205	494,269	26,645,379	413,617	I.	80,652
Coal, anthracite, tons.....	777,013	3,507,389	585,117	2,686,910	D.	820,479
bituminous, tons.....	2,196,470	5,250,655	2,210,416	5,658,052	I.	407,379
Coke tons.....	167,742	667,463	183,916	810,864	I.	143,401
Copper ore, tons.....	3,579	447,003	10,693	813,140	I.	366,137
ingots, bars, plates and old, lbs.....	88,888,337	14,532,919	173,450,814	21,556,259	I.	7,023,340
manufactures of.....		710,830		908,967	I.	198,137
Gunpowder, lbs.....	576,791	81,973	601,274	84,367	I.	2,394
other explosives.....		798,466		821,224	I.	22,758
Instruments and apparatus for scien. purposes		3,113,871		2,283,789	D.	830,082
Iron and steel, manufactures of:						
Iron ore, tons.....	6,230	16,614	13,908	39,675	I.	23,061
Pig iron tons.....	40,637	607,581	14,655	249,596	D.	357,985
Bar iron, lbs.....	28,513,338	459,987	23,765,812	407,806	D.	52,181
Bars or rods of steel, lbs.....	42,907,867	721,410	23,110,950	470,397	D.	251,013
Billets, ingots and blooms, tons.....	26,435	653,071	8,828	24,727	D.	628,344
Hoop, band, and scroll, lbs.....	2,015,245	43,484	2,177,003	49,260	I.	5,722
Steel rails, tons.....	437	12,235	168	3,150	D.	9,085
Iron sheets, lbs.....	168,387	4,511,677	41,156	1,120,051	D.	3,385,626
Steel sheets, lbs.....	9,021,430	253,962	3,389,853	103,133	D.	150,829
Tin and terne plates and taggers tin, lbs.....	39,276,426	671,840	13,558,625	281,140	D.	390,700
Structural iron and steel, tons.....	44,249	1,748,332	69,612	1,877,789	I.	25,363
Wire, lbs.....	25,083	1,412,629	35,333	1,696,226	I.	283,597
Scrap and old, fit only for remanuf., tons	5,568	1,899,729	96,139,057	2,267,153	I.	367,424
Hardware.....	3,800,034	78,207	4,875	75,303	D.	2,904
Nails, cut, lbs.....	12,814,480	282,243	8,009,524	164,241	D.	118,002
Nails, wire, lbs.....	19,099,946	404,056	21,413,141	322,741	I.	81,315
Spikes and tacks, lbs.....	1,920,252	118,152	1,800,078	113,468	D.	4,684
Machinery, electrical.....		2,512,631		2,422,048	D.	90,583
Metal working.....		1,340,943		1,333,266	D.	7,677
Pumps and pumping.....		913,417		837,249	D.	76,168
Steam engines and parts of.....		853,554		1,854,678	I.	998,876
All other machinery.....		12,127,100		14,807,174	I.	2,680,074
Pipes and fittings.....		2,161,541		2,112,571	D.	48,970
All other manufactures of iron and steel.....		798,111		6,231,428	I.	5,433,317
Lead, pig, bar, and old, lbs.....	4,636,524	208,926	3,719,455	164,250	D.	44,676
manufactures of.....		142,204		159,580	I.	17,385
Lime, bbls.....	12,166	12,581	20,476	25,467	I.	2,886
Marble and stone, unmanufactured.....		34,309		86,472	I.	52,063
Roofing slate.....		364,717		310,172	D.	54,545
All other manufactures.....		306,097		290,181	D.	15,916
Mineral oil, crude, gals.....	54,161,079	2,640,269	54,419,132	2,369,295	I.	270,974
Naphthas, gals.....	8,793,744	759,481	9,285,848	673,390	I.	86,091
Illuminating, gals.....	305,013,936	10,477,743	219,339,795	19,959,390	D.	88,344
Lubricating and paraffin, gals.....	31,498,705	4,386,492	32,496,258	3,441,858	I.	944,634
Residuum, lbs.....	346,249	771,518	332,698	359,323	D.	421,195
Nickel, nickel-oxide and matte, lbs.....	2,494,686	649,278	1,244,503	35,862	D.	291,416
Paints, pigments, and colors:—Zinc oxide, lbs.....	3,747,977	160,452	4,304,189	180,962	I.	20,510
All other.....		607,550		620,214	I.	12,664
Phosphates, tons.....	294,845	2,408,982	283,303	2,237,526	D.	171,456
Quicksilver, lbs.....	399,455	225,859	300,100	179,522	D.	46,337
Salt, lbs.....	6,038,498	29,863	4,578,112	26,334	D.	3,529
Tin, manufactures of.....		217,417		233,871	I.	16,454
Zinc ore, tons.....	13,909	431,002	19,453	576,860	I.	145,858
pigs, bars, etc., lbs.....	4,168,908	176,153	3,536,638	153,884	D.	22,269
manufactures of.....		30,121		49,573	I.	19,452
Total value.....		\$112,749,927		\$111,543,960		D.\$1,205,967

37 per cent, represented iron and steel; \$26,794,265, or 24 per cent mineral oils, and \$23,278,366, or 20.8 per cent copper in all forms. Compared with last year, there is a decrease of \$4,043,070, or 9 per cent in iron and steel, chiefly steel rails, and a fall of \$1,811,238, or 7 per cent, in mineral oils, principally lubricating and paraffin, while copper shows an increase of \$7,587,614, or nearly 50 per cent, notwithstanding the lower prices. In the case of refined copper, the invoice price has fallen nearly 4 cents a pound, which on the total exports means a loss of \$6,938,000 in value this year, though there was an increase of 84,562,427 pounds in quantity. Of the 173,450,814 pounds fine copper sent abroad this year, Great Britain received 58,634,849 pounds, which is nearly four times the quantity reported last year; France imported 28,121,499 pounds, showing an increase of 11,672,591 pounds, or about 67 per cent; Germany, 25,879,354 pounds, which is 12,349,480 pounds, or 91 per cent more than last year; while other European countries received 59,427,491 pounds,

254,415, as against \$19,747,645 last year, showing an increase of \$1,506,770, or 8 per cent, chiefly in mining machinery. The exports of machinery were equal to 51 per cent of the total reported for all iron and steel products. Last year the proportion was 43 per cent, showing an improvement of 8 per cent in 1902. The other metals—lead, nickel, quicksilver and spelter—all show a decrease in exports as a result of the heavier domestic consumption. The exports of zinc ore, which are made chiefly to Belgium, have increased 39 per cent in quantity as compared with last year.

Coal exports are not growing, as was predicted last year, owing to the heavy domestic consumption and interference with production resulting from labor disputes. Anthracite, which goes chiefly to Canada, shows a decrease in exports equal to nearly 25 per cent in quantity, while bituminous coal, which is sent everywhere, shows a small increase. Coke shipments also improved, as the demand in the West Indies and Mexico has been good.

THE COPPER DEPOSITS OF THE WHITE, TANANA, AND COPPER RIVER REGIONS OF ALASKA.*

By ALFRED H. BROOKS.

The United States Geological Survey during the past year has issued three reports dealing with the copper deposits of Alaska, and it is here proposed to briefly summarize the more important economic conclusions contained in these reports. The copper deposits to be described are in the upper White and Tanana basins, which are tributary to the Yukon, in the Copper River Basin, and adjacent to Prince William Sound, a deep indentation of the

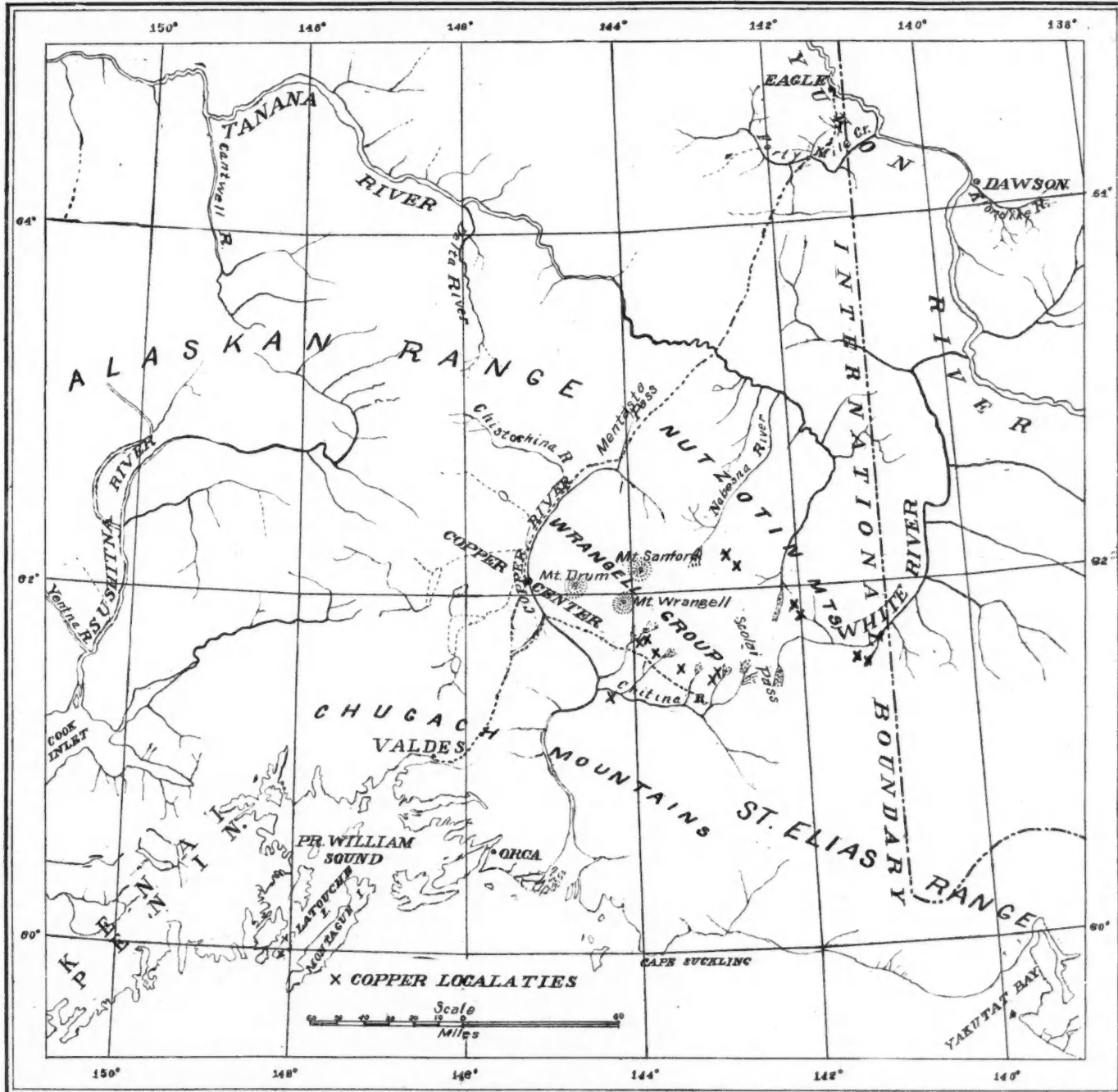
River, and is connected by the Nutzotin Mountains with the Alaskan range lying to the northwest, and marks the divide between the Yukon and Copper River waters. The southernmost range is broken by the Copper River valley, which traverses it, and also by several passes, across one of which the military trail has been built which connects Valdes, on the coast, with Copper Center, on the Copper River.

The Chugach Mountains are made up of closely folded metamorphic sediments, probably of Mesozoic and Paleozoic age, and these beds also form the shores and islands of Prince William Sound. To the northward these metamorphic rocks are over-

the same beds in the two areas of the syncline has given two copper-bearing zones, widely separated.

At the head of the White River placer copper has long been known to exist, and it was formerly extensively used by the natives in the manufacture of arrow-heads and, later, of bullets. The source of this copper in circulation among the natives was definitely determined by Dr. C. Willard Hayes, who visited the Kletsan Creek deposit in 1891, in company with Lieutenant Schwatka.

The geology of this belt is not very complex, as determined by the writer. Near the mouth of Kletsan Creek, a southerly tributary of the White, is a



COPPER DEPOSITS OF THE WHITE TANANA AND COPPER RIVERS IN ALASKA.

coast lying north of the Copper River delta.

The St. Elias Range stretches northwestward from Cross Sound up the coast line, and near the 141st meridian splits into two divergent ranges. The southernmost continues parallel to the coast, and merges with the Chugach Mountains lying north of Prince William Sound, a deep indentation of the coast and the interior. The northern branch sweeps around the headwaters of the Copper

lain by younger beds, which include horizons from the Mesozoic through to the Pleistocene. The Nutzotin Mountains, which limit the copper-bearing area on the north, are formed of metamorphic rocks, probably of lower Paleozoic age, which, to the south, are overlain by Paleozoic, Mesozoic and Tertiary rocks. This succession is similar to that north of the Chugach Mountains.

The structure of the Copper River Basin may be interpreted as a broad synclinalorium, the central part of which is occupied by the Wrangell Mountains, which are made up of effusive rocks of Tertiary and recent age. The Paleozoic limestone on the north of the Wrangell Group has been identified in the Chitina basin to the south. These structural features of the region are of interest, for the recurrence of

belt of white crystalline limestone containing carboniferous fossils, which overlies a tufaceous greenstone series. Above the limestone is a series of carbonaceous schists and shales. Both limestone and shales are cut by greenstone dikes, which are of basaltic and dioritic character. The greenstones are jointed, but not much sheared. The placer deposits of metallic copper are contained in stream benches, which owe their existence to rocky barriers through which the streams have cut their courses. The largest nuggets found weigh from 8 to 10 pounds. As far as limited time would permit, a careful search was made for evidence as to the source of the copper. The green stones were found to be traversed by irregular joints along which calcite was deposited, and these were found to carry native copper. The

*Published by permission of the Director of the U. S. Geological Survey.
 † "Reconnaissance from Pyramid Harbor to Eagle City, Alaska"; by Alfred H. Brooks: *Twenty-first Annual Report, Part II.*, pages 331-391.
 ‡ "Reconnaissance of the Chitina River and the Skolai Mountains, Alaska"; by Oscar Rohn: *Twenty-first Annual Report, Part II.*, pages 398-440.
 § "The Geology and Mineral Resources of a Portion of the Copper River District, Alaska"; by F. C. Schrader and Arthur C. Spencer.

veins found were all small and of no commercial importance. All of the copper-bearing veins were in close contact with the limestone. In the close vicinity amygdaloidal greenstones occur, carrying amygdules of copper pyrite. The same bed-rock series was traced westward for about 100 miles, but no veins were found except at Kletsan Creek, though in a number of streams which cut across it placer copper was found.

On the south side of the range the occurrence of copper deposits in the Copper and Chitina rivers had been reported for many years, but no ore bodies were located until 1895. The copper ores occur associated with a greenstone series. As determined by Messrs. Schrader and Spencer, the greenstone series is made up of a succession of basalt flows, which is locally much sheared. Massive bluish limestone, of younger age, overlies the greenstone. This limestone has been correlated with that on Kletsan Creek, in which carboniferous fossils were found. The metal sometimes occurs native, either filling former cavities or in stringers penetrating the barren rock. Some of the well-marked veins which carry metallic sulphides are bordered by native copper in the country rock near by. A more important class of copper deposits includes the sulphides occurring in true fissure veins, which are found in various localities where the greenstone occurs. It was observed that the ore always increases in the vicinity of the contact between igneous rock and the overlying limestone. In the southern belt this limestone is found overlying the greenstone, which does not seem to be intrusive, while in the White and Tanana River region the underlying rocks are buffas and the greenstones are unquestionably intrusives.

Deposits belonging in the southern belt are reported on the Kotsina River, where the ore is chalcopryrite and bornite and native copper. In Strelna Creek is a mineralized zone, 8 or 10 feet wide, carrying sulphides of iron and copper. On the Kuskulana River no prospects have been opened up; but in the bed of its tributary, Nugget Creek, a mass of native copper was found, 8 feet in length and from 3 to 5 feet in width. On the ridge between McCarty Creek and Kennicott Glacier a true fissure vein was observed, which cuts across the contact of the greenstones and limestones. The vein varies in width from 2 to 7 feet. The ore is practically pure chalcocite, and is stained upon the surface by copper carbonates. The relations of the ores suggest that they are replacements of limestone. In the same region is another vein, 2 to 4 feet thick, carrying chalcopryrite and bornite. Other veins have been reported at the head of the Chitina.

In the Prince William Sound regions copper prospects were opened up some years ago. They occur in fissure veins and in mineralized zones. The ores are chiefly sulphides. The association of the ores with the greenstone is very general, for even when they lie in sedimentary rocks the greenstone is never far distant.

The best route to the northern belt of deposits is by the head of the Copper River to the Nabesna River, and thence to the source of the Tanana and White rivers. The deposits on the upper White are about 300 miles from the coast. A shorter route is by the Chitina River, and thence across Skolai Pass, but this involves crossing the Russell Glacier. The Chitina copper deposits can be reached by a trail crossing the river at the mouth of the Tonsina, which is marked on the accompanying map. These deposits are 125 to 175 miles distant from the coast.

The Prince William Sound deposits have the advantage of being located on tide-water, and are similar in character to some of those on Prince of Wales Island in Southeastern Alaska. They can be exploited without any very large outlay of capital. The developments thus far made in the deposits of the interior are limited to a few prospect holes and cross-cuts. Exploitation on a commercial scale is dependent on the construction of a railroad. The building of such a railroad offers no serious difficulties, and once constructed across the Coast Range it could easily be extended to tap the deposits in the Chitina basin, and also those at the

head of the White and Tanana rivers. Valdes, which would be the coastal terminus of such a railroad, can be reached in a week by steamer from Puget Sound.

THE TAKASIMA COAL MINES, JAPAN.*

By E. W. NARDIN.

The Takasima coal mines comprise four islands near the entrance to Nagasaki Harbor, Japan, and are owned and worked by the Mitsu Bishi Company.

There are several unusual features in the occurrence and working of these coal seams. The steep angle of dip, the numerous seams of good coal separated by hundreds of feet of sedimentary rocks, the extensive faulting of the strata, and the way in which the coal is won, when so little surface is available for works, and where there is the ever-present danger of subsidence of the roof and consequent flooding of the workings by the ocean.

The islands are named respectively Hasima (Extreme Island), Nakanosima (Middle Island), Takasima (High Island), and Yokosima, and are situated about 1 mile from the main land. With the exception of Takasima, which is of fair size and has some show of vegetation, they all are simply barren rocky knobs rising out of the ocean.

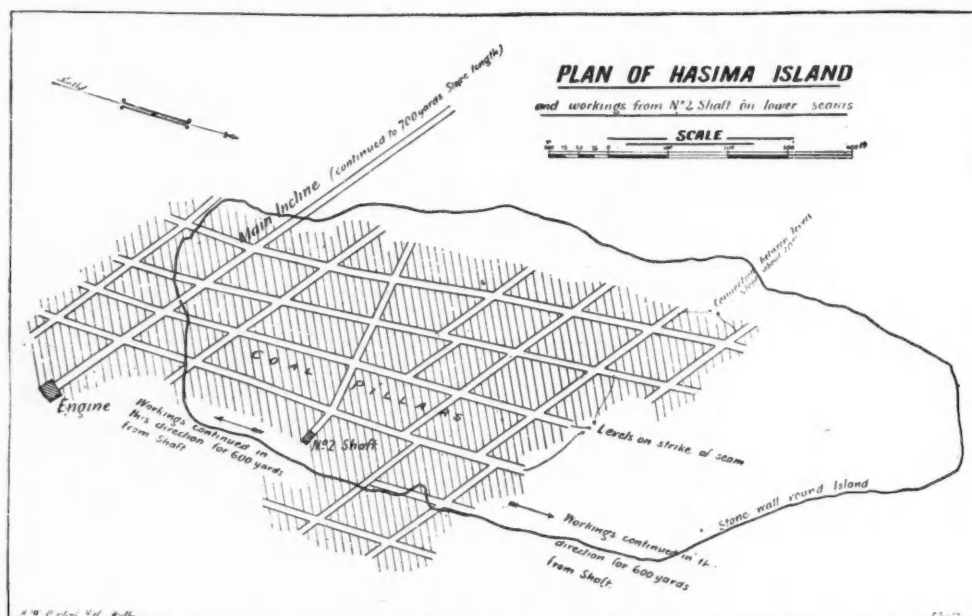
of the upper seam being found by drills to have been thrown down some 500 feet.

The author examined chiefly the Hasima workings. Here an 8-foot seam outcropped on the island, and had been worked for some time, but was allowed to fill with water on account of fire. The seams dip west at an angle of 35° to the horizontal, and are thus rather difficult to work.

Besides this upper seam, coal is being mined from three others; No. 2, of 7 feet 9 inches thickness, at a depth of 450 feet from sea level; No. 3, 5 feet 5 inches thick, at 596 feet, and No. 4, of 9 feet 7 inches thickness (two seams separated by thin seams of shale), at 626 feet.

No. 2 seam is worked by No. 1 shaft, and Nos. 3 and 4 by No. 2 shaft, the workings, airways, etc., of each seam being kept entirely separate. Each shaft is divided, making a return airway 10 by 5 feet and a double compartment winding-way 10 by 8 feet. Single-decked cages carrying two trucks are arranged in these, are hauled by a powerful single drum winding engine, and are fitted with safety catches, detaching hook, etc.

No. 2 shaft is sunk 700 feet, a short cross-cut is put into the seam, and then No. 1 level is put in along the strike; there are 23 of these levels, each 120 feet apart (on the slope); at every 100 feet along their



Hasima has also been partly levelled and in both cases a high stone wall has been built along the water line; when entering Nagasaki from Shanghai, Hasima looks like a huge gray battleship, the chimney stacks, smoke, etc., adding to the deception. The country on the main land (to the east) is entirely different from the islands, which appear to be the limit of the sandstone formation in that direction, so that if these beds had not been tilted to such an extent as to bring part of the upper strata above sea level, the coal deposits would probably never have been known. The formation is said to belong to the Tertiary, and fossils of shells, etc., and leaves are plentiful in the shales.

The main body of rock is a fine grained grayish sandstone, which, near the coal seams, is replaced by shales. A longitudinal section through Hasima, Nakanosima and Takasima shows (by soundings) great depressions between them, and in the workings of all three these depressions are shown to be due to faults.

Between Hasima and Nakanosima the coal seams are broken, and there is now some 20 feet difference in level. At the north end of Nakanosima, another fault occurs, and also one at the south end of Takasima, and from soundings taken between these two points it is evident that others exist. The fault at the south end of Takasima is much more extensive than any of the others, the broken portion

course these levels are connected by openings, which are practically winzes, thus leaving blocks of coal about 100 feet square. These winzes are not at right angles to the levels—that is, not in the direction of the dip of the seam. This is done purposely, to avoid having the haulage gradients too steep, and explains the peculiar diamond shape of the pillars shown in the accompanying sketch plan of the underground workings of the lower seams from No. 2 shaft.

The winding engine on the main incline has double drums, and works a double line of rails, hauling 10 trucks, each holding about one-half ton coal. Branches lead off from each level, and everything is hauled to No. 1 and then run to the shaft. Heavy timbering of all these levels and connections is necessary, as the coal is soft and crumbling and the roof must not be allowed to subside on account of the danger of flooding from the ocean.

Very little water has to be contended with, but as the workings are all to the dip, an excess of pump power is necessary. The main station is at the bottom of No. 1 shaft, 530 feet down, and here there are three large Worthington pumps raising the water in one lift; only one is in use, the others being kept ready for an emergency. From the working faces—the 23d level—the water is lifted to the sump at the bottom of the shaft in five stages by five sets of Tangye pumps. All these pumps and the winding engines (underground) are supplied with steam from the surface.

Gas is plentiful in some parts of the mine, and

*Abstract of paper read before the Australasian Institute of Mining Engineers.

safety lamps are in use. At each of the shafts, small ventilating fans are working, connected with the up-cast compartment of the shaft.

From the pit heads the coal is loaded direct into sailing junks and taken to Nagasaki, where it is stored, and then lightered to the ships as required.

At Takasima the main seam is being worked from its outcrop by an incline, but the available coal is becoming exhausted and fresh working must be opened up. A new shaft has therefore been commenced on the southwest corner and is to be sunk 700 feet, so as to pick up the continuation of the seam on the other side of the fault.

Altogether on the three islands 3,000 miners and 2,000 surface hands are employed.

BRITISH COLUMBIA SMELTERS.

By E. JACOBS.

In order to illustrate the gradual increase in the treatment capacity of the smelters of British Columbia (resulting, probably, in large measure from the experience gained of the smelting characteristics of the individual ores and the consequent better knowledge of the most effective way to reduce them) the monthly tonnage of each smelter is separately given, and, too, the daily average tonnage for each month from the time of fairly settling down to work is given in the following table. It must be premised, though, with the statement that the Granby Smelter started with only one furnace in operation, the second one not being blown in until some time in October of 1900, so that the figures prior to November of that year do not show the daily average of the two furnaces. The B. C. Copper Company has operated only one furnace all through, so its figures do not need similar qualifications. No allowance is made below for stoppages for repairs at the Granby works, the period of these not having been ascertained.

Ore Smelted.

GRANBY CO.'S SMELTER.		
Month.	Tons.	Daily Ave.
1900.		
August (11 days).....	2,902	
September	8,753	291 1/2
October	14,215	468 3/4
November	18,050	601 1/2
December	18,467	595 1/2
Total for 1900.....	62,387	
1901.		
January	17,640	569
February	17,700	632 1/2
March	19,713	636
April	18,995	633 1/2
May	19,075	615 1/2
June	18,510	617
July	18,176	586 1/2
August	18,028	581 1/2
September	20,059	668 1/2
October	20,347	656 1/2
November	20,706	690 1/2
December	21,971	708 1/2
Total for 1901.....	230,928	

B. C. COPPER CO.'S SMELTER.		
Months.	Tons.	Daily Ave.
1901.		
January	3,016	
February (11 days).....	3,016	
March	10,519	330 1/2
April	11,322	377 1/2
May	11,830	381 1/2
June	11,206	373 1/2
July	11,943	385 1/2
August (23 days).....	7,884	350 1/2
September	11,823	394 1-10
October	12,660	408 1/2
November	12,264	408 1/2
December	13,098	422 1/2
Total (10 months).....	117,565	

SUMMARY.

	1900.	1901.	Total.
Granby Smelter.....	62,387 tons	230,928 tons	293,315 tons
Greenwood Smelter.....		117,565 tons	117,565 tons
Total for 1901.....		348,493 tons	
Grand total (1900 and 1901)		410,880 tons	

It may be interesting to note that the daily average for the Granby Smelter (two furnaces) for last year, making no allowance at all for stoppages for repairs, was 633 tons. A more adequate idea of the increased effectiveness of treatment methods now as compared with a year ago will probably be conveyed by the following comparison. In November and December of 1900, the Granby Smelter treated 36,517 tons of ore, a daily average for those two months of 598 2-3 tons. During the corresponding months of 1901, the same two furnaces reduced 42,677 tons, or a daily average of 699 2-3 tons—an increase of 101 tons per day.

The daily average of the B. C. Copper Company's Smelter for the 309 days of last year it was in operation was 380 1/2 tons (one furnace). During recent months, though, the daily average has steadily increased, having been 394 tons for September, 408 tons for October, 409 tons for November and 422 1/2 for December. On one day in January, this smelter made its record day's run, having during 24 hours ended 6 o'clock A. M. of the 11th, treated 460 tons of ore. The total tonnage for that month was 13,287 tons, giving a daily average of 428 3-5 tons. It must be borne in mind that all the foregoing figures refer to ore alone—no coke consumed in smelting is included and no barren fluxes are used. The latter results appear to be fittingly designated "phenomenal," and as has been stated in the public press of the Province, they "constitute eloquent testimony to two prominent facts: First, the particularly favorable nature of the self-fluxing ores of the Boundary; next, the skill in designing, constructing, and operating smelters that have produced results hitherto unknown in the history of copper smelting."

Smelter Betterments.—Both smelters are adding to their treatment capacity, the Granby Smelter putting in two additional furnaces and the Greenwood Smelter a second furnace. In both cases delay in the construction of furnace parts and other requisite material was occasioned by the late labor troubles in connection with the steel industry. However, delay is now practically at an end, for at the Granby works construction is about completed and at Greenwood another month should see the new furnace nearly if not quite ready for operation. The addition of two more blast furnaces will give the Granby smelter a total treatment capacity of between 1,300 and 1,400 tons per day, while a second furnace at the Greenwood works is expected to raise their capacity to not less than 800 tons per day for the two furnaces that will here be in operation.

The B. C. "Mining Record" lately published the following brief description: "The additions to the Granby plant include two furnaces, two converters, one turbine wheel, electric generators and motors, hydraulic power appliances, another sampling mill complete, and numerous accessories to these several additions. For the housing of these either previously existing buildings have been enlarged or new ones erected. The furnaces that have been in operation the past year are double-decked, steel-jacketed furnaces, 44 inches by 160 inches, with nine 6-inch tuyeres on each side, each furnace having a nominal daily treatment capacity of 250 tons. The two new furnaces are similar in size and make to these, and like the old ones, will be set 39 feet apart, center to center. The matte-converting plant is placed in a building having a structural steel frame covered with corrugated iron. In this are two 10-ton converter stands and room is left for two more converters whenever such enlargement shall be found necessary. Between the furnaces and the converters two electric cranes travel. A 10-ton crane carries the matte ladles, some of which are of 5-ton and others of 8-ton capacity, from the furnaces to a tilting furnace holding 25 tons and which serves as a reservoir for the molten matte. A 40-ton crane, besides handling the converter shells and other heavy plant, conveys the red hot matte from the tilting furnace to the converters, where a 98 per cent copper product is turned out. Accessory to the converters are appliances for relining the shells, including a Dodge crusher and a pair of rolls for crushing quartz, and a mud mill for mixing the clay and crushed quartz which composed the lining. Near the converter building is a sulphate building in which are being installed the blowing engines and hydraulic pump for the converter plant, each having its separate electric motor. In the power house has been placed a fourth 16-inch turbine wheel, direct-connected to a 440-volt Westinghouse generator, and a third double-action triplex pump having a capacity of 750,000 gallons each 24 hours. The new sample mill has bigger machines and a larger capacity throughout than the one heretofore in use. More ore bins have been built, bringing the total ore storage capacity of bins and bunkers up to about 12,000

tons. A fourth Connorsville blower has been put in the furnace-blowing room. Another automatic charging car has been placed on the furnace feed floor. Electric power has been substituted for steam in the machine shop. The flue dust chamber has been extended 200 feet, and other additions and improvements have been made to keep pace with the steadily increasing demands that are being made upon the capacity of these important reduction works."

At the B. C. Copper Company's smelter, a new set of lower ore bins, 12 in number, has just been erected, increasing the total capacity of the lower bins to about 10,000 tons. All the bins, both upper and lower, and the tramway from the upper bins to the sample mill, have been roofed over. Another railroad trestle, 580 feet in length, has been built between the two previously in use, in order to facilitate the daily handling by the railway company of about 1,000 tons of material—ore, coke, coal and matte—that will shortly have to be handled here. The foundations for the furnace buildings in which to house the second furnace are in, and the structural steel and iron for this has arrived at Greenwood. The furnace cast iron columns and deck plates are in position, and the brickwork of the furnace will be put in hand as soon as the weather moderates sufficiently to allow its being done. The No. 7 1/2 Connorsville blower, received a few weeks ago, is ready and in place for the new furnace. Other improvements made include the erection on Boundary Creek of a large Prescott steam pump, the shortening of the water supply from Copper Creek during the winter months having made it necessary to provide an additional water supply to meet present requirements as well as for the new furnace. Some 400 feet in length of cast iron plates 1 1/2 inches thick by 18 inches wide have been put in the granulating flume and the necessary castings for a second flume, for the new furnace, together with two large settling pots have been obtained. The floor about the furnace has been considerably extended, to give more room for handling the matte, and this work is being continued, having in view the company's intention to put in bessemerizing works as soon as the time shall be ripe for doing so. The erection of a 50,000-gallon tank to form a reservoir into which to pump water for the furnaces is shortly to be undertaken. As all the Mother Lode ore, which constitutes the main supply for this smelter, is crushed at the mine and does not have to go through the smelter crushers and sampling mills, this last-mentioned part of the works will not have to be enlarged just yet.

CLASSIFICATION OF PIG IRON PRODUCTION.

The report of the American Iron and Steel Association for 1901 gives for the first time a complete classification of the production. Heretofore only bessemer and basic irons have been separately stated. This classification for two years past is shown in the following table, in long tons:

	1900.		1901.		Changes.
	Tons.	Per ct.	Tons.	Per ct.	
Bessemer and low phosphorus ...	7,978,209	57.9	9,589,936	60.4	I. 1,611,727
Basic pig.....	1,072,376	7.8	1,448,850	9.1	I. 376,474
Forge pig	793,092	5.7	639,184	4.0	D. 153,908
Foundry pig	3,037,689	22.0	3,186,348	20.1	I. 148,659
Mall'ble Bess'm'r.	173,413	1.3	256,532	1.6	I. 83,019
White, mot'd, etc.	129,909	0.9	97,374	0.6	D. 32,535
Charcoal pig....	339,874	2.5	360,147	2.3	I. 20,273
Direct castings..	8,703	0.1	8,522	0.1	D. 181
Total pig iron.....	13,533,265	98.2	15,586,893	98.2	I. 2,053,628
Spiegel & ferro.....	255,977	1.8	291,461	1.8	I. 35,484
Totals	13,789,242	100.0	15,878,354	100.0	I. 2,089,112

The bessemer figures for 1900 and 1901 include low phosphorus pig iron, but they do not include the comparatively small quantity of bessemer pig iron produced with charcoal. They differ from the bessemer figures heretofore printed, especially for 1900, in which year low phosphorus pig iron was not included.

The main part of the increase last year was in bessemer and basic pig, while there was also a gain in foundry iron. In forge iron there was a considerable decrease. In other words, the gain in our production is almost entirely in steel, nearly three-quarters of the pig iron made being converted into that form.

COPPER RESOURCES OF CALIFORNIA.

Mr. Lewis E. Aubury, State Mineralogist, has just issued *Bulletin No. 23* of the State Mining Bureau on the "Copper Resources of California." It is a volume of 282 pages very fully illustrated and with numerous maps showing the various copper belts, etc. One large map shows the locations of all the copper properties, large and small, in California. The practical and economic facts relating to the copper resources of the State are set forth in detail, while the purely scientific and technical phases of the subject have been given but incidental attention. What has been sought is to give in general understanding of the status of the copper industry and a brief descriptive account of the copper mines and prospects that seem worthy of present attention. The field assistants of Mr. Aubury who gathered the data presented were P. C. Du Bois, F. M. Anderson, J. H. Tibbitts, G. A. Tweedy, Marion Aubury and J. O. Denny. These assistants visited every county in the State during their researches. This is the most pretentious *Bulletin* yet issued by the Mining Bureau and has been been very carefully compiled, rendering it of great value to all interested in copper mining.

There is a chapter on the general condition of the industry, and complete statistical tables, together with historical notes relating to copper in California. Then each county in the State is taken up and its copper resources, mines, smelters, etc., described, with suitable illustrations.

California now stands fourth among the copper producing States of the Union, being exceeded in annual output only by Montana, Michigan and Arizona. The following table of California's copper production, by counties, in 1901 shows the present status of the industry; the figures are in pounds:

CALIFORNIA'S COPPER PRODUCTION IN 1901.

County.	Pounds.	Value.
Alameda	13,728	\$2,162
Alpine	8,377	1,319
Amador	52,000	8,190
Calaveras	1,701,589	268,000
Fresno	1,159,672	182,648
Inyo	8,566	1,349
Kern	429,248	67,606
Madera	108,430	17,077
Mariposa	191,622	30,180
Merced	79,071	12,453
Mono	1,938	305
Nevada	39,588	6,235
Placer	11,200	1,764
Sacramento	2,007	316
San Bernardino	50,000	7,875
Shasta	30,990,781	4,881,048
Stanislaus	79,330	12,494
Trinity	4,838	761
Total	34,931,985	\$5,501,782

As an appendix to the volume is a chapter describing the California State Mining Bureau, etc., mines, and the methods of work. Appropriate illustrations are given. The Bureau no longer distributes its reports and bulletins free, but a small charge is made to defray cost of publication. The charge on this copper bulletin is 50 cents and postage 12 cents. The address of the Bureau is Union Ferry Building, San Francisco.

EXPORTING STEEL CANAL BOATS.—The *Cleveland Marine Review* says: "It will be remembered that the Cleveland Steel Canal Boat Company some time ago sold all its vessels (19 of them) to the Philippine Transportation and Construction Company, a New Jersey corporation of \$1,000,000 capital, organized to undertake the lightering of vessels in the Philippines, principally in Manila harbor. The crude methods of transferring cargo to and from vessels at Manila and other points in the Philippines has several times been referred to in these columns. It has been explained that the work is done mainly by small boats known as cascoes, which are of only about 15 tons capacity, and propelled principally by poles. Mr. Henry F. Lyman, of Cleveland, president of the canal boat company, has gained, through other business associations, a thorough knowledge of the hemp trade in the Philippines. This prompted an investigation of the lightering conditions, in which Mr. Lyman was joined by Mr. C. E. Wheeler, manager of the canal boat company. Satisfied that modern methods must be applied to the business, a movement to interest capital in New York was undertaken, and the result was

the formation of the Philippine Transportation and Construction Company, and the sale to that company of the fleet of steel canal boats—4 steamers and 15 barges—that had been carrying merchandise between New York and Cleveland by way of the Erie Canal and Lake Erie. Mr. Lyman is president of the new company, Mr. Wheeler manager in the Philippines, and Mr. Ira Taylor in charge of the New York office.

"For moving the canal boats to the Philippines two large ocean freighters—the *Poplar Branch* and the *Melbourne*—were chartered. Of course, these vessels took out general cargo from New York, but they had to be chartered outright on account of the special conditions attending the transport of the canal boats, which are 400 to 450 tons capacity each. Four of the canal boats were carried on the deck of the *Melbourne* and two on the deck of the *Poplar Branch*, which is one of the turret type of ship. The services of the Merritt & Chapman Wrecking Company were engaged in putting the barges upon the steamer. The 13 other canal vessels were cut into sections and stored in the holds of the big ships.

"The *Melbourne* has arrived at Hong Kong with her cargo of boats, and the turret steamer, the *Poplar Branch*, is due there shortly. The four steam canal boats will each tow a barge from Hong Kong to Manila. The other canal barges will be towed by steam vessels regularly engaged in trade between Hong Kong and Manila."

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

RIGHTS OF APPROPRIATORS OF WATERS FOR PLACER MINING.—Where certain parties entered on the ground of others, on which the waters of a stream were then being used for placer mining, and without the knowledge or consent of the latter constructed a ditch which diverted water after it had passed over the flume used for placer purposes, but before it returned to the stream, and such diversion was acquiesced in, they acquired only a license, and could not enjoin the pollution of the stream by the turning of another body of water into it by the first appropriators.—*Fairplay Hydraulic Mining Company v. Weston* (67 *Pacific Reporter*, 160); Supreme Court of Colorado.

APPEAL DOES NOT LIE ON INTERLOCUTORY ORDER IN CALIFORNIA.—An order authorizing a receiver of a mining company to purchase and operate a cyanide tailings plant, and pay for the same out of the funds in his hands, is not a final order, or one which would be a final judgment on a collateral matter from which an appeal is authorized under the laws of California (Code Civil Procedure, sec. 963), but is an order made in the progress of the action, tending to facilitate the final adjudication of the controversy, and renewable only under section 956 of such law, on appeal from the judgment.—*Free Gold Mining Company v. Spiers* (67 *Pacific Reporter*, 61); Supreme Court of California.

ACTION TO QUIET TITLE TO MINING CLAIM.—Under the provisions of sections 1 and 2 of the law entitled "An act regulating the rights of aliens, corporations and associations to acquire real estate," etc. (Idaho Sessions Laws 1899, page 70), it is not necessary in an action to quiet title to a mining claim to allege the citizenship of the one bringing the action, but those sections do not apply in an action on an adverse claim under the provisions of Section 2326 of the Revised Statutes of the United States, after application has been made for a patent.—*Bulkley v. Fox* (67 *Pacific Reporter*, 659); Supreme Court of Idaho.

MIXING IMPORTED LEAD ORES AT SMELTING WORKS.—The requirement of article 1076, Customs Regulations of 1899, which directs that after the arrival of any shipment of bonded ore or crude metal at any bonded warehouse of class 7, it will be obligatory for the owners of the warehouse to keep such bonded ore or metal separate and distinct from any unbonded

material, is hereby so modified as to permit the mixing on arrival of imported with domestic ore, for the purpose of "bedding" the same in bins, provided that the said bins must be permanently numbered for identification, and that the manufacturing records must show with exactitude the importation lots, car numbers, weights, and lead contents of the bonded ores in each such bin or mixture, together with the weight and lead contents of the domestic ores contained therein.—Order of Treasury Department.

ABSTRACTS OF OFFICIAL REPORTS.

Union Copper, Land and Mining Company, Michigan.

The report of this company for the year 1901 says that the total expenses for the year, less interest received, were \$8,464, leaving a cash balance of \$92,707 forward to current year. The reports further says:

"Since the date of the last annual report we have carried out our intention expressed at that time, of securing the services of a competent engineer for the purpose of carefully surveying the different parcels of land owned by the company and definitely locating their boundaries. In the case of several tracts, surveyed many years ago, it was found that the landmarks were becoming obliterated, and hence it was imperative that the descriptions (of which there are nearly 200) should be corrected, confirmed and made a matter of record without delay. We are also exploring the surface to determine so far as possible the different geological formations, mineral outcrops, etc., and, by the aid of woodsmen, the quantity and nature of the standing timber, with which much of the land is covered, and all similar information as to the general conditions and value of the whole property, which should be immediately available when needed.

"There is little call for this class of real estate for agricultural, residential, building or similar purposes, and aside from the timber its principal value lies in its mineral wealth, the presence of which mainly determines the value of the land itself. Hence the active demand for these lands depends almost exclusively on the varying periods of activity in the copper industry, and it is not therefore surprising that no sales have been made by us during the past year."

Peña Copper Mines, Limited, Spain.

This company is developing a deposit of copper-bearing pyrites in the same district as the Rio Tinto mines. The capital stock is £450,000, of which £100,000 has been issued. The report is for nine months ending December 31, 1901.

The sales of ore, copper and precipitate amounted to £58,619; increase in stocks, £5,122; total, £63,731. Working expenses were £43,967, leaving a balance of £19,764. Charges for depreciation, London office, etc., reduced this balance to £10,306.

The report says: "The quantity of overburden removed during the 9 months under review has been 65,252 cubic meters, compared with 82,833 cubic meters for 12 months in the year 1900. The account for extraction of mineral is regularly charged with a rate per ton of ore mined calculated to be sufficient to write off, eventually, the cost of removal of overburden.

"*The Output of the Mine.*—This has also been carefully considered and the earlier figures revised. It is being regulated on a definite system to meet the demand for washed ore, which is now the principal ore exported from the mine. The output of copper precipitate which can be shipped necessarily varies to some extent, according to the quantity of water available either from rainfall or storage. The output of ore from the mine is satisfactory and progressive, as evidenced by the following statements: 1898 (12 months), 70,238 tons; 1899 (8 months intermittent), 43,521; 1900 (12 months), 95,452; 1901 (12 months), 167,817 tons. The output was dealt with as follows: Ore added to the heaps for leaching, 275,006; ore for export, 102,000 tons. The present total quantity of ore on heaps under-

going treatment for the extraction of copper is about 255,580 tons. The ore in stock at the mines and in Huelva for export was 9,624 tons. The total mineral in stock, including some sundry mineral valued at £1,586, is valued in the inventory at £23,356. As explained in the former report, the ore on heaps is in the meantime constantly being increased by the addition of fresh ore from the mine, exceeding the quantity lifted from the heaps as washed ore.

"Shipments of Ore.—Cupreous pyrites and washed sulphur ore were as follows, in tons:

Year.	Cupreous Ore.	Washed Ore.	Total.
1899 (Nov. and Dec.).....	6,754	...	6,754
1900 (12 months).....	46,777	966	47,743
1901 (12 months).....	42,763	32,245	75,008

"The production of copper precipitate is satisfactory and is still increasing. The total has been 1,314 tons in fine copper, of which 413 tons were made in 1901. The whole of the produce of 1901 was sold before the end of that year, and the net proceeds, although some part was only received in 1902, are included in the accounts for 1901.

"The delegates of the board devoted much time to the examination of costs and believe that much better results in this direction may be expected in the future. The arrangements for discharging and loading trucks at Huelva were very inadequate, and steps have been taken to remedy this defect. It is hoped that the means adopted will ensure greater speed in loading and dispatching ore from the yard to the pier.

"The profits and loss account shows substantial signs of progress. Before paying debenture interest there is a gross profit of £10,306, out of which the charge, at the rate of £10,000 per annum, is made for debenture interest, amounting to £7,500, leaving £2,806 net profit for the 9 months under review as compared with the previous 12 months, when the gross profit was only £1,593, or after charging £5,000 for debenture interest, a loss for that period of £3,407. This adverse balance carried over from last year is thus now reduced to £600. The amount written off for depreciation and charged to profit and loss is at the same rate as before, 7½ per cent on the value of buildings, railways, plant and development work as at March 31st, 1901. As the writing down is made overhead on the gross amount of the plant and development, it is equivalent to a considerably higher rate on some of the assets, as certain of them are of a kind which does not call for the high rate named."

Winona Copper Company, Michigan.

The report of this company for the year ending December 31, 1901, shows 298 feet of sinking done and 1,603 feet of drifting and cross-cutting. The shaft at the close of the year was 578 feet deep. The surplus from the previous year was \$44,197; receipts from interest, \$297; a total of \$44,494. Expenditures at the mine were \$48,352; in Boston, \$5,759; total, \$54,111, leaving a deficit of \$9,617 at the close of the year.

The report says: "The operations during the year include the completion of the diamond drill exploration across our lands, which, however, failed to reveal the existence of any deposit carrying copper enough to be of value.

"The principal expenditure has been made in the further development of the amygdaloid belt known as the Winona lode, and here some short stretches of good copper ground have been encountered, showing an improvement over the developments of the previous year, but the quantity of pay ground does not as yet seem to warrant the expenditure involved in the construction of a stamp mill, and the additions to the mine plant that would be required in order to handle a large quantity of rock.

"The results of all of the work done in this mine indicate that the copper-bearing portion of the lode lies south of No. 2 shaft, and there is copper enough showing in the third and fourth levels to warrant further expenditure in that direction, in the hope that a still greater improvement will be manifested as the levels are extended.

"A quantity of good rock is now on the dumps,

and a much larger quantity can be mined by stoping at the points where good ground is exposed in the levels. It is probable that arrangements can be made in a few months to lease a head of stamps in the Atlantic mill, when a working test can be made of the value of this material; meanwhile the extension of the fourth and sixth levels should be continued."

St. John del Rey Gold Mining Company, Brazil.

This British company operates the Morro Velho and Cuiaba gold mines in Brazil. Its report covers the year ending February 28, 1902. The capital account includes £544,706 stock and £130,210 debenture bonds. Of the bonds, £96,335 carry 10 per cent interest and £33,875 pay 7 per cent.

The rock raised from the mine was 158,058 tons, and of this a quantity equal to 2.3 per cent was rejected as waste. The ore crushed in the mill was 154,356 tons, and the bullion saved was 82,990 ounces. Of this bullion 80 per cent was obtained from the mill, and 20 per cent by the second process, which the company calls the oxygen process.

The earnings and expenses for the year were as follows, in sterling, the averages per ton being reduced to United States currency for purposes of comparison:

	Total.	Per Ton.
Bullion saved.....	£278,018	\$8.64
Taxes and insurance.....	£15,122	\$0.47
Working cost in Brazil.....	180,883	5.63
New plant and development.....	12,890	0.40
London expenses.....	3,893	0.12
Total expenses.....	£212,788	\$6.62
Net earnings.....	£65,230	\$2.02

Payments from net earnings have been: Interest on bonds, etc., £12,168; dividends (1s. 6d. per share), and income tax, £46,940; total, £59,108, leaving a balance of £6,122, which has been carried to suspense capital account for new works.

The report says: "The mine reports have for some months been satisfactory with regard to the quality of the mineral met by the inclined winze going down from horizon 11, and it is now down 320 feet on the lip of the lode. West of this winze, and beyond the slide at the horizon of No. 11, mineral of first-class quality has been met by an exploratory drive. This body of mineral is about 15 feet in length and 12 feet in width, and is being followed upwards towards horizon 10. The lode east of the indent at the same horizon is reported on as most satisfactory in regard to both width and quality; and, taken altogether, the prospects at horizon 11 have considerably improved during the last few months.

"Winze No. 10, which is being sunk from horizon 10 on the south portion of the lode, is now in the country rock, showing the tendency of the lode to underlie northward; this tendency, so marked in horizon 11, decided Mr. Chalmers, instead of prolonging the underlie shaft below that horizon, to sink a vertical shaft to reach and work the lode at lower horizons. This shaft will communicate with the masonry floor of horizons 10, 11 and 12 by tunnels. The work is in active progress, and the additional power needed for haulage of the mineral and for drilling purposes by means of compressed air is now nearly completed.

"The additional power is known as the Gaia Scheme; it consists of a rego carrying water from the River Macacos to drive Pelton wheel and electric plant at Gaia; from thence the power will be transmitted by electric current to drive motors at Morro Velho; the motors will in turn actuate engines to give compressed air equal to 300 effective horse-power daily.

"These works for haulage and power, including buildings, plant and machinery, involved a total capital cost of about £77,000. Towards this the company had in hand on capital account by the balance sheet February 28, 1901, about £22,000, and an undivided balance of profit and loss of £14,000, which the directors reluctantly felt compelled to use; only 11,347 shares having been applied for of the new issue that was intended to provide the necessary moneys for capital expenditure. The balance still

required is about £30,000, and the directors hope that when the issue is again offered to the shareholders a sufficient number will be taken, or they will be compelled to use further portions of the current profits to complete these works essential for the mine at greater depth."

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.

Comptes Rendus du Congrès International de Chrométrie; Exposition Universelle de 1900. Prepared by MM. E. Fichot and P. de Vanssay, Secretaries, Paris, France; Gauthier-Villars. Pages, 254; illustrated. Price (in New York), \$5.25.

Diagrams of Mean Velocity of Uniform Motion of Water in Open Channels. Based on the Formula of Ganguillet and Kutter. Prepared by Prof. Irving P. Church, New York; John Wiley & Sons, London; Chapman & Hall, Limited. Eleven diagrams, 8 by 6 inches. Price, \$1.50.

California State Mining Bureau; Bulletin No. 23, Copper Resources of California. By Lewis E. Aubury, State Mineralogist, Sacramento, Ca.; State Printing Bureau. Pages, 282; with maps and illustrations. Price, 50 cents.

South Africa Handbooks, Nos. 8 and 9, South African Companies Analyzed. London, England; Reprinted from *South Africa*. No. 8, 32 pages; No. 9, 28 pages.

Pipes and Tubes. By Philip R. Bjorling. London and New York; Whitaker & Company. Pages, 244; illustrated. Price (in New York), \$1.25.

Map of the Town of Whitehorse and the Adjacent Copper Belt. Compiled by H. G. Dickson. Whitehorse, Yukon Territory, Canada. Blue-print 15 by 25 inches; scale, 3,000 feet to 1 inch.

Twelfth Census of the United States, 1900. Volume IV., Vital Statistics. Part II., Deaths. Prepared under the supervision of William A. King, Chief Statistician for Vital Statistics. Washington; United States Census Office. Pages, 1056.

Mineral Resources of the United States, 1901. Production of Arsenic. By Joseph Struthers. Pages, 4. *Production of Barytes.* By Joseph Hyde Pratt. Pages, 10. *Chromite, or Chromic Iron Ore.* By Joseph Hyde Pratt. Pages, 12. *Production of Graphite.* By Joseph Struthers. Pages, 8. Washington; Government Printing Office.

BOOKS REVIEWED.

The Michigan Engineer. Proceedings of the Michigan Engineering Society for 1902. Climax, Mich.; published by the Society, F. Hodgman, Secretary. Pages, 172; illustrated.

This volume, besides the report of the proceedings of the Society, contains a number of papers by members. These are chiefly on municipal engineering, water supply and road building. They present results of the experience of members and are generally of value in their special lines.

American Engineers in South Africa. Kimberley, Cape Colony; compiled and issued by Alpheus S. Williams. Pamphlet, 24 pages.

This is a very convenient directory for mining engineers and others interested to consult. It gives a list of American engineers who are now engaged in the South African mines, with their present positions and addresses; also some notes on their previous experience and the mines and works with which they were connected before leaving this country. It seems to be very carefully compiled and to give a complete list.

Coal Cutting by Machinery in the United Kingdom. By Sidney F. Walker. London, England; the Colliery Guardian Company, Limited. Pages, 144; illustrated. Price (in New York), \$4.25.

This book is chiefly a reprint of a series of papers

which have appeared in the *Colliery Guardian* during the past year. They were the results of an investigation undertaken by the members of the firm which publishes that paper into the question of coal-cutting machines in British mines. The subject has been recently treated in some articles in our own columns. The author has given a history of the use of these machines in Great Britain, and he follows this by a description of the different machines used, with some notes on the results of experience with them. In closing he gives some advice to colliery managers on the adoption of these machines and generally on the application of power in mining.

The Deep-lying Auriferous Gravels and Table Mountains of California. By Henry G. Hanks. San Francisco; F. H. Abbott. Pamphlet, 16 pages; illustrated.

As the author says of this paper in his introduction, its object is not to disprove the opinions of others, but to record some of the results of his study and experience on questions which are still in controversy among geologists. While not claiming to be a full discussion of the subject, it contains many interesting notes and observations. Experience has shown the author how easy it is for an investigator to be deceived, and he has been very careful in sifting and presenting his facts.

South Dakota Geological Survey, Bulletin No. 3, Including Mineral Resources of South Dakota. By Dr. Cleophas C. O'Harra, and *Mineral Building Materials, Fuels and Waters of South Dakota.* By J. E. Todd, State Geologist. Vermillion, S. Dak.; published by the Survey. Pages, 136; illustrated.

This bulletin is one of a series which is now being prepared and issued by the South Dakota Geological Survey, the main object of which is to call attention to the resources of that State. It contains two papers, one covering 80 pages was prepared by Prof. C. C. O'Harra, of the School of Mines, and treats of the mineral wealth of the Black Hills. It has been published in separate form by the School of Mines, and has heretofore been noticed in our columns. It gives a careful and comprehensive statement of the different ores found in that region and its other mineral products, a history of the development of these properties, and an account of the principal mines and mills.

The second paper, which is written by the State Geologist, and covers 50 pages, relates to the building materials, fuels and waters. The first part, on building materials, describes the stones, clays and cement materials found in different parts of the State. They are varied in character, and there are some extensive deposits of limestone and other stone valuable for building. Sandstones are extensively found, and in Custer County there is an extensive deposit of white marble, which promises to be of much value. The clay deposits include kaolin, fire-clays, and a variety of clays suitable for the manufacture of ordinary brick. Under the head of fuel coal, or rather lignite, natural gas and indications of petroleum are treated. Under the head of water, the paper speaks mainly of the mineral springs and of the artesian waters of the State. The general subject of water supply is not taken up. Much data had been collected on this point, but it was finally decided in view of its importance to make the general subject of water supply the subject of a separate bulletin to be issued later. This paper, like that one on the Black Hills, is illustrated by a number of plates, and it seems to cover very well the subjects of which it treats.

The Decay of Timber and Methods of Preventing It, Bulletin No. 14, Bureau of Plant Industry, Department of Agriculture. By Herman von Schrenk. Washington, Government Printing Office. Pages, 96; illustrated.

The annual destruction by decay of forest timber and of timber used for construction purposes, such as railroad ties, fence posts, telegraph poles, bridge

timber, etc., is almost beyond computation, and is one of the greatest drains on the timber resources of the country. Several years ago the Bureau of Plant Industry undertook an investigation of the causes of such destruction, and the general awakening of interest in forestry has called special attention to the importance and necessity of work in this line. For a number of years the railroads have been investigating methods of preserving ties, and the progress made by them has served as a basis for the general investigation of the subject of preservation of construction timber.

Dr. Hermann von Schrenk, instructor in the Henry Shaw School of Botany, and special agent in charge of the Mississippi Valley Laboratory of Vegetable Pathological and Physiological Investigations, has been actively engaged in the work for several years, and has collected much valuable information in connection with it, both in this country and in Europe. The present report, which is a basis for much more extensive investigations planned for the coming year, embraces a discussion of the factors which cause the decay of wood, an account of the various methods used in this country and abroad for preserving timber, and also an account of original work conducted to test various methods.

The work is being pushed vigorously, in co-operation with the Bureau of Forestry, which is actively aiding in the investigations in this line, and it is believed it will appeal to the country as a whole, as all interests and classes are affected, directly or indirectly, by the losses occasioned by the decay of construction timber. It is to be hoped also that as a result of the experiments planned much standing timber of varieties now worthless for construction purposes, owing to its rapid decay, may be made commercially valuable by preservative processes.

The monograph is well illustrated, and is an important contribution to a work of great importance and value to the country at large.

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 required. Letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

Magnesia in Slags.

Sir: I am trying to secure some information as to the action of magnesia in slags from lead smelting furnaces. Hofman devotes very little space to it, and figures it generally as replacing lime. Is this altogether the case? Perhaps some of your readers who have had experience can give some data or information on this point. H. G.

St. Louis, June 21, 1902.

Scheelite and Tungsten.

Sir: We notice in the "Question and Answers" column of your issue of June 7, 1902, that one of your readers seeks for information with regard to scheelite. We think it may be of interest to your correspondent to learn that the price paid for scheelite ore, f. o. b. Hamburg or London, has recently been between 6s. and 7s. per unit of WO_3 contained in the ore. The ore should contain about 65 to 70 per cent WO_3 , and be as free as possible from any injurious constituents, such as sulphur, phosphorus, tin, etc. The makers of Tungstein metal give the preference to wolfram, and also hübernite, as these two minerals offer advantages in manufacture. On the other hand, a good scheelite can be utilized for the manufacture of sodium tungstate, for which a good demand has sprung up of late.

With regard to tungsten, we think we are correct in stating that tungsten for the manufacture of self-hardening tool steels (by far the greatest outlet for the metal), is generally preferred in the metallic state, in the form of a fine uniform powder testing from 95 to 98 per cent metallic tungsten; present price in England is about £160 per ton.

We also think that your figure of the world's consumption of tungsten, as such, and also in the shape of ferro-tungsten and other special alloys, does not exceed 200 tons, is far too low; the Sheffield District alone accounted for about 150 tons, and we think that the world's production is nearer 500 than 200 tons yearly.

TUNGSTEN AND RARE METALS COMPANY, LIMITED,
STEINHART & VOGEL, Managing Directors.
London, June 19, 1902.

Ore-Bearing Saddles and Troughs.

SIR: Mr. T. A. Kickard, in his interesting article on the "Saddle-reefs of Bendigo," which appeared in your esteemed JOURNAL of March 29, states, in effect, that he and Mr. E. J. Dunn were the first to decipher the structure of those deposits. I believe Mr. William Nicholas, F. G. S., should have that credit, for in 1884, or six years before Mr. Rickard first visited Bendigo, and nine years before the publication of Mr. Dunn's first report on the gold-field, that gentleman wrote a series of letters for the *London Mining Journal*, in which he described the real nature of the Bendigo saddle-reefs. These letters were subsequently reprinted in pamphlet form under the title, "The Golden Quartz Reefs of Australia." The local ignorance on the subject in 1890 is, therefore, inexplicable, considering that the *Mining Journal* circulated in the camp and that Mr. Nicholas was then lecturer on Mining in the University of Melbourne, and was ex-lecturer on geology as applied to mining at the Bendigo School of Mines.

Besides the localities pointed out by Mr. Rickard, I would mention that gold-bearing saddles and troughs occur on a small scale in the Organos District, Department of Tolima, Republic of Columbia, and no doubt will eventually be found to exist in other parts of the world.

It appears to be forgotten that metalliferous saddles and troughs were formerly worked in the lower carboniferous rocks of Derbyshire and North Staffordshire, England. Excellent descriptions of these deposits, written by Dr. Watson, appeared in the *Geologist* of 1860.

Where the saddles occur the beds of limestone are frequently wholly or in part formed of chert. The chert layers evidently replaced limestone, and Mr. Nicholas was of the opinion that the saddle reefs of Bendigo were produced by substitution.

In England the crown of the saddle or hump (Somersetshire) is termed the "buckle," and the sides are called the "wings" (Australian "legs"). Trough and saddle joints generally occur and are frequently ore-bearing, especially the former, but the main part of the ore (copper pyrites with some galena) in the saddle itself is formed between the thick and thin beds forming part of the saddle and trough, and not far from the fissure joints. No trace of veinstone accompanies the ore in the saddles; calcite, not infrequently plated with ore, occurs in the checks of the fissure, and spar also exists beneath the ore in the wings.

In the place of veinstone there are guides called "weigh beds," formed of soft decomposed limestone overlying the ore.

Owing to the porous nature of limestone the metalliferous saddles and troughs of England are much more complicated than those of Bendigo, for, besides the more or less vertical joints, they are intersected by "lums" (east and west fractures), and are frequently connected with "pipes."

EDWARD HALSE.
Puerto Berrio, Republic of Columbia.

One Solution of the Labor Question.

Sir:—A paper read recently before the American Institute of Mining Engineers touched lightly upon a topic which well merits the careful consideration of mine superintendents everywhere, but particularly of those who, as in the above case, are isolated and can be a law unto themselves, as it were. The problem is whiskey; and if I offer a few well chosen remarks upon such a well worn topic, my excuse is that in spite of all the discussions heretofore, mine is the

only shrewdly practical, business like and dividend-paying scheme of action proposed.

To begin with, all will admit that there is no possibility of a failure of the supply of drinking mine labor. (I should like, if I dared, to give an estimate of the proportion of drunken to sober men in the business.) Taking this fact as granted, and that a mine manager has neither the time nor ability to reform the craft, the problem is resolved into this: Get as much work as possible for as little money as possible.

In all frontier camps are saloons and dance halls. The company should own them. Poor liquor is supplied. The company should supply good liquor. *A very high price should be charged.* This latter works to the advantage of both the company and the man, since no one can deny that the man is better off if his money lasts only for a few days' drunk. Pay days are usually monthly. They should be bi-monthly, or better, weekly, since men will contrive to save part of, say, a \$60 check, who would not keep a cent of \$15. All religious and patriotic holidays should be carefully observed, particularly where Latin-Americans are employed. It will require a larger force to produce the ore, but so much the better for the boarding house and store, which the company owns. As regards the boarding house, all single men must board there. The rate can ordinarily be put at \$30 a month, but the Union is liable to interfere if a higher rate is set. Of course, if possible, \$35 is not too much to charge, and where freights are high the rate can be raised still higher.

As a rule, hard drinkers are hard workers when sober, and any foreman can cite instances of men who earn every cent they receive—and save nothing. In fact, it is often necessary to take up a subscription to pay their doctor's bills if the spree lasts too long. The Union usually attends to that, and it costs the company nothing. These are the men to have and they should be encouraged to go to your camp. The miner who goes to you and says, "I'd like to lay off for a day or two?" and straightway imbibes freely, will, when he has surfeited with enjoyment, return anxiously to work and can be driven that much the more. Encourage the drinker. The company practically gets his work for his board and overalls. If it is impossible to reform the drinking miner, and it is, it is also impossible to corrupt the sober one, so no one need have qualms of conscience. In some instances stockholders will object, but if the results of this system are placed before them in the right way—on the balance sheet—little trouble from that source need be anticipated.

If by error of judgment a sober, miserly man is employed, he should be replaced or moved from common labor to a position of responsibility as soon as convenient. It naturally follows that the mine foreman should be sober, in order to get the best results. Occasionally a foreman is found who will drive a man with whom he has been drinking all night just as hard as he will any of the others, but this is the exception. The foreman must be cold blooded and not able to sympathize with the man with a headache. It is not pleasant work for the average foreman under these conditions, so it is well to pay him a premium based upon the proportion which the work done bears to the pay-roll minus the returns from the store, boarding house and saloon.

The single defect of this system is its limited applicability. It is not economically possible to hire drinking engineers, smelter men or amalgamators. A family man, unless his family is with him, is seldom desirable. Very rarely will he spend all his money, but on the contrary will send a large proportion if not all, to his family. Let them go. They can easily get work in other places. It is astonishing how quickly a camp which is run this way will become renowned. The ten-day man is the most exasperating. He is of exactly the class of men wanted—spends his money freely—but he will not stay.

In the practical application of this system there are many small items to consider. For instance, it

would never do to have a pay day when the stock of beer, ice or other essentials was low. It would be much better to postpone pay-day. As regards prices of liquor, I have in mind one camp where the price of beer per bottle was 25 cents, and so much was consumed that the management decided that a raise in the price was possible. The result of a raise to 35 cents was a loud roar—and just as much beer was bought as before.

Very little friction is caused by adopting this system. It would be foolish for a Union to complain about the price of beer and whiskey. The Federation would tell them to stop drinking if the price was exorbitant and that would not suit the class of men under discussion—in fact, they couldn't do it. Then, too, while not invariably so, it is the rule that non-drinkers are non-agitators and will take a discharge for not spending enough money in the saloon as a compliment rather than otherwise.

The beauty of the scheme is its simplicity. It arranges itself. No Union will interfere as they would in case of an attempt to increase the number of working hours, cut wages or raise prices of necessities. And what drinker will object to holidays, bright lights, music and the clink of glasses, and the chance for a good time without fear of loosing his job?

Such a camp is for them a veritable paradise!
Los Angeles, Cal., June 5. M. R. L.

QUESTIONS AND ANSWERS.

(Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; reference 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.)

Hancock Jigs.—Can you tell me if the Hancock jig, used in Australia, is manufactured in this country?—C. F. H.

Answer.—We do not know that the Hancock jig is made in this country—at least under that name. Perhaps some of our readers can inform us on this point.

American Cement.—Can you tell me where I can get the names of American cement makers, and other particulars about the trade?—H. E.

Answer.—You can obtain the information you need from the *Directory of American Cement Users*. It is published by the Municipal Engineering Company, at Indianapolis, Ind.

Gold Deposits of Porto Rico.—Can you give me any information about the gold deposits of Porto Rico?—F. J.

Answer.—There is very little information in existence, chiefly because no considerable gold deposits are known to exist in Porto Rico. A little gold has been obtained from placer washings in some parts of the island; but the quantity has been very small, and no extensive explorations have been undertaken.

Corundum.—Can you tell me where I can market unprepared corundum? This is just in the lump as it is mined, is free from gangue, and can be furnished in rather large quantities.—F. C. G.

Answer.—The corundum business in the Eastern United States has been largely syndicated. The chief buyers at the present time are the National Abrasives Manufacturing Company, 416 Drexel Building, Philadelphia, and the International Emery and Corundum Company, Broad Exchange Building, New York.

Magnesite.—Can you give the addresses of parties handling magnesite—raw or calcined? Does any magnesite occur in Missouri, Arkansas, Kansas, Colorado or the neighboring States?—J. R. M.

Answer.—Among the chief buyers of magnesite

in this country are the Harbison & Walker Company and the Fayette Manufacturing Company, both of Pittsburg, Pa., who use the material in making refractory brick and furnace linings; and the American Carbonate Company, of No. 424 East Nineteenth street, New York, which calcines the raw magnesite for the supply of carbonic acid obtained.

We do not know of any workable deposits of magnesite in the districts you name. All the magnesite mined in this country hitherto has come from California. There are said to be large deposits in Arizona, but they have never been exploited.

Concentrating Molybdenite.—What is the best method of concentrating molybdenite out of a quartz gangue? What is the value of the ore?—D. F. H.

Answer.—The specific gravity of quartz being 2.6 and that of molybdenite 4.7, a fairly close saving might be made by crushing fine, using any approved form of buddle or concentrating table. If water is scarce a dry concentrator, such as the Hooper, might prove serviceable. Molybdenite being soft, there will be a large quantity of fines made in crushing. Before installing a concentrating plant of any kind you should have tests made on different types of concentrators.

As to the value of the ore, it is impossible to give very general statements. The demand is limited, and there are only a few buyers. Sales of ore are generally made on assay, and the purchasers will not name an fixed prices. Any considerable new supply would doubtless reduce selling values.

Indications of Iron Deposits.—Where lightning strikes frequently on the same property, is it to be taken as an indication that iron deposits underlie the surface, and where there is a strong attraction of the dipping needle from iron ore on the surface, should that be taken as indicating a large deposit below the surface? I have found ore on property lying in the township of Castle Rock, County of Dakota, Minnesota, and have also tested it with a dipping needle. From all I can learn, there are good indications of iron ore.—W. C. K.

Answer.—The fact that lightning is known to strike frequently in a given area is not necessarily a sign that iron ore occurs there. Neither is a pronounced dip of the dipping needle an indication of merchantable ore. The needle may be influenced by the presence of magnetite, and a lean, valueless magnetic schist may affect the needle strongly, while a deposit of high grade hematite would have no appreciable effect. These facts are well known in the Lake Superior country, where the dipping needle has been used by prospectors for years. If lumps of ore occur on the surface, you should take samples from a number of them, mix the samples, and then have an analysis made of the mixed average. The result will show something definite, but only actually digging or prospecting will prove the occurrence of a large ore body.

A MINE VENTILATING PLANT.

The accompanying drawings, Figs. 1, 2 and 3, show the details of a special steel plate fan with connections now being installed for the purpose of ventilation at the mine of the Modoc Coal and Mining Company, Glouster, Ohio. This fan has a 250-inch three-quarter housing of a special width, 72 inches. The sides are built of extra heavy sheet steel, and are heavily and thoroughly braced with angle irons of ample size, which effectually prevent vibration. The blast wheel is of the usual centrifugal type. The radial blades or vanes with backwardly curved tips are supported by two spiders of wrought iron tees springing from cast iron hubs and are further stiffened by two conical side plates.

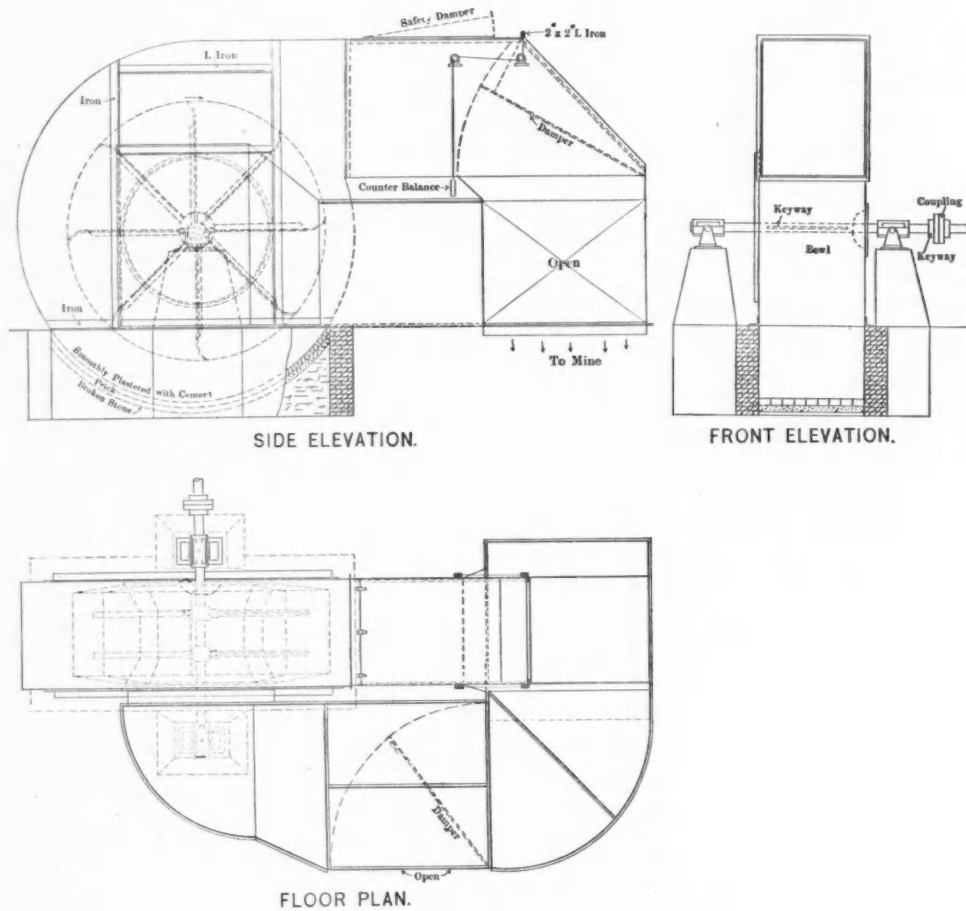
The 6-inch fan shaft is supported independently of the housing by two standard Buffalo self-aligning chain-oiling outboard bearings mounted on masonry pedestals. The motive power is furnished by a direct connected 12 by 20-inch side crank engine of 80

horse-power, running under about 95 pounds steam pressure.

The connections, best shown in the plan, Fig. 1, are ingeniously arranged so that the apparatus may either exhaust from or blow into the vertical mine shaft located at the outlet end of the fan. The passage to the inlet is controlled by the two-way dumper (see plan); that from the outlet by another two-way

a place to which there is a restricted passage, or in taking it from place to place—down a mine, for instance, or to the face of a drift.

It is a California machine, and is to some extent a product of necessity for such a tool among the mines and engineering works in that State. All the riveting for the battleships Oregon and the Olympia was done with Cumming forges.



VENTILATING FAN FOR MODOC COAL COMPANY, GLOUSTER, OHIO.

dumper (see elevation, Fig. 2). A weighted door opening outward is placed in the connections over the shaft, as shown in Fig. 2, to prevent injury to the apparatus in case of an explosion in the mine. The opening to the mine shaft is 93 square feet in area.

At free delivery this fan will handle 1,600 cubic feet of air per revolution. It is designed to operate at a speed not exceeding 150 revolutions per minute and to discharge 125,000 cubic feet of air per minute against a mine resistance of two inches of water column.

The apparatus was designed and is being installed by the Buffalo Forge Company, of Buffalo, N. Y., which is also building three additional plants of the same size.

CUMMING PORTABLE FORGES.

An ingenious forge that recommends itself to engineers and miners from its simplicity and efficiency is illustrated herewith. The blower and working parts are enclosed and protected; it is a compact machine, giving a strong blast, easily produced and maintained for some time after application of power has ceased.

The forge is made almost entirely of wrought iron and steel, and is practically proof against breakage.

A tuyere pipe, a basin or hearth, a blower, a set of legs or stand and a shield, each well designed and proportioned, are assembled to make the forge. This forge is easily and quickly taken apart and as readily put together again. This dismembering and reassembling feature is a desirable and convenient one when it is necessary to use the forge in

These forges and blowers are made by David Cumming, 789 W. Kinzie street, Chicago, and also



CUMMING PORTABLE FORGE.

in San Francisco, where they originated. They are the patented invention of George Cumming, of San Francisco, California.

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 June 17, 1902.

702,408. CONVEYOR.—John H. Cook, Brooklyn, N. Y., assignor to Henry B. Newhall, Plainfield, N. J. In a conveyor system, a feeder-conveyor extending longitudinally of a building mounted in a substantially central position therein upon the roof-trusses of the same, said feeder-conveyor comprising slats supported by trolleys and sprocket-chains, an inclined throw-off board adjustably mounted upon said feeder-conveyor and bodily-movable distributor-conveyors provided with throw-off boards on either side of said feeder-conveyor.

702,418. GAS GENERATING AND BURNING FURNACE.—Chas. M. Gearing, Brownwood, Tex., assignor of three-fourths to Charles W. Drown, Adolph Grivot, and Alexander C. Landry, New Orleans, La. In an oil-gas generating and burning furnace the combination of a fire-box, having a bottom of refractory material and an open recess or chamber extending entirely around the fire-box and opening directly thereinto, a perforated air-pipe encircling the fire-box and located back in said recess and provided with perforations opening directly thereinto, this piping being of smaller diameter than the outlet of said recess, an air-supply pipe connected to each of the front corners of said pipe and extending out through the front wall of the furnace, a common pipe connecting said two pipes and means for supplying air under pressure to this common pipe, an air-nozzle connected to the front portion of the encircling pipe at a point between the supply-pipes and extending into the furnace, and an oil-supply pipe extending into this air-nozzle.

702,473. BUCKET-DUMPING DEVICE FOR STEAM SHOVELS.—Harry T. Porter and George H. Beaumont, Cleveland, O., assignee of one-third to Willard T. Moore, Cleveland, Ohio. In a steam-shovel, the combination of a dipper, a movable dipper-arm, tripping mechanism for controlling the discharge of the dipper, and means mounted upon such arm for operating such mechanism.

702,490. APPARATUS FOR TREATING COPPER ORES.—Richard Seeman, Ealing, London, England. A plant for the treating of copper ores containing carbonate or oxide of copper, consisting of a series of vessels comprising a mixer, a settler, a still, and a safety vessel, the mixer, settler and still being located at different levels, the several vessels being pipe-connected, and the parts of the apparatus with which the ammoniacal solution of copper comes in contact being of a material indestructible by such solution.

702,499. HAND ROCK-DRILL.—Valerius Y. Smith, Oakland, Cal. The combination in a drill of a slotted casing, a drill-shank guided and longitudinally slidable within the casing, means by which the drill and shank are partially rotated at each reciprocation, a double centrally-pivoted lever, slide-bars connected to the arms of said levers, spring-pressed bell-crank levers pivoted in the rear ends of the slide-bars, having one arm extending in the direction of the length of said bars and the other arm projecting laterally through the slot in the casing and into the path of the drill-shank, to engage and retract the latter, and means for alternately engaging one of the arms of a bell-crank lever to withdraw the other arm from engagement with the drill-shank.

702,526. SPELTER FURNACE.—Alfred J. Ash, Peterborough, England. A reverberatory furnace for refining hard spelter, having an inclined liquation bed, with refining and collecting pits adjacent to the lower edge.

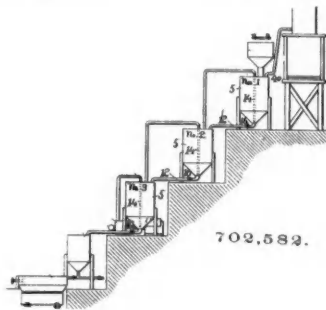
702,541. ORE CONCENTRATOR.—Louis Cohen and John Gross, Sombretto, Mexico. A belt concentrator with a bed made in sections, so arranged that the pitch and inclination of the rollers carrying the belt can be altered by changing those of the sections of the bed.

702,573. APPARATUS FOR THE MANUFACTURE OF ARTIFICIAL STONE.—Friedrich Marx, Leipzig, Germany. An improved apparatus for the manufacture of artificial stone free of pores, from a mixture of burnt magnesite, calcium carbonate and a lye of magnesium chloride as moistening means, from which latter the impurities have been removed by submitting to atmospheric air, whereby the said impurities settle down and, in consequence of the extraction of the salts, a consistent and unvariable product is obtained, especially suitable for lithographic stones.

702,580. APPARATUS FOR PRODUCING GAS.—Teile H. Muller, New York, N. Y. The combination of a retort, a furnace for heating the same, a steam-pipe connected with the said retort and coiled around the same in the furnace in the path of the combustion-gases, and means for collecting the gas produced.

702,582. PROCESS OF RECOVERING METALS FROM ORES.—James W. Neill and Joachim H. Burfeind, Salt Lake City, Utah. An improvement in leaching copper ores,

consisting in forcing sulphurous-acid gas through a charge of pulp to agitate the same mechanically and thereby assist in the leaching action, separating the solution from the ore,



702,582.

recovering the metal from such solution, thereby releasing the gas and returning the gas released by such operation for use in agitating and dissolving the metal from fresh charges of ore.

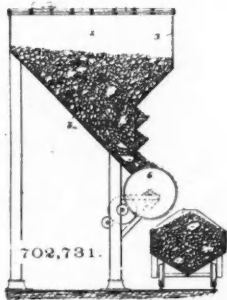
702,611. MANUFACTURE OF ARTIFICIAL STONE OR BRICK AND THE PREPARATION OF LIME THEREFOR.—Oskar H. Anderson, Stockholm, Sweden, assignor, by mesne assignments, to Silicate Brick Syndicate, Montreal, Canada, a corporation of Delaware. A process of simultaneously making brick or other articles out of lime and sand and slaking lime, consisting in mixing the sand and lime with the minimum amount of moisture necessary to hold the mixture in form, next molding the mixture into the desired shape, inclosing the molded articles in a chamber together with a separate quantity of unslaked lime, and finally hardening the bricks, and slaking the lime by the application of high-pressure steam only.

702,643. GOLD SEPARATOR.—Charles W. Gardner, Portland, Oregon. The combination in a gold-separator of a shell or casing, a grating or screen upon which the gravel is received, said grating or screen being inclined in the direction of the length of the shell or casing, a second screen inclined in the direction of the width of the shell or casing and discharging laterally through the side walls thereof, a chute leading from the side of the shell or casing and a chute in line longitudinally with the shell or casing, a foraminous plate below the second screen and extending longitudinally of the casing, and a water-supply adapted to discharge upon the screens in opposition to the flow of gravel thereon.

702,653. SAND PUMP AND BAILER.—Frederick W. Jackson, Chicora, Pa. In a pump, the combination with a pump stock or tube, and a fixed reinforce or lining mounted within the lower end thereof, of a valve seat or casing mounted within the lower end of the reinforce, said valve-seat being supported by the reinforce and detachably connected therewith by interlocking means.

702,705. FLOATING DREDGE.—Ephraim Chaquette, New Rochelle, N. Y. A floating dredge provided with a longitudinal channel therethrough, with its ends inclosed, a dredge-carriage moving on a suitable track extending along said channel near the water-line, a chain-bucket dredging apparatus and its operating mechanism supported on and carried by said carriage, and a dumping-apron car adapted to receive material from said chain-bucket dredge and convey it to the discharging apparatus.

702,731. ORE POCKET.—Frank K. Hoover, Kansas City, Mo., and Arthur J. Mason, Chicago, Ill. An ore pocket or hopper having converging front and rear walls, in combination with a roller journaled below the same and forming a movable bottom wall for the discharge-outlet, the rear wall of the hopper extending substantially into contact with the periphery of the roller, and the front wall terminating above



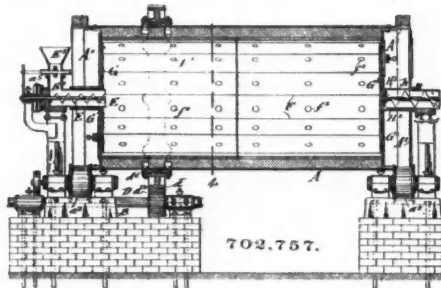
702,731.

the roller below the line marking the natural angle of repose of the material operated upon and at a distance from the nearest point on the periphery of the roller which is substantially equal to the distance between such lower termination of the front wall and the nearest point on the opposite rear wall.

702,736. APPARATUS FOR REDUCING FUSIBLE MATERIALS TO DUST.—Albert F. Madden, Newark, N. J. A machine for converting fusible material into dust, com-

prising a rotary vessel having unobstructed peripheral openings, means for heating said vessel above the melting-point of the fusible material and means for rotating said vessel at a speed sufficient to spray the melted material from the peripheral openings into the form of dust.

702,757. BALL GRINDING MILL.—Max F. Abbe, New York, N. Y. In a ball grinding-mill, the combination, with a rotary drum and grinding-balls within the same, of a gear-ring applied to said drum, and a cushioning-ring inter-



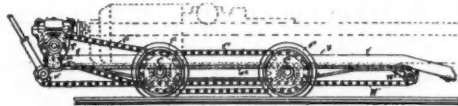
702,757.

posed between the gear-ring and drum for taking up the concussions within the latter.

701,758. METHOD OF GRAPHITIZING ELECTRODES.—Edward G. Acheson, Buffalo, N. Y., assignor to the International Acheson Graphite Company, Niagara Falls, N. Y., a corporation of New Jersey. The method of subjecting electrodes and other articles, composed of carbon and impurities capable of determining the conversion of the carbon into graphite, to a high temperature through the agency of electricity, which consists in arranging said electrodes or other articles with their longest dimensions in the same general direction, and then passing a current of electricity through the same in a direction approximately transverse to the direction of their longest dimensions.

702,764. PROCESS OF EXTRACTING ZINC.—Jules L. Babe and Alexis Tricart, Paris, France. A process herein described of extracting metallic zinc from ores poor in zinc, which consists in forming briquettes from a mixture of the ore, carbonate of soda and carbon, subjecting said briquettes to the action of heat suitable for driving off the zinc-vapors, condensing said vapors whereby a condensation product containing zinc oxide is formed, mixing said product with carbonate of soda and carbon, subjecting said mixture to a suitable temperature for driving off the metallic zinc in the form of vapors, and condensing said vapors.

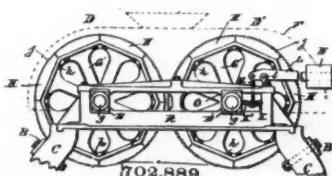
702,817. MINING-MACHINE TRUCK.—Alexander Palmros, Columbus, Ohio, assignor to the Jeffrey Manufacturing Company, Columbus, Ohio, a corporation of Ohio. In a combined coal cutting and transporting mechanism, the combination of the truck, the supporting-wheels, the transverse shaft, the sprocket-gearing connecting the transverse shaft with the supporting-wheels, the longitudinally-arranged



702,817.

shaft, the worm-gearing connecting the longitudinal and the transverse shafts, the clutch element in the longitudinal shaft, and the cutting apparatus adapted to be drawn onto the truck, and having a clutch element counterpart to, and adapted to be engaged with the aforesaid clutch element.

702,877. METHOD OF MAKING HYDROGEN CHLORIDE AND SODIUM SULPHATE.—Theodor Meyer, Buerger, Germany, assignor to firm of K. Oehler, Anilin & Anilinfarben-Fabrik, Offenbach-on-the-Main, Germany. An improvement in the process of manufacturing concentrated hydrogen chloride and sodium sulphate which consists in finely powdering and intimately mixing in about equimolecular proportions common salt and sodium bisulphate



702,877.

and heating the same to a temperature below the melting-point.

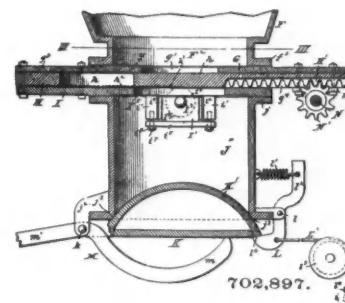
702,892. ORE-ELEVATOR.—Henry A. Vezin, Denver, Colo., assignor to Joseph A. Jeffrey, Columbus, Ohio. In an elevator for pulverized ore the combination of the loading-drum formed with the peripheral tubes extending beyond

the periphery of the drum, the sprocket-wheels rigid with the drum, the series of buckets, the chains carrying said buckets, and the series of forked sprockets with threaded stems radially adjustable on said wheels arranged substantially as set forth whereby the sprockets can be so adjusted as to cause the proper registering of the buckets with the filling tubes and permit variations in the pitch distances of the sprocket-forks and the chain lengths.

702,889. COAL CRUSHER.—Archibald W. F. Steckel, Columbus, Ohio, assignor to Joseph A. Jeffrey, Columbus, Ohio. In a crushing mechanism, the combination of a frame, a relatively stationary roll, an opposing movable roll, a toggle mechanism acting on the movable roll to force the latter toward the stationary roll.

702,894. CONVEYOR.—Alfred J. Webster, Columbus, Ohio, assignor to Joseph A. Jeffrey, Columbus, Ohio. In a crushing mechanism, the combination of a frame, a relatively stationary roll, an opposing movable roll, a toggle mechanism acting on the movable roll to force the latter toward the stationary roll.

702,897. MACHINE FOR WASHING COAL, ETC.—Freeman B. Willson, Jr., assignor to Joseph A. Jeffrey, Columbus, Ohio. The combination of two chambers, terminating in opposing flanges, valve-box formed separately from and secured to the opposing flanges, and having a plate which



702,897.

extends to points inside of the walls of the chambers rectilinearly-sliding valve in said valve-box, and antifriction supporting devices for the valve situated in the interior of the chamber.

GREAT BRITAIN.

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

Week Ending June 5, 1902.

9,927 of 1901. ZINC-COATING IRON.—S. Cowper-Coles, London. Coating iron articles with zinc by enclosing the articles in zinc dust in a closed chamber and heating to a dull red heat.

10,105 of 1901. TREATING ZINC-LEAD SULPHIDES.—C. H. T. Havermann, Paris, France. Treating mixed sulphides of lead and zinc with molten iron, and so reducing the lead.

10,351 of 1901. METAL SEPARATION.—F. Heberlein, Bundt Watty, Switzerland. Separating volatile metals from ores by mixing with coal in a converter, and introducing air or other oxidizing agent.

13,277 of 1901. ROCK DRILL.—Z. W. Daw, London. Improvements in the valve gear of the inventor's percussive rock drill.

15,526 of 1901. CONCENTRATOR. A. S. Elmore, London. Modifications in the plans used in the inventor's system of concentrating ores with oil.

18,575 of 1901. CLEANING BLAST FURNACE GASES.—A. Clemang, Luxemburg. Improved apparatus for cleaning blast furnace gases and for preventing the entrance of air while the furnace is being charged.

23,056 of 1901. GAS MIXER.—R. Fabry and F. Linard, Brussels, Belgium. Improved method of mixing the heating gases before going to the heating flues of coke ovens.

26,560 of 1901. COAL DUST SPRINKLER.—G. R. Jones, Aberdare. Tank for watering collieries with sprinkling rose actuated from the wheels.

5,208 of 1902. PULVERIZER.—D. S. S. Stewart, London. A pulverizer consisting of a number of hammers pivoted to a revolving shaft.

7,995 of 1902. ELECTRO-DEPOSITING BATH.—G. Langbein, Leipzig, Germany. The addition of ethyl sulphate to the metallic salts forming electro-depositing baths, so making a much tougher deposit.

8,184 of 1902. BARIUM CHLORIDE MAKING.—J. Waldbauer, Louvain, Belgium. Process for making barium chloride from iron chloride waste liquors and barium sulphate.

MINERAL LANDS IN TEXAS.

By WILLIAM B. PHILLIPS.

Certain decisions that had been made relative to the status of mining claims have been discussed by the writer in previous communications. Another decision has been made by Associate Justice Williams, of the Supreme Court, in the case of the Colquitt-Tigner Mining Company, Limited, vs. Rogan, Land Commissioner. *Texas Court Reporter*, Vol. 4, No. 14.

This is an original application by relator for a mandamus to compel the respondent to receive and file in the General Land Office its application for a patent to a mining claim upon a section of school land in Brewster County, the receipt of the State Treasurer for the price due the State for the purchase of such claim, and certain deeds thereto, from the original locator thereof, to the relator, and to accept the fee of \$5 for the patent.

The respondent declines to receive the papers and the fee, because he is in doubt as to relator's right to acquire a mining claim upon the section in question, for the reason that it has never been examined and designated as apparently mineral-bearing, as provided by Article 34986, Revised Statutes, by geological and mineralogical survey. It is conceded by the respondent that the relator and those to whose rights it has succeeded have done everything required by the statute to invest it with the right it claims, unless it is true that the land, not having been designated as mineral bearing by the survey, was not open for such claim; and this is the sole question raised in the case between the relator and respondent.

The mandamus was granted, the court holding that school land containing minerals is open to the location and survey for a mining claim under the act of 1895 (Revised Statutes, Articles 3498a to 3498t), although it has never been examined and designated as apparently mineral-bearing land by geological and mineralogical survey.

The decision disposes of the doubt that some have entertained of the legal existence of mineral lands other than as surveyed and designated by geological and mineralogical survey. It had been supposed, and indeed the Commissioner of the Land Office, who alone had power to sell the land, seems to have shared the opinion, that unless the land had been thus surveyed and designated no mining claim could be located upon it. A certain agency had been provided for the examination of the public land with respect to its mineral-bearing character, and the question arose whether any such land could be considered as apparently mineral-bearing unless this agency had certified to the fact. The geological and mineralogical survey, which had been designated by the Legislature as this agency, was established in 1888, and discontinued in 1892. While it was in existence it examined a very small proportion of the public lands, and since 1892 there has been no survey specifically charged with this duty. The public domain in Texas covers an enormous area, about 18,000,000 acres (more than 28,000 square miles), and it is situated in nearly all portions of the State. It would have required years of constant labor even to ride over it, to say nothing of examining it.

If we grant that mining claims could legally be located within the area examined by the survey and designated as apparently mineral-bearing, what can be said of land known to be mineral-bearing and yet never examined by the survey? The court holds, and properly, that the Legislature "provided for the survey as an aid in finding the lands to which the reservation (that of minerals) should attach, but used no language implying that only those lands were to be protected or that the survey was to be the only means of discovery. It provided other procedure through which the commissioner, who alone could make sales, might learn as well as, or even better than, by the survey, that particular lands contained minerals."

This "other procedure" is based on the actual finding of minerals. The survey was an agency, not the sole one, otherwise the State would suffer loss

in the sale of mining land as agricultural or grazing land.

The effect of this decision will be to stimulate prospecting in what is, perhaps, the great mineral region of the State, the Trans-Pecos, comprising an area of 30,000 square miles. This region is known to contain gold, silver, lead, copper, zinc, quicksilver, tin, coal, salt, sulphur, oil and gypsum. If the Legislature were to go a step farther and allow of the sale of mining lands in that region at much less prices than now maintain it would be the best thing that could be done under the circumstances. The region is, for the most part, barren of timber and devoid of water. Except in isolated localities the question of timber and water is a most serious one. At least one promising district is now hauling water 6 to 8 miles at an expense of about 1 cent per gallon, and paying \$1 each for poles 16 feet long and 4 inches minimum diameter. The supply of wood for fuel is limited, and it is now costing from \$5 to \$6 a cord. In order to promote the mineral development of the country under such conditions the price of the land should be placed at the lowest possible point, and every facility should be given to those who are engaged in prospecting or who wish to buy. In the case of non-metallic minerals, such as oil, sulphur, salt, gypsum, etc., the provisions of the law are liberal enough, for the prospector has 12 months in which to purchase the land, and he may then acquire one section of 640 acres, or, under certain conditions, two sections. The mining laws of Texas correspond to those of the United States, but the objection to them is that they do not sufficiently recognize local conditions. What may be a fair price in some localities becomes an excessive price in other localities. In some coal regions good land can be bought for \$25 an acre, but it does not follow that this is a fair price in a region remote from rail and devoid of water. There should be a harmonious relation between the price and the local conditions, otherwise the prospector, often a man of limited resources, is heavily handicapped and has to give place to large aggregations of capital. He may have to do this sooner or later, under most circumstances, but he should have a fair chance to acquire a legal standing in the fruits of his labors. We cannot dispense with him, and would not if we could, for he is the advance guard of progress.

TRUST MOVEMENTS IN AUSTRIA-HUNGARY.

CONSULAR REPORT.

Oil.—Negotiations are under way between oil refiners and raw-oil producers of this Empire to regulate production in the interest of greater profits. It is proposed to limit output and divide the markets among the parties concerned. Both refiners and producers already have separate agreements. The present movement, therefore, has in view a combination on a broader scale—substantially a fusion of separate combinations.

Glass.—The agreement between Bohemian and Bavarian raw-glass producers, formed for the purpose of regulating selling prices, which was dissolved some time ago, is to be at once renewed. In conjunction therewith, a former combination of looking-glass manufacturers of Bohemia and Bavaria is to be revived. In both cases the object is to reduce competition to a minimum and restore prices to a profitable basis.

Cement.—A union of Austrian portland cement manufacturers has been effected. It is complained, however, that the recalcitrance of a few outside firms makes it difficult to accomplish the purpose of the combination—to check a further fall in prices by judiciously dividing the markets among the parties to the agreement. But it is hoped that the outsiders may be gradually forced into line, as they come to realize that their interests are thereby subserved.

Iron.—After a severe struggle of two years, the iron industries of Austria and Hungary have formed a combination with the object of increasing profits by reducing competition and raising prices; though it is openly charged that the large concerns have all

along been realizing dividends ranging from 7 to 25 per cent.

Previous combinations of iron industries have been formed in this Empire, but they embraced only certain establishments or related to only a certain kind of product. But all these have been dissolved through disagreements or otherwise, and are succeeded by the present giant combination, which absorbs substantially every iron-working concern in the Empire and covers every variety of iron product.

The agreement is to last ten years. During that period a new iron-working establishment cannot be started in the Empire—unless, indeed, it is able to use its own raw material, which will be practically impossible. All the iron smelters in Austria are owned by the members of the combination, and it is not practicable to start new ones. In Hungary, under peculiarly favorable conditions, some strata of iron ore might be developed outside of the trust, but enormous capital would be required. Thus, from appearances, the trust is in a position to absolutely shut out competition.

The liberal policy of the Hungarian Government, in financially encouraging new industries, would seem to be an obstacle to trade combinations, but it is argued that this policy really aids the iron combination, since its protective spirit leads to legislation tending to exclude foreign competition.

In production and in markets, the iron industries of this Empire have gained much during the past decade. Certain individual works have largely increased their working capital, and others have added materially to their producing capacity.

The markets will be carefully divided among the members of the combination. In one respect, the Hungarian members have secured a decided advantage over their Austrian brethren. Under the agreement the former may deliver to Austria 28,000 metric tons of product, while the latter may deliver only 11,000 tons to Hungary. Under former agreements, the exchange was equal.

It is announced that members of the combination have notified their customers that they cannot make future contracts at the old prices. The increases, it is stated, range from 1 to 4 crowns (20 to 80 cents) per 100 kilograms (220.46 pounds), depending upon the kind and quality of the iron product.

STEEL PRODUCTION OF THE UNITED STATES.

We have heretofore given the production of Bessemer and open hearth steel in the United States in 1901, as reported by the American Iron and Steel Association. The full report of the association adds the small production of crucible and special steels, giving a completed statement. The figures are given in the following table, in long tons:

	1900.		1901.		Changes.
	Tons.	Per ct.	Tons.	Per ct.	
Bessemer	6,684,770	65.6	8,713,302	64.7	I. 2,028,532
Open hearth	3,398,135	33.4	4,656,309	34.6	I. 1,258,174
Crucible	100,562	1.0	98,513	0.7	D. 2,049
Special	4,862	...	5,471	...	I. 609
Total	10,188,329	100.0	13,473,595	100.0	I. 3,285,266

We have already commented on the output of Bessemer and open hearth steel. The production of crucible steel in the United States in 1901 amounted to 98,513 gross tons, against 100,562 tons in 1900, 101,213 tons in 1899, 89,747 tons in 1898, 69,959 tons in 1897, 60,689 tons in 1896, 67,666 tons in 1895, 51,702 tons in 1894 and 63,613 tons in 1893. Nine States made crucible steel in 1901, namely, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Tennessee, Ohio, Illinois and Wisconsin. The direct castings produced in 1901 by the crucible process, included above, amounted to 3,927 tons. Pennsylvania made about three-fourths of the country's total crucible steel production in 1901.

The production of steel in the United States in 1901 by various minor processes amounted to 5,471 gross tons, almost all of which was in the form of direct castings, against 4,862 tons in 1900, 4,974 tons in 1899, 3,801 tons in 1898, 3,012 tons in 1897, 2,394 tons in 1896, 858 tons in 1895, 4,081 tons in 1894, 2,806 tons in 1893, 4,548 tons in 1892 and 4,484 tons in 1891.

COAL TAR PRODUCTS IN GERMANY.

Recently published statistics of the chemical industry in Germany show that the manufacture of dyestuffs, and particularly aniline colors and other coal tar products, which are German specialties, has shown a remarkable growth during the last six years. The exports of aniline colors in 1901 exceeded those of 1896 by over 50 per cent, as shown in the following table:

Year.	Metric Tons.	Quantity.
1896	16,232	\$15,460,000
1897	17,639	15,696,000
1898	19,712	17,131,000
1899	24,705	17,839,000
1900	23,781	18,402,000
1901	25,029	19,213,000

This table shows that the exports have increased regularly each year, but without a corresponding advance in values. The growth in the export chemical trade has been made in the face of adverse conditions.

The German manufacturer of chemicals is alike dependent upon foreign countries for most of his raw material, and for an outlet for his products; he is also hampered by the high price of fuel and freights, and he realizes that his main reliance is the supply of trained chemists in Germany. A summary of the statistics of this industry in the United States, taken from the recently published census returns, has been published somewhat widely in Germany; and the certainty of vigorous and increasing competition on the part of the United States in this important branch is admitted.

The possible competition from this country which the Germans seem to fear is not apparent in the coal tar branches of the chemical industry. The report of the Bureau of Statistics shows that the imports of coal tar colors and dyes, including alizarin, etc., amounted in value in 1901 to \$5,497,985, as compared with \$4,843,303, in 1900, an increase of more than \$650,000, or over 13 per cent.

PERSONAL.

Mr. J. B. Barker, of Boston, Mass., is in the copper district of Northern Michigan inspecting mines.

Mr. John Scudder, of St. Louis, Mo., this week visited Central City, Colo., where he is interested in mining property.

Mr. George A. Flagg, secretary and treasurer of the Calumet & Hecla Company, is visiting the mine at Calumet, Mich.

Mr. Edward H. Cox, of Springfield, Ill., is spending 10 days in the Southeastern Ohio coal-fields in the interests of his employers.

Mr. M. L. Effinger, of Salt Lake, Utah, secretary of the Ophir Mining Company, recently visited the Lake Superior copper district.

Mr. C. J. Devereaux, of New York City, vice-president of the Quincy Mining Company, is visiting copper mines in the Lake Superior District.

Mr. Paul A. Oliver, of Wilkesbarre, Pa., has been visiting in Gilpin County, Colo., where he is interested in mining and milling enterprises.

Mr. Simon Bamberger, of Salt Lake, Utah, is in New York City. His visit is said to be in connection with a deal for the De La Mar gold mines.

Mr. Charles M. Dull has returned to Salt Lake, Utah, to enjoy a short vacation. Mr. Dull has been with Mr. Charles Butters in Honduras, C. A.

Mr. James Wilson Woodrow has succeeded the late Dr. H. Van F. Furman as general superintendent for the Penoles Mining Company at Mapimi, Mex.

Mr. C. B. Halliday, of Waterloo, Ia., a stockholder in the Gauntlet Gold Mining Company operating near Central City, Colo., recently visited the property.

Mr. F. C. Alsdorff, formerly of Central City, Colo., who is operating in the Missouri mining sections, is on an expert trip to Arizona on behalf of Eastern men.

Mr. Milton D. Joseph, mining broker of Salt Lake, Utah, has returned from a 6 weeks' trip to New York, Boston, Cincinnati, St. Louis and other cities.

Mr. J. P. Turner recently returned to Salt Lake, Utah, from the inspection of an Idaho property, and is now examining a proposition in Lemhi County, Ida.

Mr. Alexander McLean has accepted a position as superintendent of the mechanical department of the Nova Scotia Steel and Coal Company works, near Sydney, N. S.

Mr. W. H. Adams leaves New York City this week for Alaska. He will examine pyrites deposits on

Clarence Strait, and on his return examine a copper proposition in Montana.

Mr. George B. Earnshaw returned last week to Salt Lake, Utah, from a 10 days' trip to Colorado, where he has been examining and sampling a gold proposition for Eastern men.

Capt. Thomas Carylon, formerly head mining captain at the Trimountain Copper Mine, in Michigan, has accepted the position of head mining captain at the Silverton Mine, in Colorado.

Mr. George W. Maynard, of New York City, recently spent some weeks at the Richardson Mine, at Isaac's Harbor, N. S., making an examination of the property and preparing a report.

Mr. W. R. Todd, of New York City, secretary and treasurer of the Quincy, Adventure and Rhode Island copper mines in Northern Michigan, is inspecting those mines and others in that district.

Mr. William Bishop, of Grass Valley, Cal., has resigned as foreman of the Red Boy Mine, near Baker City, Ore., and Superintendent Dikeman, formerly of Rough and Ready, Cal., has also resigned.

Mr. Percy L. Fearn, of New York City, who recently returned from an extended examination of the Thunder Mountain and other mining districts in Central Idaho, leaves this week for Arizona.

Mr. James W. Shields, of Hancock, Mich., assistant superintendent of the Tamarack-Osceola Mill, has been appointed superintendent of the Quincy Mining Company's mill, to succeed Mr. Cornelius Bedell.

Mr. Walter B. Jarvis, a prominent Butte mining man, has returned from a trip to New York City. He has interests in the Thunder Mountain country that he intends to extensively develop during the season.

Mr. Nathaniel Dunlop has been admitted a partner in the well known coal firm of Hull, Blyth & Co., of London and Cardiff, Wales. He has taken an active part in the business of the firm for several years past.

Mr. H. Chester Crouch, of Oswego, N. Y., a graduate of Cornell University, has been appointed assistant professor of mechanical engineering in charge of the department at the University of Colorado, Boulder, Colo.

Messrs. H. C. Walrond and I. A. Chennel, of London, Eng., were Gilpin County, Colo., visitors last week. The former is a stockholder in the Colorado-Carr Company, Limited. Both gentlemen are on their way to England from the far East.

M. Sosthenes Doise, an eminent mining engineer of France, who has been visiting the coal mining regions of western Pennsylvania studying American methods of mining and handling coal by machinery, passed through New York City this week on his way home, sailing for France on July 1.

Mr. George Westinghouse, Jr., president of the British Westinghouse Electric and Manufacturing Company, sailed this week from New York City by the American liner *St. Louis* for a short trip to the other side. The British Westinghouse works at Trafford Park, Manchester, Eng., are expected to be in full working operation this month.

Mr. A. C. Milner recently returned to Salt Lake, Utah, from a trip that consumed nearly a month, during which he went over the country between Shoshone Falls, Ida., and the properties of the Dexter-Tuscarora Company at Tuscarora, Nev. He went over the ground with a party of engineers for the purpose of locating a line over which to transmit electric energy from the Shoshone Power Company's plant to the Nevada camp.

Mr. Charles R. Miller, of Wilmington, Del., vice-president of the company owning some of the Tonopah, Nev., mines, and 11 other Eastern men owning stock in the corporation, recently inspected the Tonopah District. In the party were Messrs. Joseph Swift, Preston Lea, W. G. Mendenhall, W. F. Sellers, J. Whiteman, V. B. Wooley and C. A. Daniel, from Wilmington, Del.; W. P. Bement, W. E. Ammon and Thomas M. Longscope, of Philadelphia, Pa., and Winton Liddell, of Charlotte, N. C.

Mr. William Knox, member of the Federal Parliament, Australia, and the head of the firm of Knox, Schlapp & Company, of Melbourne and Sydney, has been in New York City. He is visiting this country as one of the Federal Commission on the Construction of the Parliament House for the Australian Government, and has visited the capitols in St. Paul, Ottawa and Washington for the purpose of getting ideas from the buildings. Mr. Knox is prominently identified with the mining industries of Australia, being largely interested in the Broken Hill Proprietary Company in New South Wales and the Mount Lyell Mining and Railway Company, Tasmania. Through his efforts the Australian tariff on all kinds of machinery was reduced from 25 per cent to 15 per cent, thus aiding the large mining industries of the country in securing equipments from manufacturers in the United States.

OBITUARY.

William B. S. Reed, a well-known civil and mining engineer, died on June 27 at the home of his brother-in-law, Frank H. Sherwood, in Brooklyn, N. Y., in his forty-fifth year. He was a graduate of the Polytechnic Institute in Brooklyn and of Columbia College. For several years he had been engaged in professional work in the West and South. He was unmarried.

Henry Plummer, a Colorado pioneer, who died recently in Idaho Springs, Colo., was born in Waterford, Me., August 9, 1836. Mr. Plummer left his native State, going to Wisconsin, in the spring of 1857. In company with A. B. Griswold, he left his Wisconsin home April 23, 1861, reaching Denver in July of the same year, having traveled all the way with ox teams. After remaining in Denver a few days the party went to Idaho Springs, at which time there were not over 200 to 300 people there. Griswold and Plummer bought claims on Chicago bar and placer mined until the spring of 1862. Then, in company with M. O. Coddington and Joseph Cox, Mr. Plummer went to Idaho and opened placer mines around the present site of Boise City for a few months. Then Mr. Plummer went down the Piat River, and ran a stage station until the fall of 1865, when he returned to Idaho Springs, and later went into business there. He was one of the organizers of the First National Bank of Idaho Springs. Mrs. Plummer and an adopted son survive him.

Allen G. Campbell, a widely known and popular Utah mining man, died recently at his home in Riverside, Cal., from pneumonia. Mr. Campbell was about 77 years of age, and was a native of Missouri. After following mining in various parts of the coast and mountain States with indifferent success, he went to Utah in the early '70s. When the great Horn Silver Mine was but little more than a mere prospect, it passed into the hands of himself, Matthew Cullen and Pat and Dennis Ryan. The mine proved a bonanza, and in 1879 it was sold for \$5,000,000, each of the partners owning an equal interest. With his fortune made, Mr. Campbell continued to invest in mining properties, chiefly in Beaver and Iron counties, and later in Nevada and southern California. Recently he parted with large blocks of ground near Milford and Frisco, Utah, but his holdings there and in the iron belt further south were still considerable.

Mr. Campbell leaves a widow, 2 little sons and a daughter, besides an elder son, Charles, by a former marriage, who lives in Kansas. Mr. Campbell's disposition was kindly, and his manner genial. In former years he paid out thousands of dollars for the education of poor children.

Prof. John B. Johnson, dean of the Department of Engineering of the University of Wisconsin, died on June 22 at Pier Cove, Mich., where he was spending the summer. He was killed by falling from a wagon.

John B. Johnson was born in Marlboro, O., in 1851. He graduated from the University of Michigan in 1878. During his college days he was connected with the lake survey, and for 3 years was a member of the Mississippi River Commission. In 1881, through Prof. C. M. Woodward, dean of the school of engineering and architecture of Washington University, St. Louis, Mo., he was invited to the chair of civil engineering of that institution. After a service of 18 years at Washington University, in 1899, he was tendered the position of dean of the engineering department of the University of Wisconsin, which he accepted and held until his death. He built up the engineering department at Madison, and was instrumental in securing a costly engineering building and equipment. Prof. Johnson was a member of the American Society of Civil Engineers, the American Association for the Advancement of Science, the Society for the Promotion of Engineering Education, and during his connection with Washington University was at one time president of the St. Louis Engineers' Club. He was considered one of the foremost authorities on engineering science in the United States, and wrote some standard books upon the subject. Prof. Johnson was the author of the following works: "Topographical Surveying," 1884; "Theory and Practice of Surveying," 1888; "Modern Frame Structures," 1893; "Engineering Contracts and Specifications," 1895; "Materials of Construction," 1897, and two volumes of indexed notes on current engineering literature from 1884 to 1895. Several of his works are used as textbooks.

Prof. Johnson several years ago established a testing laboratory at Washington University for testing the strength of materials. His work in this line included a large number of tests of yellow pine—the results of which attracted much attention in lumber, building and engineering circles all over the country. The deceased leaves a widow and 5 children.

SOCIETIES AND TECHNICAL SCHOOLS.

SCRANTON ENGINEERS' CLUB.—The directory issued by this society at Scranton, Pa., shows a total membership of 160. The officers are: H. H. Stoek, presi-

dent; B. F. De La Rue, vice-president; A. E. Lister, recording secretary; A. B. Dunning, corresponding secretary; F. J. Platt, treasurer, and H. M. Lane, librarian.

INDUSTRIAL NOTES.

The Risdon Iron Works of San Francisco, Cal., is reported to be figuring on some substantial Mexican contracts through Victor M. Braschi & Brother, of the City of Mexico.

The American Locomotive Company, from its Schenectady, N. Y., shops, is about to make a shipment of locomotives to Algoa Bay for the Cape Government railways, South Africa.

The Truro, N. S., Foundry Company is building a 10-stamp mill for the Warwick Gold Mining Company, including boiler and engine. It will be used in the latter company's property at Renfrew, N. S.

The General Electric Company is reported to have purchased property in the city of Ottawa, Ont., for the purpose of erecting a plant which at first is to be used chiefly for sorting and trimming mica.

The Lake Shore Engine Works of Marquette, Mich., was awarded a gold medal for its exhibit of marine engines at the Charleston Exposition. The award was given on account of simplicity of construction, sureness of action, perfection of build, large horse-power developed in small space and minimum weight.

The Pelton Water Wheel Company, of New York City and San Francisco, is reported to have secured contracts for a fair-sized water wheel plant, including 1,500 ft. of steel-riveted pipe, 24 in. in diameter, for the San Juan Coal Mining Company, of Puebla, Mex. Orders are also said to have been lately received from France, Bologna, Italy and Dominica, West Indies.

The Coeur d'Alene Iron Works, of Wallace, Ida., has recently placed on the market a self-oiling axle. The axle is claimed to be absolutely dust-proof, and to prevent any waste of oil. It also travels easily on a curve, one wheel being loose, the other tight. The Coeur d'Alene Company says that all mining companies in its district have used this axle, and are highly pleased with it.

The coke oven blowers in the Buffalo plant of the Lackawanna Iron and Steel Company are to be operated by direct-connected electric motors. Ten induction motors of 75-h. p. each have recently been purchased for the purpose from the Westinghouse Electric and Manufacturing Company. Four induction motors of 100-h. p. each will be used for operating the gas cleaning plant, and the machine shop will likewise be driven by induction motors. This company has lately bought in all 151 Type C Westinghouse induction motors of from 1 to 100-h. p. each.

The Fayette Manufacturing Company will use electrical power transmission for driving its new plant for the manufacture of refractory brick at Chester, Pa. The entire power for mixing and grinding the ingredients, for conveying the same to and from the various machines and finally pressing them into shape will be furnished by induction motors. The Fayette Company has recently purchased from Westinghouse Electric and Manufacturing Company a three-phase equipment, including an engine-type alternator, exciter, switchboard, and alternating-current motors aggregating 290 horse-power.

The last wire for the cables of the new East River Bridge, connecting New York and Brooklyn, has been strung. The work was done by the John A. Roebling's Sons, of Trenton, N. J. Each cable is composed of 7,696 wires of No. 6 gauge, or about 3-16 of an inch in diameter. The wires are grouped in 37 strands, each strand containing 208 wires. The wires were wrapped first into separate strands and will finally be squeezed into one circular mass about 18 3/4 in. in diameter. Each wire is about 3,000 ft. long. The wire has an ultimate strength of 200,000 lbs. to the square inch. The work of stringing the wires was begun in December, 1901, and since that time something like 4,000 tons of wire have been placed in position by the contractor.

The South Carolina Inter-State and West Indian Exposition awarded the American Steel and Wire Company the following awards: Merchants iron and steel, cold drawn steel shafting, gold medal; horse and mule shoes, gold medal; wire nails, gold medal; rail bonds, gold medal; wire rope, gold medal; machinery and appliances for drawing wire, gold medal; springs and spring wire, gold medal; copper, gold medal; iron and steel, gold medal; aluminum wire, gold medal; bicycle and automobile spokes, silver medal; rolled wagon skeins, silver medal; underground and overhead wires and cables, silver medal; metallurgy of zinc, silver medal; music wire, bronze medal; coal and coke, bronze medal; bale ties, bronze medal; chemicals and colors, bronze medal; installation in Commerce Building, diploma of merit. The gold, silver and bronze medals represent the highest awards in each class.

The Crocker-Wheeler Company, of Ampere, N. J., manufacturing direct-current machinery, has includ-

ed the following among recent orders: Standard Steel Works, Burnham, Pa., 2 size 234 200-k. w. generators; James Cooper Manufacturing Company, Montreal, Que., 55-k. w. generator; Buda Foundry and Manufacturing Company, Harvey, Ill., size 280, 240-k. w. generator; Whitehall Portland Cement Company, Cementon, Pa., 85-h. p. motor; Woodward & Lothrop, Washington, D. C., 4 generators; Tidewater Steel Company, Chester, Pa., size 280, 250-k. w. generator; Green Engine and Machine Company, Harrison, N. J., 4 35-h. p. motors; Descubridora Mining and Smelting Company, Mexico, 4 20-h. p. motors; Moline Malleable Iron Company, St. Charles, Ill., size 100 D, 90-k. w. generator and 11 motors aggregating 125 h. p.; Lake Shore & Michigan Southern Shops, Collinwood, O., 11 motors aggregating 200 h. p. Speed control will be obtained by the Crocker-Wheeler system of multiple-voltage operation.

The American Steel Foundries Company, the formation of which was recently announced, has been organized under the laws of New Jersey with an authorized capital stock of \$20,000,000 6 per cent cumulative preferred stock and \$20,000,000 common stock. Of these amounts only \$15,500,000 preferred and \$15,000,000 common stock are to be issued to pay for the 6 subsidiary companies and to provide additional cash working capital. The balance of the stock will remain in the treasury to be issued only for cash or property of the actual cash value at par. The new company will take control about July 15. The official announcement of the organization, contained the following statement: "The plant owners declined to take any cash in payment for their properties, but instead took stocks of the company; therefore the cash requirements have been very considerably reduced, and all have been guaranteed by Messrs. C. M. Schwab, E. H. Gary and Max Pam; for that reason a syndicate has become unnecessary. There will be no underwriting privileges."

The American Shipbuilding Company has closed contracts at Cleveland for 6 freight steamers that will cost \$1,200,000. The first order was for 5 freighters, and was placed by the United States Transportation Company. In carrying capacity the boats will range from 5,200 to 6,200 tons on 18 ft. draft. The largest of the steamers will be 434 ft. over all, 414 ft. keel, 50 ft. beam and 28 ft. deep. Three of them will be 400 ft. over all, 380 ft. keel, 50 ft. beam and 23 ft. deep. The smallest of the steamers will be 390 ft. over all, 370 ft. keel, 48 ft. beam and 28 ft. deep. They will all have triple expansion engines and Scotch boilers, which will be fitted with Ellis & Eaves induced draft. The boats will be built at the Lorain and South Chicago yards, and, according to the contract, they are to be completed April 15, 1903. The order for the 6th steamer was placed by Henry A. Hawgood. She will be 434 ft. over all, 414 ft. keel, 50 ft. beam and 28 ft. deep, and will have triple expansion engines and Scotch boilers. This boat will also be ready for business by the opening of navigation next spring.

TRADE CATALOGUES.

Some supplies of value to railway men described in a 16-page pamphlet issued by the Railway Appliances Company, of Chicago, Ill., include the Gilman-Brown emergency knuckle, Economic metallic packing, the R. A. car mover, the Fewings car and engine replacer and the Ajax cotton belting diaphragm.

"Lyon Brand" S. A. M. Alloy is described in a little pamphlet sent out by George G. Blackwell, Sons & Co., Limited, of Liverpool, England. This alloy is stated to be of great value to all firms making their own iron and steel castings, as it tends to prevent formation of blow-holes, pipes and other flaws.

George B. Newton & Co., of Philadelphia, Pa., send to their friends in the coal trade a finely printed map showing the anthracite and bituminous fields from which coal is shipped to Philadelphia. The map shows the various mining districts and the railroads connecting them with shipping ports and industrial centers. The map will be found useful for reference.

The American Blower Company, of Detroit, Mich., in catalogue No. 139, describes its A. B. C. moist air and blower dry kilns, for seasoning lumber. These kilns are recommended for their simplicity, economy and ease of control. The A. B. C. heating coils and hot blast apparatus are used; likewise the company's steel disk fans, driven by A. B. C. high-speed engines.

The Keystone water meter is described in a circular sent out by the Pittsburg Meter Company, of Pittsburg, Pa. This meter is composed of 3 principal parts, the upper outer chamber, including the intermediate train register and register cover; the lower outer casing and the disc working chamber. All working parts are protected against breakage, and the meter is recommended for its accuracy, simplicity and durability.

The Harrisburg Foundry and Machine Works, of Harrisburg, Pa., issues a unique folder giving the names of users of its well known engines. The list

includes prominent industrial concerns and mining companies in about every State in the Union, besides the names of concerns in Africa, Sweden, Mexico, Japan and the West Indies. The company states that there are in operation nearly 1,000,000-h. p. or Harrisburg engines.

"Soft Water," a 16-page pamphlet issued by the J. S. Toppan Company, of Chicago, Ill., describes the water softening apparatus for railroad tanks manufactured by the Kinnicott Water Softener Company, of Chicago. The pamphlet points out the low cost of reducing or eliminating the scale-forming ingredient in such as is often the only water available for locomotive use. Illustrations of a number of railway tanks where the Kinnicott apparatus has been installed are given.

The Bush Steam Rotary Engine Company, with offices in New York City, sends out a little 16-page pamphlet pointing out some of the well known advantages of the rotary engine, such as compactness, freedom from vibration, reduced weight, small space occupied and high economy. The company states that it has purchased a tract of land in Long Island City, near Newtown Creek on the Long Island Railroad. Here it has contracted for the erection of a foundry and machine shop 60 by 180 ft.

A pamphlet entitled "Coaling at Sea" has been issued by the Lidgerwood Manufacturing Company, of New York City. The pamphlet describes in detail the construction and methods of operation of the Lidgerwood-Miller marine cableway that has been tested by the United States and Russian governments and adopted on a battleship of each. The two special operating winches required in the latest design can be also used for other purposes, and there is no increase in the necessary amount of machinery on deck. It is expected that the capacity of this conveyor will be 60 tons of coal per hour.

A large catalogue of 72 pages, sent out by the Aktiengesellschaft fur Feld-und-Kleinbahnen-Bedarf, formerly Orenstein & Koppel, with head offices at 24 Tempelhofer Ufer, Berlin, Germany, describes the company's narrow-gauge, portable and permanent, railway supplies. The list includes rails, switches, crossings, turntables, car-wheels and axles, and in particular trucks and cars. The company's dump cars are built in a large variety of styles and sizes for mining and all industrial purposes. They may be had either of all steel construction, or with wooden bodies, and are either side or end dump. The company also manufactures locomotives, freight cars and passenger cars for light railways.

Mining cars, cages, etc., are described in a neat 16-page catalogue sent out by A. F. Bartlett & Co., of Saginaw, Mich. The company states that it makes over 12 different shapes and sizes of steel mine cars. These cars have sides and ends made of the best grade of sheet steel, strongly re-enforced with steel bars and angles. The axles, either square or round, are also of steel, and the wheels are of cast-iron, either self-oiling or not, as desired, and may be had with or without chilled rims and hubs. The company's wooden mine cars have bodies of the best grade of oak, reinforced with steel bars; the axles and wheels are similar to those of the steel cars. The company also builds automatic self-dumping mine cages made entirely of steel and iron, and double-drum and double-cylinder direct-coupled hoisting engines with balanced valves. Car-wheels and axles, frogs, cross-overs and turnouts and tippie machinery are made by the company.

The Jeanesville Pump Company, of Jeanesville, Pa., with a western office in Denver, Colo., has sent out a 20-page pamphlet, describing some types of the Jeanesville pump. This pump has several fundamental ideas of design. The outside packed plungers are of hard iron, bronze, wood or glass, to resist chemical action; the plungers are end-packed, permitting the weight of the plungers to be carried on outside guides, reducing the wear on the glands and eliminating the piston rod in the water end with its two packing boxes. The pump is sectional in design, both suction and discharge valves being in separate chambers. The subdivided construction facilitates handling and erection and enables a large pump to be placed in a mine through a small shaft. The water end has a circular section, and in case of acid water, can be lined with wood at all parts in contact with the water pumped. The pumps are built in many sizes and of different designs, to suit the varying demands that determine the selection of an economic plant for a particular mine.

The H. W. Johns-Manville Company, of New York City, Boston, Philadelphia, Pittsburg, Chicago and London, is sending out printed matter calling attention to its Kearsarge asbestos-metallic and other high pressure packings. These packings are said to be the products of long experience and skilled labor. They are made from asbestos especially prepared for the purpose. A proof of their efficiency and durability lies in the fact of their adoption and continued use in large quantities by the United States Navy and transport service, by transatlantic and

domestic steamship lines, and by large steam plants throughout the United States and abroad. The company's Kearsarge asbestos-metallic sheet packing and gaskets are called standard for flange and joint packing. Some of the points of excellence claimed for the gaskets are: They hold against any steam pressure; are unaffected by heat or boiler compounds; are easy to apply; can be "broken down" repeatedly; are elastic and conform readily to uneven surfaces. The company also says that its wound cloth piston rod packings are reliable, durable and economical for high speed engines; while Snow hot water packing for pumps delivering water above 180° F. is claimed to have no equal.

GENERAL MINING NEWS.

ALASKA.

CAPE NOME.

Vessels are arriving at Puget Sound ports with tales of the sort that have appeared every spring since the Klondike excitement. New gold fields of great richness are mentioned, often in localities that have already been pretty thoroughly prospected. Considerable new work is under way in territory adjacent to Cape Nome, however, with promising results.

CALIFORNIA.

ALPINE COUNTY.

(From Our Special Correspondent.)

Stella.—A mill is to be built on the mine, at Loope.

Telluride.—Active operations are going on at this mine, at Loope, under supervision of Peter Curtz.

AMADOR COUNTY.

(From Our Special Correspondent.)

Amador Tunnel.—W. A. Nevills and John P. Jones have begun suit against William Fleming, D. C. Nichols, C. W. Cowles and Jane Doe Borland for \$150,000 damages for failure to comply with an agreement in relation to the Amador Tunnel, Mill and Mining Company and the Hamilton Gold Mining Company, near Middle Bar, east of Jackson.

Kennedy Mill and Mining Company.—A contract has been let to the Fulton Iron Works of San Francisco for a new 20-stamp mill on this mine, at Jackson, J. F. Parks, superintendent. The capacity will be later increased to 60 stamps. The new mill will be near the new east shaft.

Keystone.—In this mine, at Amador City, Charles Bunker, superintendent, a new body of ore 8 ft. wide has been found in the "greenstone" formation 160 ft. east of the main vein at the 500 level.

Moore.—This claim, 1 mile south of Jackson, has been sold under order of court, bringing \$70,250. The property has been idle for 15 years. There were two factions in the control of the property—W. A. Nevills and Senator John P. Jones on one side and C. W. Cowles and W. Fleming on the other. The purchase is supposed to be in the interest of Nevills and Jones. The disagreement among the partners is thus settled, and it is supposed that work will start shortly.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

Angels Quartz Mining Company.—The new mill has been completed at this mine, at Angels, James V. Coleman, of San Francisco, owner. A vein of good ore has been uncovered.

Benson Mining Company.—Good milling rock is coming from this mine, formerly the Parnell, near Angels, and additional machinery is to be purchased.

Big Six.—This claim, at Jenny Lind, worked by McAfee & Williams, has been shipping to the Selby works.

Douglas Flat District.—Beach Thompson is opening up the Batten ditch, and will be able to furnish water to many mines. The Junction Mine has its shaft down 100 ft., or nearly to bedrock, with indications similar to those in the Texas and Wild Goose, both producers. The Fair View Mine has been bonded by a company from Stevenson, Tatten & Company.

Rigney.—At this mine, near San Andreas, 2 giants are busy night and day. The debris dam is being enlarged.

Sultana Mining Company.—This company, at Angels, C. H. Morgan, superintendent, is working the old Bovee and Fritz claims. The Bovee shaft is down 500 ft. A new air compressor has been installed and a new hoist is being put up.

Slate Creek.—This mine, at Jenny Lind, is yielding good ore under the superintendence of Mr. Caldwell.

DEL NORTE COUNTY.

(From Our Special Correspondent.)

Yates.—This beach sand mine, near Crescent City, has been recently purchased by W. Burgemaster, who

has put in machinery. Water is to be pumped from the ocean by a gasoline engine.

ELDORADO COUNTY.

(From Our Special Correspondent.)

Gamecock and Mammoth.—It is reported that these 2 mines, near Shingle Springs, are to be operated by a German company.

Vandalia.—This property, at Shingle Springs, owned by John Rosenfeld's Sons, of San Francisco, Charles E. Seymour, superintendent, has started up its new 200-ton cyanide plant. Power and lights are supplied by crude oil engines. The ore is passed through a crusher, then through dryers and thence to 3 Cornish rolls. There are 10 large leaching tanks.

FRESNO COUNTY.

(From Our Special Correspondent.)

Fresno Placer Mining Company.—The placer claims of this company, on Sycamore Creek, are yielding well. Considerable money has lately been expended for new ditches.

KERN COUNTY.

(From Our Special Correspondent.)

Echo.—The new mill at this mine, near Mohave, is about completed; 25 men are at work.

King Solomon.—This company, near Havilah, intends putting up mills this year. The Morning Glory group of mines is worked.

Kinyon and Wedge.—Connection has been made between these Randsburg mines at the 155-ft. level.

MARIPOSA COUNTY.

(From Our Special Correspondent.)

McAlpin.—On this mine, at Coulterville, preliminary work is being done under supervision of S. E. Rigg. This mine was formerly a producer, and is being reopened. New buildings have been put up and roads made.

NEVADA COUNTY.

(From Our Special Correspondent.)

Crystal Lake.—This company has men clearing up the wreck of the mill at Meadow Lake which blew down last fall. The mill will be rebuilt on the same site.

Golden Gate.—This mine, at Grass Valley, has resumed operations after a short shut-down. George E. Tuttle is in charge.

Red Cross.—J. A. Brent, manager of this mine, near Nevada City, will rebuild the mill which was destroyed by fire. George Bonney is superintendent.

PLACER COUNTY.

(From Our Special Correspondent.)

Big Channel Company.—The main tunnel has been started. The mine is near Forest Hill.

Mayflower.—J. E. Nihell, superintendent, is working 3 shifts of miners at this drift mine, at Forest Hill. The mine was once a large producer.

Morning Star.—The leasers at this mine, at Iowa Hill, are opening a good body of gravel by a 200-ft. bedrock tunnel to the left of the main tunnel. This mine is owned mainly by Harold T. Power, of Michigan Bluff.

Washington.—This company, near Forest Hill, has bonded the Dewey and Hancock claims from the widow of Samuel Burt. Superintendent Dudley is running the Dewey tunnel to cut the ledge 500 ft. below the upper one.

PLUMAS COUNTY.

(From Our Special Correspondent.)

Grass.—On this mine, near Genessee Valley, a 15-stamp mill is to be erected.

New York.—At this mine, near Greenville, 10 stamps will be added to the mill this summer.

SAN BERNARDINO COUNTY.

(From an Occasional Correspondent.)

Colorado River Gold and Copper Company.—This company, in Monumental District, expects to erect a small smelter this year.

Wright.—From the claim of D. P. Wright, near San Bernardino, some very rich specimen rock is being taken. The mine is about a mile and a half from the Green Lead claim.

SAN DIEGO COUNTY.

(From Our Special Correspondent.)

California Salt Company.—This company, which recently acquired leases on the Carlsbad, La Costa and Kelly sloughs, and put up salt evaporating works near Carlsbad, has been sued by M. Lewis, who asks for a receiver and an injunction preventing the company from collecting an assessment. The vats and works cover 25 acres.

Free Gold Mining Company.—The mines of this company, at Hedges, better known as the Golden Cross property, will resume work, a compromise on the accounts of Isaac Trumbo, the former receiver, having been reached. Mr. Trumbo will assume notes

on the First National Bank of San Francisco, aggregating \$10,000, which the court ruled Trumbo had no right to draw. Trumbo also agrees to pay to the present receiver \$500. His agreement to take care of the notes and the payment of \$500 wipes out the alleged deficit of \$8,600. The merchandise claims, amounting to \$49,000, are adjudged to be a lien on the property, and must be paid from the funds of the company or from future operation. The settlement also provides for the payment of a balance due creditors of \$44,000 on claims dating as far back as 1895. These creditors are to receive \$20,000 at once and half of the net earnings of the mines until the obligations are canceled, while the merchandise creditors are to get \$10,000 down and the other half of the net earnings. There is an agreement that neither party shall appeal. It is declared that in due time all creditors will be paid. The mines have lately been closed, pending this settlement, but the cyanide works have been operated. The property is one of the large producers of California.

Julian District.—The Owens, Helvetia, Julian Consolidated and other quartz properties at Julian have been recently examined by A. F. Judson, of Los Angeles, in the interest of Eastern men, with a view to purchase. This is an old camp worked since 1870, but no very great depth has been attained.

SHASTA COUNTY.

(From Our Special Correspondent.)

Balaklala Mining Company.—There can be no sale of this property until a suit now on trial is decided. The company sues to compel a partition of the property.

French Gulch Mines.—The transmission line of the new electric plant of the Hazel Mining Company will pass through French Gulch. At the Gladstone there are now 70 men at work. On the Niagara there are 20 men; 12 on the Milkmaid and 15 on the American.

Gladstone.—It is expected that 10 additional stamps will be added to the Gladstone Mill, at French Gulch.

Great Western Gold Mining Company.—This company is at present one of the best advertised propositions in California. It is stated that a smelter is to be erected at Copley. The printed circulars contain some very remarkable statements. Thus far the values are entirely prospective. The amount of literature being sent out is somewhat unusual, and its character is such as to call comment from men connected with legitimate mining enterprises.

Mount Shasta.—A pumping plant is to be put on Clear Creek, and pipes laid a distance of about 3,700 ft.

SISKIYOU COUNTY.

(From Our Special Correspondent.)

Cherry Hill.—The long tunnel on this quartz property, near Yreka, is now in 1,500 ft., being the longest and deepest tunnel in that vicinity.

Dewey.—At this mine, near Gazelle, 32 men are employed, mainly on development.

Keene.—At this mine, near Callahans, more vats have been added to the cyanide plant.

Mamet.—A 10-stamp mill is being put up at the H. Marmet Mine, near Hornbrook. Oil fuel will be used.

Mother Lode.—This claim, near Sawyer's Bar, has been bonded to E. D. Baker, George Henderson and George Graves for \$25,000.

Portuguese.—This mine, in charge of Mr. Stalling, will have larger ditches and pipe line the coming season.

Sisson.—This copper property, near Gazelle, has been bonded to Ernest Harrison, who expects to interest Eastern capital.

SONOMA COUNTY.

(From Our Special Correspondent.)

Culver-Baer.—This quicksilver mine is yielding well with a small furnace.

Eureka.—This quicksilver company is opening a new road to its mine from the Geyser road.

Gopher Oil and Development Company.—This Minneapolis company has leased 1,200 acres of oil-bearing land between Sonoma and Petaluma with right of purchase.

Pacific.—In this mine, at Pine Flat, the long tunnel is nearly completed.

Socrates.—This quicksilver mine, at Pine Flat, has a new Gates crusher of 50 tons a day capacity. F. A. Huntington, the principal owner, has bought from the Carr Realty Company its 750 ft. of the mine. Litigation has stopped.

TRINITY COUNTY.

(From Our Special Correspondent.)

Fairview.—At this mine, near Minersville, Joseph Porter, manager, 22 miners are busy. A new saw-mill is ready, and a new wagon road has been built. Grading of the mill site is in progress.

Sweepstake.—There are all sorts of rumors in California about this gravel mine, which was sold some time since to a Philadelphia, Pa., company for a reported price of \$6,000,000. It is asserted that the mine was "salted," and also that the gravel still holds up to its expected value. Large sums have been paid for water rights and constructing pipe lines and ditches. The San Francisco Construction Company, having a contract on ditch building, recently stopped work, and this caused rumors. As very little actual mining has so far been done, it is perhaps too soon to condemn the property. A lot of "dead" dirt has to be removed before the deposits supposed to be very rich are reached. Only two payments have been made, and 23-24 of the sale price is to come out of the ground itself. The published price was much exaggerated.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

Bell.—In this mine, at Tuttle town, a good body of ore has been struck at the 300 ft. level.

Gold Hunter.—At this mine, at Tuttle town, men are opening the ground.

Roosevelt Mining Company.—This company, near Chinese Camp, Charles E. Uren, manager, has completed a very large stamp mill, and is employing about 250 men altogether.

Soulsby.—At this mine, at Soulsbyville, sinking has started in the new shaft below the 200-ft. level.

Toledo.—This mine and the Indian, at Tuttle town, have been bonded by William Forsyth.

VENTURA COUNTY.

(From Our Special Correspondent.)

The mica mine at Lockwood, 30 miles from Camulos, continues work, and recently made another shipment to San Francisco.

COLORADO.

American Smelting and Refining Company.—In a voluminous complaint filed by Attorney-General Post of Colorado in the State Supreme Court, it is set forth that this company and several other smelter concerns are in a combine to restrict competition in the smelting business; that the results of the monopoly are injurious to the industries of the State; that it is violating the laws, and that it is paying unreasonable dividends upon excessive and fictitious capitalization. The complaint asks that all the defendants be adjudged to have forfeited their rights, that they be ousted and forever excluded from doing business in the State, and that a receiver be appointed to take charge of their property in Colorado.

The defendants in the case are: American Smelting and Refining Company, Omaha & Grant Smelting Company, Pueblo Smelting and Refining Company, Bimetallic Smelting Company, Colorado Smelting Company, Philadelphia Smelting and Refining Company.

The complaint recites the fact of the formation of the trust in New Jersey, with a capital stock of \$65,000,000, and adds: "That said American Smelting and Refining Company was organized by the aforesaid defendants, for the specific and deliberate purpose of creating a monopoly of the business of smelting and refining gold and silver and other valuable ores and metals, as aforesaid, and to substantially engross the same, contrary to the public policy and the laws of the State of Colorado." Then follows a severe arraignment of the company's methods, particularly excessive charges "for the smelting and reduction of the gold and silver ores which are shipped to it by the people of said State," conniving with railroads to destroy competition, and "wrongfully keeps back for its own uses the difference between the published freight rates and the said secret rates, wrongfully secured by said American Smelting and Refining Company, as aforesaid." The company now refuses to receive for smelting all the gold and silver ores offered to it by the citizens of Colorado, it is stated, and the company has shut down and dismantled several of its smelting and refining plants, to the great injury of the public. These plants, it is said, were prosperous concerns prior to their conveyance to the American Smelting and Refining Company, and would, but for the conduct of the company, be prosperous concerns to this day.

It is alleged that the company secures more favorable rates than are enjoyed by the general public of the State, and by reason of the extortionate and unreasonable charges demanded and received from the people for the smelting and reduction of their ores, as claimed, the American Smelting and Refining Company is enabled to pay, and does pay, excessive and unreasonable dividends.

EL PASO COUNTY.

Economic Mill.—The experiments at this mill at Arequa Gulch with the sulphide ore roasters on the sulphide ores and dust from the mill, are reported entirely successful and the process will be used without delay. The percentage of saving by the new method is reported to be high. The mill is now treating an immense quantity of ore from the different properties controlled by the Woods Investment Company.

GILPIN COUNTY.

(From Our Special Correspondent.)

Mining Deeds and Transfers.—W. B. Fry to H. and C. R. Baer, 1/2 interest 4-11-44 and Lottie M. lodes, Vermilion District; Quartz Hill G. M. Company to Byron Lake, 400 ft. on the Stark County and Gibson lodes, Illinois Central District; F. M. Miller to Henry Baer, 2-7 interest in Indian, a group of 6 lodes, Wisconsin District; Q. Campbell to W. O. McFarlane et al., the Missouri, Baker, Indiana and Elizabethan lodes, Nevada District; Tracey Hall to The Bullion M. & M. Company, Bullion mill site, in Enterprise District; Haverhill Gold Mining Company to Etta M. Baldwin, the Clay County lode, Lake District; Henry Cole to the Peniel Trust Company, the Galatea, Reno and Day Dawn lodes, Pleasant Valley, Independent and Idaho Districts; Frances Arma to Margaret J. Sauer, 1/2 interest in the Castle Rock lode, Quartz Valley District; the Liberty Center Mining Company to the Bullion Mining Company, the Last Dollar lode, Enterprise District; E. M. Baldwin to the New National Tunnel Mining Company, the Caledonia No. 2 and Clay County lodes, Lake District.

Bant.—Nebraska men have bought this property, in Gregory District; they have let a contract for a shaft building 20 by 40 ft., and will install a hoisting plant capable of going down 1,000 ft. They will start sinking as soon as possible. The property is near the well-known Running Lode Mine. G. D. Johnstone, Black Hawk, will be in charge.

Colorado-Carr Mines Company, Limited.—This company, through its agent, Stephen Hoskin, of Central City, has purchased the Golden Fleece claim adjoining the main group on Bobtail Hill, for \$16,000.

Cook.—Sinking is under way, and the shaft will go to 1,200 ft., where connection can be made with the lower workings of the Fisk and Gregory-Bobtail properties. It is believed that increased work will follow, and the output will be larger. Q. B. Thompson, Black Hawk, is manager of the Boston & Denver Consolidated Mining and Milling Company.

Govers Mines Syndicate, Limited.—The average product is about 150 tons of concentrating ores, all of which go to Idaho Springs, and about 80 tons of smelting ores, which are handled at the local sampler and also sent direct to the smelter. The grade of both is above the average. Sinking has stopped for the present, the shaft being down 725 ft. T. Dunstone, Black Hawk, is superintendent.

Mine's Ore Sampling Company.—A 34-h. p. gasoline hoist and 2 Sturtevant ore crushers have been received for the new sampling works, and work will be pushed. The owners will ship ores to independent smelters in Dakota. It is believed that there will be a fight with the American Smelting and Refining Company.

New Sampling Arrangement.—The American Smelting and Refining Company's sampler announces that it will take ores for the Golden Smelter of a value of \$15 or less per ton, charging \$5.50 per ton with an extra 50c. for sampling, payment to be made at Black Hawk; all ores carrying over 50 per cent silica to be charged for at 5c. per unit. The arrangement will secure for the miners prompt settlement.

Sapp.—Bruce Meyers & Co., of Central City, are opening a good lease on this property, in Illinois-Central District, and have ordered a 12-h. p. gasoline hoist. They are shipping ores to the Golden Smelter, which brings value up to \$30 per ton.

GUNNISON COUNTY.

Akron Mining Company.—This company, under the direction of Superintendent Harper, has its new tunnel on the North Star property, at White Pine, in 1,800 ft. The tunnel will be about 3,300 ft. long and cut the vein at a depth of 1,000 ft.

Forest Hill.—The shaft is down 350 ft. and producing enough ore to keep the 50-ton mill busy. The ore is lead-zinc with gold and silver values. The company, composed of Pennsylvania and Ohio men, owns 320 acres of lode claims and 160 acres of placers. About 32 men are at work under Superintendent J. C. Jensen. The 2 tunnels represent nearly 700 ft. of work.

Grizzly Mountain Mining and Milling Company.—This company, composed of Carrollton men, has 19 quartz claims and 410 acres of placer ground northwest of the Grizzly Peaks, and is about to erect a mill. A 223-ft. tunnel has been run to open some of the claims, and a ditch dug for working the placers. John Lynch is superintendent.

Hall.—This placer, on the Gunnison River, is being worked steadily. The machinery installed comprises 2 35-h. p. boilers, engine and hoist. The superintendent is A. W. Hall, late of Cripple Creek. Floyd T. Voris, of Storm Lake, Ia., is president, and with him are associated a number of men of that city.

Spensly Placer Company.—This company is working a large force of men, most of them on a large dam to store water for washing. A little village has sprung up around what was known as Sid's Cabins.

Whig.—Texas men recently purchased this group

of claims, at Pitkin, from Scott & Kimbell, and have installed some heavy machinery, including a large air compressor. J. T. Quigley is superintendent.

OURAY COUNTY.

Cosmopolitan Mining Company.—Many mining men have been watching with great interest the outcome of the suit on trial in the United States District Court, in which this Maine Company is plaintiff and Thomas F. Walsh defendant. The property involved comprises the Hidden Treasure, Gertrude, Emily, Norina, Yellow Rose, Crusader and Talisman lode mining claims, all now included in the great Camp Bird group. The plaintiff patented the claims and worked them, but was unable to discover their value, stopped work, and accumulated debts, with the result that the property was sold by the Sheriff, passing into the hands of Mr. Walsh, who developed their real value. The plaintiffs have claimed that the Sheriff's deed was invalid, and attacked its validity in general, as well as on several technical points.

SAN JUAN COUNTY.

(From Our Special Correspondent.)

Mining Transfers.—Gus Lundstrom to Gus Burquist, Cornucopia lode; George F. Steinbeck to James F. Steinbeck, Corondo lode; W. D. Watson to R. H. Rohrig, Idaho lode; Charles Pearson to Caroline G. Pearson, Great Western lode; Abbie O. Megrue to A. G. Agard, Golden Eagle lode; James H. Nichols to John D. Coplen, Noah's Ark lode; Charles F. Hammon to Henry E. Paine, Yellow Jacket lode; Theodore Grabowski to Fred Neef, Walla Walla lode; Abbie Megrue to G. A. Larsen, Golden Eagle lode.

Grand Mogul.—Eastern owners of this property, at Gladstone, are in Silverton preparing to erect a 500-ton mill. A large body of lead ore was lately struck in the new workings.

Nama Group.—Denver parties have a bond for \$3,000 on this group from August Johnson. The property is on North Lookout Mountain, near Silverton, and is developed by an 80-ft. tunnel.

North Star.—This property, on Sultan Mountain, near Silverton, recently cut the vein at great depth, and has begun shipments of high-grade ore.

Pittsburg Mining and Milling Company.—This company has resumed work on its properties, on Brown Mountain, near Silverton, and has acquired several new claims which will soon be developed by tunnels. A shaft is now being sunk through a large body of low-grade ore in the Kentucky Giant group.

Ridgway.—This property, worked under bond and lease by Sherman, Garrison & Hill, recently made the first shipment of the season—a car-load of rich gold ore.

Royal Mining Company.—Work in the long tunnel at the foot of Sultan Mountain, near Silverton, is pushed by 3 shifts, and ore is being shipped regularly from the upper workings. An aerial tramway is a probability.

Silver Ledge.—Contracts have been let for a large mill at Chattanooga, and work will be started as soon as the railroad spur, under construction, is completed. William Feigel, of Silverton, will build the mill, and J. J. Kewin, of Ouray, will construct the ore lines.

TELLER COUNTY—CRIPPLE CREEK.

Accident.—A fine plant of machinery is to be installed on this claim, on Foley Hill. This property is owned and operated by Stewart McDougall, of Brooklyn, N. Y. The hoist will have a capacity to 1,000 ft. and a compressor will also be installed. The claim contains only about 6 acres.

IDAHO.

LEMHI COUNTY.

Boston-Idaho Mining Company.—This company's claims are on the western slope of the Salmon River Mountains, in Spring Mountain District, about 12 miles west of Nicholia, the nearest postoffice, and about 2 miles west of the location of the old Spring Mountain Smelter. The nearest railroad station is Mackay, about 32 miles away. The company has 5 claims. The ore runs in lead and silver, with a little gold. William H. Tibbals, of Salt Lake, Utah, is president of the company.

SHOSHONE COUNTY.

Ella.—Judge Beatty, of the United States Court, at Boise, has handed down a decision for the defense in the famous case of Patrick Clark, et al., vs. Charles Sweeny et al., involving the ownership of this claim, adjoining the Tiger-Poorman at Burke, in the Coeur d'Alenes. Sweeny purchased the Ella from plaintiffs for \$4,000. It was claimed afterward that he secured it through misrepresentations and fraud, it being asserted that the property was then worth \$1,000,000. Suit was brought for cancellation of the transfer.

Referring to the charge that the Ella was clandestinely explored, the opinion says: "While there is no evidence of authority for or objection to what defendants may have done, it seems that since the time of Clarke's management workings have been

extended into this ground without question and acquiesced in, and it may have been because the old company owned the ground on both sides of the Ella. Sweeny says he found the works there and used them without knowing of any objection. Under such circumstances it cannot be concluded that such possession was clandestine or for the purpose of defrauding the Ella owners."

As to Mr. Sweeny's obligation to give information concerning the condition of the property, the opinion uses this language: "If the purchase was made without any representations with regard to the property, and if any knowledge he had of it were derived alone from works in his property, he could not be held to reveal such knowledge."

The opinion deals with the testimony of Clark and Sweeny on the subject of the deal and the making of the deal. It finds Sweeny corroborated by his partner, F. Lewis Clark, and adds that this should be conclusive as against the unsupported evidence of Patrick Clark. It then calls attention again to the fact that counsel for the complainants had insisted that Sweeny and F. Lewis Clark could not be believed because of their impeachment by the Court of Appeals in the Hanley case, and pointed out that there were questions in that case about which courts might differ.

The plaintiff will probably appeal the case.

INDIANA.

(From Our Special Correspondent.)

United Mine Workers.—Secretary Wilson has rented a hall, and is making other preparations for the special convention to be held July 17. Secretary Wilson denies that any papers have been served on him enjoining him from holding conferences with representative miners in West Virginia.

LOUISIANA.

ARCADIA PARISH.

(From Our Special Correspondent.)

Jennings Heywood Company.—This company has purchased and delivered the pipe for a new 6-in. line, which will be laid from the field to Mermentau. It has also purchased barges and tugs, and will engage extensively in the coast and Mississippi River trade.

Southern Oil Company.—Well No. 2 has had a liner put in similar to that in the other gushers, and has been brought in as a gusher, said to equal in capacity Nos. 3 and 4.

GREENE COUNTY.

(From Our Special Correspondent.)

Prospecting for deep coal seams has begun. Most mines in the Clinton District are in what is known as the upper vein, about 100 ft. deep. A few of the mines are working a second vein nearly 100 ft. deeper. The upper vein is from 4½ to 5½ ft. thick, and the second is at least a foot thicker. There is a rumor that a third vein, thicker and better than either of the others, exists at a depth of 500 to 600 ft. A company that recently purchased 400 acres of coal land north of Clinton is drilling to see if a third vein exists within workable distance of the surface.

PIKE COUNTY.

(From Our Special Correspondent.)

W. S. Little Coal Mining Company.—This company has bought 1,000 acres of coal land and will open 2 new mines.

VANDERBURG COUNTY.

(From Our Special Correspondent.)

Coal Output.—Strikes in the East have caused an extra demand for coal, and the mines in this and adjacent counties are running full capacity. All the coal is sent to Chicago and consumed by the local market. The miners are well satisfied, and declare there is no likelihood of their striking out of sympathy for the Eastern miners.

Monon Railway.—This company has completed its survey for a new coal road into Southwestern Indiana, and work of construction will begin soon. Within a few months the line is expected to be hauling coal into Chicago and Indianapolis.

Ohio Valley Coal Company.—This company has been organized, and will operate the Ingle Mine, near Evansville. The mine will employ 200 men. The company incorporated with \$25,000 capital stock.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

Champion.—The June output was 120 tons of mineral. This mine produced 30 tons of mass copper.

Isle Royale.—It is estimated that the June product was 340 tons of mineral.

Oscocla.—The June output was about 1,030 tons of mineral.

(From Our Special Correspondent.)

Arcadian.—Diamond drill exploratory work continues on the undeveloped sections. The drill has been moved south. Work will continue until a cross section of the company's lands is completed.

Atlantic.—An accident to No. 4 head at the stamp mill will result in a decreased production for June. A new foundation for the head is being built, to be completed July 10. Owing to the accumulation of rock at the mine, F shaft has closed down, and the force of rock and shaft house employees laid off.

Baltic.—The new Fraser & Chalmers hoisting engine at No. 4 shaft has gone into commission. The shaft is being repaired, and 2 skips will soon be in operation. The underground force has been enlarged and additional power drills are in use.

Calumet & Hecla.—Sinking in No. 4 shaft, of the Calumet branch, continues. This shaft will be sunk to the 81st level to improve the air circulation in the Red Jacket shaft, making it the deepest incline shaft in the world. Machinists are installing new Nordberg compressors in the Superior engine house. Two are in place and 6 more will be installed.

Quincy.—The 2d and 3d heads at the new stamp mill are to be equipped with revolving screens and ½-in. grates. The change will increase the capacity, and not interfere materially with stamping. Two more additional locomotives for use in No. 6 shaft have arrived from the General Electric Company.

Rhode Island.—Sinking in No. 2 shaft, the only active one, will continue until January 1, when a depth of 1,000 ft. will be reached. The shaft is now timbered to the 6th level, and sinking below the 7th. At the 10th level cross-cuts will be run to the Allouez conglomerate and Pewabic amygdaloid.

Tri-mountain.—Eleven car-loads of machinery and structural material, purchased from the Arcadian Copper Company, have been received at this mine. The Wisconsin Bridge and Iron Company, of Milwaukee, Wis., has a large force at work on the steel framework for the rock house at No. 3 shaft. The foundations for a compressor house, boiler house and self-supporting steel stack at No. 3 shaft are completed. The new hoisting engine at No. 1 shaft is being installed. About 600 men are employed besides the forces of the steel company and contractors.

Winona.—The right of way for a branch line of the Copper Range Railroad to No. 2 shaft will be cleared at once. The company has made arrangements for a mill test on 150,000 tons of rock at the Atlantic Mill as soon as the Champion Mine releases the No. 6 head.

Wolverine.—Development work underground is being pushed in anticipation of the new mill starting. Twenty-five power drills are used. At the mill at Traverse Bay work is practically completed, and it should go into commission August 1.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

Mineral Range Railroad.—On the Mohawk & Traverse Bay line, owned by the Mohawk Mining Company, a third rail is being laid to accommodate standard gauge rolling stock.

Mohawk.—Good progress has been made on the new stamp mill at Traverse Bay. The washing department is completed, and the foundations for the heads are ready. Some of the jigs and tables will be installed at once.

Phoenix.—All grading for railroad extensions is completed, and the contractor's forces have been removed. Mining is confined to the West and St. Clair shafts. Work on the new one-head stamp mill is progressing. A Corliss engine, with cylinders 14 by 20 in., used many years ago, has been repaired and installed in the new machine shop.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Victoria.—Opening work is pushed, and drifting is under way at several levels. No. 2 shaft is sinking below the 16th level in good ground.

IRON—GOGEBIC RANGE.

Cleveland-Cliffs.—This company has the structural iron for its new shaft house at the Ashland Mine on the ground, and work is being pushed. When the new shaft is completed the product of the Ashland will be considerably increased. The output of the Ashland this year approximate 225,000 tons.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

Joplin Ore Market.—The smelter strike is a thing of the past, and producers are looking for better prices. Lead ore has advanced \$1 a ton, and now sells for \$47. There was no advance in the top price of zinc ore, but a great deal more ore sold at the top figures, fully 300 tons bringing \$35. The bulk of the sale, however, was of 60 per cent ore, which brought \$32 a ton. In the same week last year the top price of zinc was \$28 per ton. The shipment was less a year ago by 172,060 lbs. of zinc and greater by 432,000 lbs. of lead, but the total value was less by \$22,794. For the corresponding 6 months of last year the sales were less by 4,625,210 lbs. of zinc and greater by 1,877,150

lbs. of lead, while the total value was less by \$547,957. The following are the shipments from the various camps for the week ending June 28:

	Zinc, lbs.	Lead, lbs.	Value.
Joplin	2,611,810	309,200	\$50,361
Galena-Empire	1,094,980	82,500	17,956
Cartersville-Webb City	2,070,700	369,710	39,748
Duenweg	1,032,810	69,000	17,630
Aurora	810,880	.....	11,520
Zincite	414,510	10,560	7,395
Central City	196,250	2,890	2,720
Prosperity	404,420	26,860	7,103
Spurgeon	262,280	50,790	3,186
Alba-Neck	279,160	.....	4,606
Cave Springs	201,870	14,500	3,544
Orengo	311,140	.....	4,959
Granby	334,000	25,000	3,485
Carthage	133,780	.....	2,207
Carl Junction	143,280	.....	2,404
Reeds	135,890	.....	2,174
Sherwood	26,320	17,650	792
Seneca	21,280	.....	160
Peoria	8,900	5,760	197
Total	10,494,260	984,420	\$182,040
Total 24 weeks	272,014,080	82,102,070	\$4,505,349
Zinc value last week, \$158,972; lead, \$23,074; value zinc, 26 weeks, \$3,873,933; lead, \$691,416.			

Ore Strike at Lehigh.—The most important event of the year in this district is the discovery of large bodies of zinc and lead ore near Lehigh. The strike has only been excelled by the development of the riches of Chitwood 3 years ago by the United Zinc and other companies. It has been known for years that bodies of high grade ore were to be found at Carl Junction and Lehigh, but the heavy flow of water always impeded prospectors. Stronger pumps have made possible the development of an important camp.

Henson & McGraw made the first big strike last week in their shaft, ½ mile south of the Lehigh bridge on Center Creek, and 6 miles from Joplin and 8 miles from Webb City. They have gone through 20 ft. of high grade zinc blende, and are still in the ore. The news caused a rush of miners from all parts of the district. About 25 mining lots have already been leased near the strike, and 4 shafts are in ore.

On the Noon land, just east, a still greater strike has been made. Drill prospects in different parts of the Noon land show a 40-ft. face, and on the Cronin land drills have penetrated 29 ft. of ore, and are still in ore. Every draw leading south from Center Creek that has been prospected is showing well, the ore being high grade and free from mundic. The whole country is open ground.

The St. Louis & San Francisco road has made arrangements to build a branch from Carl Junction to the new strikes.

New Moon Mining Company.—This company has just made one of the best recent strikes on the land of the Missouri Lead and Zinc Company, and are erecting a plant.

Oliver Mining Company.—This company, composed of E. O. Bartlett, Oliver Baker, Al Baker, Jason Frye and C. O. Frye, is developing 65 acres of land near Belleville. Drill holes show a good ore body.

MONTANA.

GRANITE COUNTY.

Howard Copper Company.—This company's property is 10 miles north of Philipsburg. The company is now driving a tunnel.

MADISON COUNTY.

Toledo.—Levi Cartier and other owners of this mine, 3 miles from Sheridan town, have sold it to the Nugget Gulch Mining Company for the reported sum of \$40,000 in cash. The sale was made through F. B. Linderman, who secured a bond on the property several months ago. Eugene Ring, superintendent of the company, represented the Nugget Gulch. The Toledo was formerly owned by Henry Nickel and others, of Butte. In addition to good hoisting machinery, it is equipped with a small smelter and concentrator, which are included in the sale. The new purchaser proposes to spend a large sum in developing the property.

PARK COUNTY.

Scotch Bonnet Mining Company.—Work on the property of this company, of Cooke City, is to be resumed about July 15. Some ore will be taken out, but no shipments will be made until next year, when it is expected that Cooke will have a railroad. In case the road is not built, the ore will be hauled by wagon to Gardiner and shipped by rail to Butte, or other smelters. It will cost about \$10 per ton to get the ore to the railroad.

SILVER BOW COUNTY.

Michael Davitt.—It is reported that in the copper suit, entitled E. Rollins Morse vs. Montana Ore Purchasing Company, H. H. Rogers will take the stand at the next hearing, which is to be held before Special Commissioner William Klein in New York City on July 11. There have been repeated adjournments because of the inability of the defendant's attorneys to serve a subpoena upon Mr. Rogers, but it is said there is to be no further difficulty about procuring witnesses. It is alleged in the complaint that the defendants were guilty of trespass in working certain lands, ownership of which is claimed by the plaintiff.

An injunction is asked, and also a judgment for damages said to have been caused by extraction of ore from the Michael Davitt lode. The defense denies the allegation of trespass. It is also declared that Mr. Morse was not the proper person to sue; that the rights which he claims are those of the Butte & Boston Consolidated mines; that he erred in suing as an individual, and therefore has no standing in court.

(From Our Special Correspondent.)

Durkee Electric Drill.—A 4 days' trial of this drill, under the management of the Western Electric Drill Company, in a cross-cut on the 600-ft. level of the Berkley Mine of the Amalgamated Copper Company resulted as follows:

March 29, 1902.—Actual time drilling, including stops to change drills and shift machines, 4 hours, 32 minutes; 9 holes, 52 ft. 10 1/4 in.; after blasting, 60 cars of rock were taken out. March 31.—Actual time drilling, 4 hours 5 minutes; 9 holes, 48 ft. 9 1/2 in., after blasting, 43 cars of rock were taken out. April 1.—Actual time drilling, 4 hours 45 minutes; 9 holes, 49 ft. 3 1/2 in.; rock taken out, 47 cars; 4,100 watts for 9 holes. April 2.—Actual time drilling, 4 hours 5 minutes; 9 holes, 49 1/2 ft.; rock taken out, 40 cars; 3,500 watts for 9 holes.

The above record was made without the necessity of a single stop for repairs. The rock was average Butte granite country rock.

OHIO.

ATHENS COUNTY.

(From Our Special Correspondent.)

Congo Coal Mining Company.—It is said this company will soon be absorbed by the Continental Coal Company. T. W. Guthrie, of Columbus, O., is general manager.

PENNSYLVANIA.

ANTHRACITE COAL.

Lehigh Valley Coal Company.—This company makes the following statement for May and the 11 months of the fiscal year from July 1 to May 31.

	May.	11 Months.
Expenses	1,088,496	20,242,617
Earnings	\$920,291	\$19,710,610
Deficit	\$159,205	\$532,007

For the 11 months there was an increase of \$910,762 in earnings; of \$895,282 in expenses; and a decrease of \$15,480 in the deficit.

Philadelphia & Reading Coal and Iron Company.—This company makes the following statement for May and the 11 months of the fiscal year from July 1 to May 31.

	May.	11 Months.
Earnings	\$1,166,813	\$26,327,767
Expenses	1,335,771	24,554,073
Net of deficit.....	D.\$168,958	N.\$1,673,694

For the 11 months there was an increase of \$12,430 in earnings, an increase of \$171,986 in expenses, and a decrease of \$159,556 in net earnings.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Black Hills Porcelain Clay and Marble Company.—The entire mica output of the company is reported sold. This includes 200 tons on the dump. The ledge is opened up for 300 ft. The mica is said to be of good quality for electrical purposes. Ten men are taking marble out at the company's quarries.

Grantz Gold Mining Company.—The 2-compartment shaft at the St. Elmo mine is 500 ft. deep. It is expected to catch the ledge at 200 ft. when the 10-stamp mill will be started. The company is sacking surface ore at the Roosevelt Mine, a few miles from the St. Elmo, and shipping to Denver.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Anaconda Mining Company.—A shaft is being sunk on the property near Roubaix. Four fissures of free milling ore are reported exposed, with occasional pockets that assay high. Nels Nelson, of Lead, is manager. The company owns 400 acres.

Bee-Lode Mining Company.—A 2-horse whim is being installed and the main shaft is to be sunk to water level. W. I. Howland, of Sioux Falls, treasurer, is arranging for future work.

Dakota Mining and Milling Company.—At the annual meeting of stockholders in Deadwood, June 26. Joseph M. Ruckle, of Deadwood, was elected president; Jacob Goldberg, Deadwood, vice-president; John Hunter, Deadwood, treasurer; Hugh J. Crawford, Deadwood, secretary. All these, with the exception of the secretary, are directors. Other directors are E. F. Rose, of Coin, Ia., and Lew Wentworth, Omaha, Neb. The company is going to enlarge its 100-ton cyanide plant in Deadwood to 200 tons.

Deadwood-Standard Mining Company.—The 250-ton cyanide plant at Ragged Top has started again,

after a short idleness. A large quantity of fair grade ore has been opened.

Hiawatha Gold Mining and Exploration Company.—The owners of 160 acres of ground half a mile from Deadwood have organized for development purposes. They are A. E. Bock, Hill City; H. E. Layton, Samuel Faulk, Deadwood, and S. E. Anderson, Lead.

Little Crow Peak.—Frank S. Bryant is contemplating the erection of a 100-ton cyanide plant on this mountain. Good cyaniding ore is exposed on his property, as well as that of Dotson & Edgerton, W. B. Johnson, J. Williams and Sol Jefferson.

Spearfish Mining and Reduction Company.—The 300-ton cyanide plant is running with two shifts. A new ore body has recently been exposed on the Black Diamond claim.

Squaw Creek Group.—C. C. Parmelee and S. H. Atwood, of Plattsmouth, Neb., have taken a three-year lease on this group of 18 patented claims. A tunnel is started to catch a vertical that appears at the top of the mountain.

Zink Brothers' Group.—G. A. Duncan and associates of Mercur, Utah, who have a bond on the property, are working 40 men and exposing a good body of ore. The ground is next to the Spearfish and Deadwood-Standard groups, and the ore is found in the flat formation, near the surface.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Ohio-Deadwood Mining Company.—A new 6-drill Ingersoll-Sergeant air compressor with drills, 100-horse-power boiler and other machinery have arrived at the mine, half a mile from Rochford. I. P. Murphy, late of Toledo, O., succeeds Asa Baldwin as general manager. The vein is opened up by surface test pits for 1,200 ft.

Electro-Cyanide Plant.—F. H. Long and associates, of Chicago, are handling nearly 100 tons of custom ore daily in their Mystic mill. A night shift is to be put on, when the capacity will be nearly doubled.

TEXAS.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Beaumont Oil Field.—On the eastern edge of the Hogg-Swaine tract, but in Block 39, in the north-eastern portion of the field, 4 wells, drilled some time ago, struck salt water. The contractor guaranteed gushers, and struck the oil sand at about 1,100 ft., but could not get a satisfactory flow or a gusher. The sand proved shallower than expected, and nothing has been done to plug the wells up. It is likely development will cease in the vicinity of the holes, although pumping wells may be drilled. The vagaries of the various wells is puzzling, but the fact that some break loose and occasionally show high pressure does not alter the fact that nearly every producer is using pressure to obtain oil, and some have already adopted pumps.

Very few contracts for new wells are being made, and no gushers are guaranteed. Wells sell from \$5,000 to \$10,000, according to situation and capacity. Many wells are being cleaned out or made deeper. Shipments this month are heavy, and prices show no change.

Central Asphalt Company.—The 6-in. pipe line, from the field to Pt. Neches, 6 1/2 miles, is completed, and the plant is expected to be in operation inside of 2 months.

Guffey Company.—This company, in drilling at Big Hill, has struck an extensive deposit of salt.

Higgins Oil and Fuel Company.—This company's deep well is down 1,900 ft., and work is temporarily suspended. It is stated that the company intentionally drilled through the oil strata at the usual depth to ascertain if there was not another gusher stratum of oil sand. They have not made public the log of the well, but they had a salt water blowout at 1,650 ft., and since then have been drilling in rock salt.

McFadden Weiss Oil Company.—The well at Sabine Pass has been abandoned at the depth of 2,115 ft., and the pipe pulled.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlements.—For the week ending June 28 the Salt Lake banks report the following settlements: Bullion, \$80,300; gold, silver, copper ores, \$332,500; gold bars, \$14,800.

BEAVER COUNTY.

(From Our Special Correspondent.)

Cactus.—The first lot of concentrates from the experimental mill near Frisco, has been received at the smelters. The saving is very clean, and the management is congratulated on the fine quality of the product.

Horn Silver.—In the week ending June 28 6 cars ore arrived at the smelters at Salt Lake.

Majestic.—It is understood that consignments of

material for the smelter at Milford will start July 1, and that construction will begin on arrival.

Ophir.—An assessment of 5c. a share permits the settling of accounts and further milling. Milling has been temporarily suspended until the affairs of the company will warrant its continuance.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Shipments.—For the week ending June 28 the following shipments of ore arrived at the Salt Lake samplers: Yankee Consolidated, 6 cars; Star Consolidated, 4 cars; Lower Mammoth, 2 cars; Alaska, 2 cars; Mammoth, 5 cars; Carisa, 10 cars; South Swansea, 9 cars; Sioux-Utah, 1 car; May Day, 2 cars concentrates.

Boston & Tintic.—A strike is reported in the bottom of the 240-ft. shaft. The streak is from 6 to 8 in. wide, and assays high in silver, with 23 per cent lead and over \$1 in gold per ton.

Eureka Hill.—Fair grade copper ore is reported in the 900-ft. level. The general condition of the old mine shows improvement. Shipments have not been rushed, owing to the prices current on the ore.

Grand Central.—The Bingham Consolidated Gold and Copper Company has secured a contract for daily consignment of 175 tons low grade ores. Shipments will begin within 5 weeks. Negotiations with the Oregon Short Line for a spur to the dump are under way.

Lower Mammoth.—The management is preparing a shipment of ore from below the 1,000-ft. level; the average value is said to be better than 400 oz. in silver.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Shipments.—During the week ending June 24 the following shipments are reported: Chicago, 1 car ore; Mountain Gem, 1 car; Highland Boy Consolidated, 1 car; Highland Boy, 3 cars lead ore; Storey, 1 car; Petro, 4 cars; Sampson, 1 car; U. S. Lease, 1 car; Niagara, 3 cars; Heaston, 1 car. From Big and Little Cottonwood Canyons shipments have been made as follows: Grizzly, 1 car ore; Silver Queen, 1 car; Maxfield, 2 cars.

Bingham Consolidated Smelter.—It is the intention of the management to erect a second stack near Bingham Junction. It will be entirely of steel about 225 ft. high and 8 ft. diameter at the top. During the week ending June 28 there were forwarded to Eastern refineries from the new smelter 69,000 lbs. of copper bullion.

United States Smelter.—This company's plant is nearing completion. With the finishing of many details, the end of June should see the plant ready.

Utah Consolidated.—The Highland Boy smelters have forwarded to Eastern refineries the usual shipment of 4 cars of copper bullion averaging 60,000 lbs. to the car, the total approximating 240,000 lbs.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—The following shipments are reported for the week ending June 28: Daly-West, 3,407,600 lbs. of ore; Ontario, 1,304,360 lbs. ore; Anchor, 423,400 lbs. ore; Silver King, 1,673,480 lbs. ore; Silver King lease, 135,850 lbs. ore; Daly lease, 56,800 lbs. ore.

Daly-Judge Concentrator.—The directors have decided to enlarge the concentrator to 3 times present capacity, and to start the work as soon as possible. At present the pay-roll numbers about 200 men.

Little Mac Company.—The Ontario Mining Company, through a local representative, has secured 81,260 shares of stock of this company, long held by A. D. Woolley. The property comprises a little over 7 acres of ground, and between the Ontario and the Massachusetts, and is most accessible through Ontario working. Prospecting and development will soon begin.

TOOELE COUNTY.

The business section of Mercur was almost wholly wiped out by fire on June 25. The total loss is estimated at about \$250,000. The total insurance on the property burned was about \$85,000.

(From Our Special Correspondent.)

Stockton Shipments.—For the week ending June 28 the Ophir Hill shipped 18 car-loads of concentrates and the Hidden Treasure 3 cars ore.

Honorine Extension Mining Company.—A number of Salt Lake mining men are interested in the organization of this company, which has a capital stock of \$300,000 in \$1 shares. The properties owned are situated near the old Honorine.

Mercur Fire.—The disastrous fire during the past week was confined to the business district. So far as learned none of the mining properties suffered loss. The work of rebuilding has started.

Overland.—Effort has started to revive this property, floated by a Boston house. The success of

George Moore, of the Sunshine Mill, in handling low grade ores has given rise to the movement.

Sacramento.—Samples of the quicksilver ores encountered show a value of \$400 per ton in mercury and gold. Experiments with different forms of retorts are being made.

Uncle Sam.—Arrangements are about completed to secure water enough from the Bullion-Beck Company to operate a mill.

WASHINGTON COUNTY.

Utah & Eastern Company.—Manager Grant Snyder, of this company's Dixie copper mine, below St. George, has been inspecting machinery for use in the new smelter, which the company is preparing to build on Santa Clara Creek, 10 miles north of the mine. The new road to the mill site is about graded, and a 3-mile ditch and flume to supply the new plant is being constructed. The new smelter is to have an initial capacity of not less than 50 tons per day. The mine shaft is down 625 ft. below the tunnel and 825 ft. below surface. About 35 men are now employed in the mine.

WASHINGTON.

FERRY COUNTY.

(From Our Special Correspondent.)

California.—The wagon road between the mine and the ore dump, on the Washington & Great Northern siding, has been completed.

Gold Ledge.—The tunnel is in 1,080 ft., and is going ahead 4 ft. per day.

Hollyock Group.—Tests of 100 and 200 lots of ore show values per ton of \$6 in gold and 5 3-10 oz. silver, with 10 per cent copper and 9 per cent lead. A contract has been let to drive 100 ft. of tunnel on the vein.

Meteor.—This claim has a 20-ft. vein with gold the predominating value. A shaft is down 128 ft. A streak of ore from 8 to 16 in. wide is rich in native gold and silver, calaverite, cerargyrite and brittle silver. A small steam hoist and pump have been installed.

Mountain Boy.—A controlling interest in this property, at Park City, has been bonded to a Canadian party. Three men work on the vein, which runs in gold, silver, copper and lead.

Mountain Lion No. 2.—Work has been suspended to devise a different manner of prospecting.

Nonpareil.—This claim has a 4 or 5-ft. vein, with several exposures of ore in open cuts. At a depth of 140 ft. a tunnel intersects the vein. Upon the latter a drift has been run 180 ft. on concentrating ore, carrying gold and silver. A tunnel, now in over 100 ft., has 300 ft. in all to run to strike the vein.

Red, White and Blue.—The tunnel is in 225 ft., and has intersected the vein, which is mainly payable copper ore. A shaft will be sunk.

Republic Placers.—A 700-ft. bedrock tunnel is completed on the Little Ruby placer, and 3 men are getting from 2 to 6 oz. gold per day. The Little Falls employs 3 men, making wages. The April Fool, on Copper Creek, has about 30 ft. of sluice boxes, and is prospecting fairly well.

Stray Dog.—This claim, at Meteor, has a vein averaging 4 ft. wide. The shaft is down 120 ft. A sample lot of 2,500 lbs. of ore sent to the smelter at Everett, Wash., ran high in gold and silver ore.

Tom Thumb.—On the 400-ft. level the cross-cut is in 215 ft., and has cut the vein. A pump has been installed in the 400-ft. A diamond drill will be used for prospecting.

Washington & Great Northern Railway.—The rail end is within 3 miles of Republic. Bridges across Granite Creek, on the route to the mines, are under construction.

Water Works.—A survey has been made for a pipe line from Trout Creek to Republic, a distance of 7 miles, by the Curlew Mining Company.

WYOMING.

CARBON COUNTY.

Verde.—A strike of high-grade copper ore has been reported on this claim, near the Colorado State line, 6 miles south of Battle. But a small amount of development work has been done.

FOREIGN MINING NEWS.

AFRICA.

RHODESIA.

The Rhodesian Chamber of Mines reports the gold output in May at 19,698 oz. crude. For the five months ending May 31, the total was 83,307 oz. crude, against 66,780 oz. in the corresponding period of 1901. The total this year was equal to 74,143 oz. fine gold, or \$1,532,536.

The report of the Chamber of Mines for the fiscal year ending March 31, 1902, shows that there were 14 mines and mills in operation in Matabeleland and 6

in Mashonaland. These 20 mines had in all 298 stamps in operation, the largest mills being those of the Globe & Phoenix, the Geelong and the Selukwe companies, each having 40 stamps. There were 4 cyanide plants in operation on tailings. The total work done was 248,002 tons ore mined and milled, and 81,441 tons of tailings cyanided. The total yield reported for the year was, in crude ounces: From mill, 163,061 oz.; tailings, 17,333; miscellaneous sources, 495; total, 180,889 oz. crude gold. This was equal to 153,217 oz. fine gold, or \$3,166,993. This compares with \$2,010,240 in the previous year, showing an increase of \$1,156,753, or 57.5 per cent.

AUSTRALIA.

VICTORIA.

The Mines Department reports for April that the total gold production of the State was 48,946 oz. crude, equal to 45,221 oz. fine gold. For the four months ending April 30 the total was 211,413 oz. crude, against 229,528 oz. for the corresponding period in 1901—a decrease of 18,115 oz., or 7.9 per cent.

The dividends paid by public gold mining companies for the four months this year amounted to £113,761.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

British Columbia Copper Company.—This company now has 2 furnaces running at its smelter at Greenwood, and the works are capable of treating about 800 tons per diem. The first furnace was blown in on February 18, last year, and since then the smelter has reduced about 180,000 tons of ore, chiefly from the company's Mother Lode Mine.

Montreal & Boston Copper Company.—This company has its smelter at Greenwood in operation. The plant was built in 1900 and 1901 under the direction of Andrew Laidlaw, who was prominent in organizing the Standard Pyritic Smelting Company, of which he became managing director. Owing to the lack of sufficient ore supply and other reasons did not blow in until financial troubles overtook the Standard Company. Albert I. Goodell, of Pueblo, Colo., has had charge of the alterations and improvements now completed.

The main building is 182 ft. long by 120 ft. wide, and from the furnace floor to the roof nearly 80 ft. high. The sample mill now includes a No. 5 Gates rock crusher and a Bridgman automatic sampler. These have been added to the plant originally installed, which consisted of 2 36-in. and 2 48-in. Vezin automatic samplers, a 7 by 10 Blake rock crusher, 2 sets of 12 by 20 rolls and 2 belt elevators.

Down the center of the building are 2 parallel rows of 8 ore bins, each bin being 34 ft. by 10 ft. Beyond this group of bins are additional bins for coke. Outside the building and alongside the sample mill 3 large receiving bins have been erected, these discharging the ore into the big crusher. Over all bins run elevated railroad tracks.

The furnace floor extends 60 ft. from the stone retaining wall towards Boundary Creek, which passes below the smelter, and this level has been excavated for a length of about 140 ft. The dust flue, with stone walls and arched brick roof, runs about 200 ft. to the steel smokestack, which is 9 ft. 6 in. in diameter and 112 ft. high.

On the furnace floor are erected boilers, blowers, engines, etc. The furnace is 40 in. by 176 in. inside the tuyere line, and has a nominal capacity of 300 tons each 24 hours. It is a larger furnace than any one of those at the Granby and B. C. Copper Company's plants. There are 2 80-h. p. boilers, a No. 7 Connorsville blower, steam hoist, 2 75-h. p. engines to run the blower and sample mill, respectively, and a 250-light Siemens-Halske dynamo, driven by a high-speed Atlas engine for electric lighting. A well-equipped assay laboratory, offices, warehouses, etc., have been erected.

Snow Shoe.—This mine is shipping about 100 tons of ore daily to the smelter.

BRITISH COLUMBIA—CARIBOO DISTRICT.

Ah Quay.—This claim near Stanley is working with a larger crew than last year. Wm. Christie is foreman.

Cariboo Gold Fields.—This company's big elevator near Barkersville has been running steadily since it started this season.

Lowhee.—Piping is under way. Manager Bailey has gotten over the trouble due to the large hole found in the bedrock, which, though rich, was costly to work.

Wingdam.—At this placer claim near Barkersville work is being pushed under the direction of S. Keast, an Eastern man. Harry Jones, who has been in charge of the work, is still interested in the management.

BRITISH COLUMBIA—CASSIAR DISTRICT.

Lake View.—On this free-milling lode, between Birch and Boulder creeks, near Atlin, the owners, on

behalf of a Pennsylvania company, are running a tunnel 70 ft. below the old workings.

Rock of Ages.—Mr. Ruffner has a hoist and pump in place, and is sinking on this gold quartz lode, near Atlin.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Output.—For the week ending June 21 the output was 6,240 tons, of which 1,200 tons were shipped from the Le Roi dump, says the *Rossland Miner*. The Le Roi increased its output substantially, and the Le Roi No. 2 also increased its shipments, but the Center Star only sent out a couple of cars during the week. The Giant continues to ship ore on a small scale, and it is probable that the company's attention will be confined in the immediate future to the prosecution of development work. At the Le Roi, Le Roi No. 2, Kootenay, Nickel Plate, War Eagle and Center Star operations have been along the usual lines. Work is still under way at the Spitzee, Abe Lincoln and New St. Elmo, while a few men have been put to work on contract at the Big Four.

Shipments for the week and for the year to date are:

	Tons.	Tons.
Le Roi.....	4,500	113,304
Le Roi No. 2.....	1,600	31,305
War Eagle 2.....		
Center Star.....	60	4,076
Rossland G. W.....		2,400
Giant.....	80	260
Cascade.....		300
Bonanza.....		20
Velvet.....		250
Spitzee.....		20
Total.....	6,240	156,704

BRITISH COLUMBIA—SOUTHEAST KOOTENAY DISTRICT.

Crow's Nest Pass Coal Company.—The miners in this company's Coal Creek mines, near Fernie, are on strike, and the workings are tied up. The strike was caused by regulations issued by J. H. Tonkin, the recently appointed general manager.

MEXICO.

CHIHUAHUA.

(From Our Special Correspondent.)

Hidalgo Mining Company.—A bonanza was struck on the north drift No. 8 of La Presena Mine (silver) of this company. The breast measures 12 ft., and is said to average 64 oz. silver per metric ton. The breast of ore on the south drift No. 8 of La Morena Mine of the same company is now 11 ft. thick, and averages from 48 oz. silver on 3-ft. section of footwall side to 144 oz. on 3-ft. hanging wall, the center averaging 96 oz. A second bonanza encountered in north drift No. 2 of the San Juanico Mine is one of the richest ever struck in the Parral District. The breast is now 7 ft. thick, and is said to average 210 oz. silver and 60 oz. gold per metric ton. The breast is increasing in thickness. This mine has been idle for over a century, but about 6 months ago was pumped out and re-opened by its owners, the Hidalgo Mining Company.

J. I. Long, manager of the Hidalgo Mining Company, has returned to Parral from a 2 months' business trip to Pittsburg, Pa., the home of the company. It is expected that Mill No. 2, which was burned in May, will be in operation soon.

Moreno.—This mine, on the southern end of the Colorado vein, recently uncovered a large body of high-grade ore. It has been supposed by many that as none of the old Spanish workings showed depth the values did not hold out, but it is now known that lack of heavy pumping machinery was the cause.

Palmito.—It is understood that this mine of Don Pedro Alvarado, of Parral, which has for the last 18 months paid \$125,000 (Mex.) per month net profit, continues to pay \$100,000 per month net profit.

Prieta.—B. Gilpin, of Baltimore, Md., one of the principal stockholders, is at Parral. The mine has been idle for several months, awaiting the arrival of the necessary machinery. The machinery is now being put in, and pumping is under way. A 200-ft. vertical shaft may be sunk.

Quebradillos.—Stalforth & Dittmire, of Parral, are shipping about 2,500 tons of ore per month, averaging 50 oz. silver, from this mine.

Refugo.—The new 150-ton lixiviation plant of this mine is completed, and a satisfactory test run has been made. It is understood that the mill will not start formally until November 1.

San Juanico.—In this property of the Hidalgo Mining Company a large vein of ore has been cut with high gold values. Six feet of the vein have been uncovered, but its full extent is not known. The strike is in a drift on the 200-ft. level. The same company recently uncovered a large body of high-grade silver ore in the Presena at a depth of 800 ft. The new strike is creating great enthusiasm. Vacant properties heretofore neglected have been located, and contracts have been let for immediate development.

Tecolotes.—It is expected that the 500-ton mill will start about July 15.

MINING STOCKS.

(Complete quotations are given on pages 35 and 36.)

New York. July 3.

Brokers are doing comparatively little in mining stocks just now, owing to the approaching National holiday.

In the copper group prices show little stability, and continue at the lowest ebb. Amalgamated fell to \$62½, but later gained somewhat; but the trading was so small that the recovery was checked immediately. Anaconda was hardly visible, and on two days absolutely nothing was done in the stock. It hung around 106 per cent (\$26.50). On curb efforts were made to awaken Greene Consolidated, of Mexico, but outside investors had gone on a vacation. The stock rose to \$28½, after fluctuating as low as \$26½. Sales of Tennessee were made at better prices—\$15½@16— but the total was too small for recognition. White Knob of Idaho weakened to \$19. Montreal & Boston, of British Columbia, received new life with the blowing in of its smelter. This stock brought \$2¼@2½. Sales of 800 shares of Empire Consolidated Quick-silver Company, of California, are reported at \$1¼@1½.

Ontario Silver, of Utah, was in better form, selling at \$8½@8¾.

In the Colorado list, the Cripple Creek shares were weak, while little was done in the Leadville companies.

Comstock shares show a little recovery.

Auction sales were 2 shares Standard Oil Company at \$662¼ per share; 2 preferred shares Western Anthracite Coal and Coke Company at \$20½; \$5,000 10-year 5 per cent. gold debenture bonds, due 1911, of the International Koolin Company, at \$1,000, and 4 shares Lackawanna Iron & Coal Company at \$90. Sales in Philadelphia were 100 shares Engineering & Powdered Fuel Company, \$2 for lot.

Boston. July 1.

(From Our Special Correspondent.)

The market for mining shares remains in the same comatose condition, and there seems to be nothing in sight to change this state of affairs. Now and then a slight flurry will be noticed in some particular stock, due to special causes, but even these are of short duration.

Trading sentiment on the Exchange seems to be ultra bearish on mining shares, yet this might be changed in the twinkling of an eye, so sensitive is the ordinary trader. Interest at present centers on the Amalgamated dividend, and no surprise would be expressed were it to be passed. As usual, before the dividend period a considerable number of bets have been made on the result. Copper Range has been about as active as any stock, advancing to \$54.50, but fluctuations have been mainly between \$53@54. Winona spurted to \$53.7½, and is in fair request. Its friends are very persistent in the belief of big things for this company. Old Dominion dipped to \$19.12½, but recovered to \$20. Osceola broke \$1.50 to \$58.50 on less than 100 shares, which is a fair indication of the narrowness of the market. Tamarack has stiffened \$4 to \$179. Utah Consolidated has yielded fractionally to \$20, and is utterly without support. Mohawk has varied from \$42 to \$43, although very dull.

Very little is doing in Isle Royale, although it is steady around \$12. Net earnings for June are reported as \$15,000. There is talk of changes in the management of the Quincy at the mine. Adventure stiffened to \$23.50, and Mass has been steady at \$18.25@18.50. Daly-West touched \$50, but weakened to \$48.25. Forty-five cents is bid for the Daly-West July dividends; at present 40c. is being paid. United States Oil stock showed a hardening tendency, by advancing fractionally to \$15.87½. The second and last installment of \$7.50 on the Island Creek coal stock has been paid in. It will be converted into United States Coal and Oil stock, and considerable activity is promised in the market. The Continental Zinc Company has paid its first quarterly dividend of 1.6 per cent, or 40c. per share. This is the successor to the Consolidated Zinc and Lead Mining and Smelting Company.

Colorado Springs. June 27.

(From Our Special Correspondent.)

During the fore part of the week prices of mining shares had a downward tendency, but a reaction during the past two days has more than made up for all losses. The week closes with mining stocks in fairly good shape, and the improvement is without doubt traceable to the amicable adjustment of the difficulty which has existed in the management of the Elkton Mine, and which resulted in precipitating a three-cornered fight for the control of the management 10 days ago.

Doctor-Jack Pot sold from 14½ to 15¼c. June 21,

but dropped to 11¼c. on the 24th, closing to-day at 11¼@11½c. The company has suspended all operations on its own account. The mine is being worked by some 30 sets of lessees, who are making a fair production.

Elkton dropped from 62½ to 55c. during the fore part of the week, touching the latter price June 24. The break was precipitated by selling orders called out by the fight on the board of directors for the control of the annual meeting. The differences were compromised Wednesday, and the stock rallied, selling at 62½c. yesterday and to-day.

El Paso sold from 52½ down to 50½c. during the week, but recovered all it had lost. There has been no material change in this stock for some time. Isabella advanced to 30c. during the early part of the week on a reported improvement of ore in one of the lower workings. The advance was not well sustained, and the stock sold off, closing at 28½c. to-day. Mollie Gibson (silver) advanced from 12 to 14½c. June 25 on a favorable report from Aspen regarding the recent strikes made in that property. The demand for these shares has been slight, and the price fell off to 12½ bid and 14½c. asked to-day.

The only selling of the week in Portland was made to-day at \$1.85 a share, although the quotation has oscillated between \$1.75 and \$1.90. There is likely to be nothing new regarding the reported litigation over the Sloan filter patent, as the United States Reduction and Refining Company is fighting the case of the original patent in Washington with representatives of the Woods Investment Company. It will probably take several months to settle it.

Salt Lake City. June 21.

(From Our Special Correspondent.)

This week's market is somewhat more encouraging considering the number of shares sold. The feature of the week has been Daly-West stock, which has advanced to \$48.47½ per share, dropping as low, however, as \$44, sales amounting to 1,508 shares. Daly-Judge receded from \$7 to \$6.75 during the week, with sales of 150 shares. Carisa has been more active, marketing 10,000 shares at prices between 25 and 27c. Consolidated Mercur maintains its regular figures of \$2@1.95, with sales of 2,100 shares. Mammoth reports sales of 1,200 shares at \$1.23@1.20, while Lower Mammoth maintains nearly the same prices, putting out 1,650 at \$1.22@1.13. As was expected with the new discoveries in the Sacramento, prices have moved up from 23 to 26c. per share, 9,950 shares being sold during the week. Petro has been struck with sudden activity, as shown by sales of 20,100 shares at prices ranging from 15 to 21c. California registered the greatest number of shares sold, 22,400, at 12@14c. Next in line was the Ben Butler with 22,000 shares at 9@10c.

San Francisco. June 28.

(From Our Special Correspondent.)

Summer dullness seems to be settling down on the market. Few buyers are in sight, and the trading has been almost entirely professional and in small lots.

Some quotations noted are: Consolidated California & Virginia, \$1.35; Ophir, \$1.10; Mexican, 41@43c.; Overman, 30@31c.; Potosi, 20c.; Union Consolidated, 19c.; Belcher, 12c.; Crown Point, 5c.

On the Producers' Oil Exchange business has also been very quiet, and few buyers were to be found. Sellers, however, were not disposed to make concessions, and prices were generally firm.

Monte Cristo sold at \$1.25@1.30; Reed Crude, 31c.; Junction Oil, 21c.; California Standard, 15c. The largest transactions were in California Standard.

Both the Mining and the Oil Exchanges have decided to close from the evening of Wednesday, July 2, to the morning of Monday, July 7.

London. June 24.

(From Our Special Correspondent.)

The markets have been comparatively quiet. The shares in Rosslund companies, Le Roi and Le Roi No. 2 have been rather firmer, owing to more favorable reports as to estimated profits, but as most people continue to believe that these reports and market movements are being engineered by people behind the scenes, the actual amount of business is not great. In the Indian section Coromandels have considerably improved, and the £1 share now stands at 15s. The new discovery of ore is turning out well, and it is expected that the company will arrive at a paying basis without it being necessary to raise any further capital. The West Australian market appears to be recovering somewhat from the recent bear attack, and prices are a good deal firmer. Probably the prices had been depressed as far as they would go. It is certain that the controllers of the mines have been far more active in supporting their markets than was

the case during previous similar attacks, and the reason no doubt is that the mines are better developed and equipped than when the other attacks were made. I understand, however, that the bear movements will be renewed again before long.

A public issue of some interest was made last week. This is the Canadian Ore Concentration, Limited, which has been formed with a capital of £150,000 to acquire the Canadian rights of the Elmore oil concentration process. The company is formed to grant licenses to use and to erect machinery for other companies in the Dominion of Canada, on the same lines as the British Ore Concentration Company and the Swedish Ore Concentration Company. The process has an undoubted scope in Canada, especially British Columbia. The English company has erected plants at three mines in Wales and one in Cornwall, where the friability of the ore has prevented effective water concentration. Three mines in Sweden have also been supplied with the plant. Mr. J. D. Kendall is the consulting engineer to the Canadian company.

The Etruscan Copper Estate, Limited, are now proposing to proceed to use the £200,000 raised by the issue of debentures made just before Mr. Moering's and Mr. Hill's adverse reports were published. At the debenture holders' meeting the other day, convened for the purpose of discussing the propriety of going on with work at the mine in face of these reports, the majority of the votes were given in favor of going on with the work, but, owing to the fact that some of the votes given in favor were disputed by the opposing party the final settlement of the question was postponed. There is hardly any doubt on the issue, however, as a large majority were on the side of the directors. Since the directors waived aside Mr. Moering's and Mr. Hill's reports, they have had several other offers from eminent people interested in the company to send other mining men to inspect the mine, but the directors naively answer that they do not want to run the risk of having another adverse report. They prefer to go on with the development of the mine at indefinite expense. It is a great pity that the company should scout the opinion of every one except those in their own employ or interested in the property in some way or other, and to attribute all adverse reports to incapacity, personal pique or to bear tactics. It would have been the right thing to get an independent report by an American mining man unconnected with London interests, but if the debenture holders, with all this knowledge of the situation, prefer to go on spending their money there is, of course, no reason why they should not.

COAL TRADE REVIEW.

New York. July 3.

ANTHRACITE.

But for the holiday this week, which would have afforded a chance for rioting, it is likely that at least one or two of the large mining companies would have tried to start work at a few selected collieries. According to press despatches, Coxe Brothers in the Lehigh Region, did not start work at Drifton simply because a gang of strikers armed with clubs, and even firearms, persuaded the men who were willing to work to go home. It is reported that the foreign-born miners in the Lackawanna Region, particularly the Hungarians and Poles, are now pretty well tired of idleness and would be glad to go back to the mines could they feel secure from violence and insult. The Pennsylvania State authorities, influenced apparently by political motives, show reluctance at calling out the militia. It is safe to say that if martial law were declared in certain districts the strike there would be over inside of ten days. As matters stand there are indications that certain companies will endeavor to start a few collieries next week. If serious rioting follows, the strike will end suddenly, if there are no serious outbreaks the strike will gradually collapse.

Trade at all points is light. A considerable amount of coal released by the railroads has become available and temporarily stilled the clamor about the use of bituminous at New York City. Retailers everywhere report demand small, partly owing to this being the season of light consumption and partly owing to the current reports of exorbitant prices, which further restrict the use of anthracite for domestic purposes. Trade in the northwest is very light indeed. In Chicago territory the market continues quiet. No coal is arriving and those dealers who have supplies—and the total tonnage in storage is considerable—are not seeking business. Inquiries from out of town points are increasing. Along the lower lakes the situation shows little change. Large concerns at Buffalo are reported as disposing of what coal they sell at the regular prices, though retail prices are up. Along the Atlantic seaboard reports of the probable disintegration of the strike before long are having some effect and the market is quieter. In cities gas is used for domestic pur-

poses as never before and bituminous for steam production. At Boston wholesale trade is light; what coal is sold at speculative prices goes to other points. At Philadelphia the demand for domestic purposes continues light. Small lots of anthracite for steam production are changing hands at speculative prices. Stocks in dealers' hands at New York Harbor points are gradually growing smaller. Conservative firms still refuse to take advantage of speculative prices. The regular July quotations for free-burning white ash coal are: Broken, \$4.05; egg, stove and chestnut, \$4.30, f. o. b. New York Harbor shipping ports. An occasional cargo of almost any grade or size changes hands at \$7 or \$8 per ton.

The Delaware and Hudson Company on July 1 abandoned its Buffalo office, turning all its western trade over to the Erie, while its retail trestles at Buffalo will be operated by Williams & Petere. These changes simply follow the close relations between the Delaware & Hudson and Erie companies established a few years ago.

BITUMINOUS.

In the Atlantic seaboard bituminous trade demand continues strong, though at present prices for speculative coal are a little weaker than they have been. This weakness is no doubt due to the rumors of the early breaking up of the anthracite strike and the improved labor situation in the bituminous fields. Speculative prices just now are about \$4@4.25 for Clearfield grades, f. o. b. New York Harbor shipping ports, and apparently there is a fair supply available at these figures. Producers generally are trying to maintain, so far as market conditions permit, the monthly quotas called for by consumers' contracts. They seem to be succeeding fairly well in their efforts. It is difficult to size up the labor situation accurately. At most mines where the men went out, however, the operators are taking the men back gradually, but have not yet resumed work to full capacity. This statement applies both to the New River and Pocahontas fields. In general more men are at work than a week ago.

Trade in the far East has felt the curtailment of shipments from the mines and some speculative coal has been going to that territory to satisfy consumers who will not or cannot wait. Coal is in demand, and is being received in fair quantity. Along Long Island Sound consumers continue to call for all the coal they can get on their contracts. At New York Harbor points dealers and consumers who have contracts or have fair stocks for their limited storage facilities are pretty well cared for. The all-rail trade is short of coal. Last year's dealers in this territory had the call on coal coming from the mines, but now these consumers are receiving less attention than those in any other territory, and as a result are paying—usually for small lots—higher speculative prices than consumers at tidewater.

Transportation from the mines is about up to schedule. Car supply is fairly good. In the coastwise vessel market vessels are in plentiful though variable supply. Prompt loading usually secures a discount of 5c. per ton from current quotations; those from Philadelphia are as follows: Providence, New Bedford and Long Island Sound, 65@70c.; Boston, Salem, Portland, Wareham and Portsmouth, 75@80c.; Lynn, Bangor, Bath and Gardiner, 85@90c., with towages to last last port; Newburyport, 95c.; Saco, \$1 and towages. Rates from the further lower ports are 10c. above these figures.

Birmingham. June 30.

(From Our Special Correspondent.)

The members of the United Mine Workers of America, in Alabama, some 11,500 strong, will not work in the mines, the conference between operators and miners adjourning Saturday having failed to agree on a contract for the year commencing July 1. The operators offered to renew the contract which is now in effect, 55c. per ton, maximum, but the miners demand an increase in the maximum of 5c. per ton, and also ask for an increase for day labor in and around the mines, pay-days each two weeks, 8 hours to constitute a day and several minor things. Neither the operators nor the miners would make concessions, and when the contract expires to-night a strike will begin. President Flynn, of the Alabama organization of the United Mine Workers, states that the miners will remain out of the mines to a man. On the other hand, it is stated that the railroads in this district have been stocking coal, as well as other large consumers, and have a supply on hand which will last them several weeks. The mines in Walker County, which produced last year over 1,000,000 tons, will hardly shut down, inasmuch as the miners employed in that county do not belong to the United Mine Workers. It is not expected, however, that the Walker County coal will be used to supply demands now coming from the mines which are to be affected by the strike. The mines in which convicts are worked will not be disturbed.

The production during the month of June has been extraordinarily heavy. The consumption has not been

light either, but much coal was actually stocked in anticipation of the trouble.

Chicago. June 30.

(From our Special Correspondent.)

Notwithstanding the strike at the anthracite mines and the consequent increased demand for soft coal, the end of the month shows something of a lag in the coal trade. This is attributed by most dealers to the natural slackness of the summer business, added to the feeling on the part of the retail dealers that the anthracite strike will be over before cold weather sets in.

Smokeless coals from New River mines are out of the market, the strike having spread to them. Pocahontas smokeless is unaffected, but the demand is light; prices are unchanged. Lump and egg, 3.50; nut, \$3.25; run-of-mine, \$3.10. Hocking has advanced 10c. a ton for out-of-town orders, and dropped 10c. for Chicago business, the new price being \$3.10 for the city, and \$2.90 for country orders. Other bituminous coals are unchanged, quotations being: West Virginia, \$3.15; Youghiogheny, \$3.20; Indiana block, \$2.45; Indiana semi-block, \$2.10; Clinton lump, \$1.90; Indiana lump, \$1.85; Northern Illinois run-of-mine, \$1.80; Southern Illinois run-of-mine, \$2. Blacksmith's coal continues scarce at \$3.35, owing to its more profitable use in the East for fuel purposes.

In fear that the bituminous mines of Indiana and Illinois may be affected by spreading of the strike, the railroads are pouring large supplies from these mines into Chicago. This stock, together with that accumulating in the river yards, appears to secure the city from serious shortage for many months to come, whatever the situation at the mines.

Cleveland. July 1.

(From Our Special Correspondent.)

The shipments of coal by the lake route to the Northwest continue without interruption. They have been so heavy as to indicate that the total movement for this season will be far and away ahead of anything that has been done on the lakes in any season prior to this. It has been generally supposed that the prospect, however faint, of a general strike in the bituminous district, in sympathy with that in the anthracite district, would cause the producers to hold back on their coal for the lakes, that the domestic consumers might be better served in case of any scarcity hereafter. It seems, however, that the operators have faith in the continued activity of the mines and the railroads have not been stampeded by the threat of the miners. The result has been a free and uninterrupted movement of coal. This last week has seen the introduction of miners from the hard coal districts into the soft coal fields to assist in the mining of the bituminous product to supply the larger demands for that material and in consequence the output has been very materially increased. This has also aided the shippers by the lake and the supply at the lake ports has been satisfactory in the main. The rates of carriage do not change, holding at 45c. to Milwaukee and 35c. to the head of the lakes.

Pittsburg. July 1.

(From Our Special Correspondent.)

Coal—The production of coal during the week shows some gains, as there was a better supply of railroad cars. Prices are firm, and stiff premiums are being paid on all coal sent to Eastern markets. The organization of the Pittsburg Terminal Railroad and Coal Company and its constituent corporation, the West Side Belt Railroad Company, was perfected on Friday. The company owns about 15,000 acres of valuable coal land in the heart of the Pittsburg District, and the work of developing will be undertaken immediately. There are to be 10 openings, and the mines will have the most improved equipment. It is proposed to enter the lake trade on a large scale. Frank M. Osborne, former president of the Pittsburg Coal Company, is one of the principal promoters of the new corporation. The long expected June rise has come at last, and there is now a good boating stage. The Monongahela River Consolidated Coal and Coke Company was more fortunate than on previous occasions, as all of its tow boats are in the harbor and ready for service. Before noon to-day 5,000,000 bushels of coal had been sent down the river, and before tomorrow night it is estimated that fully 20,000,000 bushels will be on the way to Southern markets. Coal is in big demand at Cincinnati and other down river ports, owing to the strike of West Virginia miners, which has caused a suspension of shipment from the Kanawha field.

Connellsville Coke—Contracts for furnace coke at 2.25 a ton which expired yesterday were not renewed. Prices continue high, furnace coke for Western shipment being quoted at \$2.75 and for the East at \$3. The

demand is good, and there is a fair supply of railroad cars. The Courier in its last issue gives the production for the previous week at 249,880 tons. The shipments for the week aggregated 12,069 cars, distributed as follows: To Pittsburg and river tripples, 3,956 cars; to points west of Pittsburg, 5,162 cars; to points east of Connellsville, 2,951 cars. This was a decrease of 178 cars compared with the shipments of the previous week.

San Francisco. June 28.

(Special Report of J. W. Harrison.)

During the week there have been the following coal arrivals: One from Washington, 2,600 tons; one from Oregon, 450 tons; three from British Columbia, 14,354 tons; two from Australia, 4,406 tons; total, 21,810 tons. The quantity arriving this week will fully supply all current requirements. The amount on hand in yards is not excessive. This has been caused by the exceedingly light arrivals the past week. Business is moderately good, considering present conditions. Prices remain about the same, although offerings for future delivery are slightly shaded below last week. This is caused by the low freight quotations at present ruling from England and the colonies. Oil is still being offered at the former low prices, there being no evidence of an attempt on the part of producers to enhance values. Consumers are certainly the benefited parties by the stand taken by the oil producers. Each well owner seems to solicit the position of being the cheapest vender of his product. It is not who can get a fair price for his output, but who will succeed in selling cheapest, hence oil stocks on the market here are very slow articles. Under present circumstances, owners of coal mines or oil wells do not appear to be on the right side of the market. The importations of coal for the first six months of this year will be at least 125,000 tons less than for the same period of 1901.

Prices.—Our special correspondent reports that yard prices of Pacific coast coal to dealers in San Francisco, are as follows: Roslyn, \$6.50 per ton; Wellington, \$8; Seattle, \$6.50; Southfield, \$8; Coos Bay, \$5.50; Bryant, \$6.50; white ash, \$5. Cargo lots of Eastern and foreign coal are: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania hard, \$14; Cumberland, \$12; cannel, \$11; Welsh anthracite, \$14. Rocky Mountain coals are quoted as follows: Castle Gate, \$8.50; Clear Creek, \$8.50; Rock Spring, \$8.50; Colorado anthracite, \$14; Sunnyside, \$8.50.

Foreign Coal Trade. July 3.

The export trade continues quiet. Inquiries are chiefly for West Indian and South American trade. Business is postponed as much as possible on account of the temporarily high prices ruling at seaboard ports.

Exports of coal and coke from the United States for the five months ending May 31 are reported by the Bureau of Statistics of the Treasury Department as follows, in tons:

	1901.	1902.	Changes.
Anthracite	777,023	585,117	D. 191,906
Bituminous	2,196,460	2,210,416	I. 13,956
Total coal.....	2,973,483	2,795,533	D. 177,950
Coke	167,942	183,916	I. 15,974
Totals	3,141,425	2,979,449	D. 161,976

The distribution of the coal exports to different countries is shown in the table below:

	1901.	1902.	Changes.
Canada	1,958,249	1,902,907	D. 55,342
Mexico	236,236	234,633	D. 1,603
Cuba	170,102	207,309	I. 37,207
West Indies.....	174,275	150,857	D. 23,418
Europe	227,359	146,745	D. 80,614
Other countries.....	207,262	153,082	D. 54,180
Totals	2,973,483	2,795,533	D. 177,950

The falling off in shipments to Canada was in anthracite, comparatively little having been exported to that country in May. The exports to Europe, it will be noted, show a very considerable decrease this year.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of June 21 that the tone of the Welsh coal market remains unaltered. Business is quiet and unlikely to show much animation until after the holidays. Quotations are: Best Welsh steam coal, \$4.03@4.14; seconds, \$3.96; thirds, \$3.60; dry coals, \$3.60; best Monmouthshire, \$3.42@3.48; seconds, \$3.24; best small steam coal, \$2.16; seconds, \$2.04; other sorts, \$1.80. The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth and 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 2½ per cent discount.

The general tone of the freight market is very quiet, and rates of freight show no quotable change. Some rates quoted from Cardiff are: Marseilles, \$1.40; Genoa, \$1.38; Naples, \$1.38; Singapore,

\$2.64; Las Palmas, \$1.50; St. Vincent, \$1.74; Rio Janeiro, \$3; Santos, \$3.36; Buenos Ayres, \$3.24.

IRON TRADE REVIEW.

New York. July 3.

While the approaching holidays and the first really hot weather of the season have tended to make business quiet, the market remains very firm. There is practically no iron and steel for sale for the second half of the year, and the pressure for immediate deliveries seems to be falling off somewhat. The only exception to this is in structural material, in which there is a great demand for builders who have not covered their requirements. This is especially the case in Eastern cities.

The only lines in which there is much material offering for sale are sheet steel and wire. In these producing capacity has been increased so largely that a surplus seems to exist, and there is no trouble about placing contracts.

There is no change in the situation of those Eastern furnaces which use anthracite. The number of these is not large, however. A more important matter is the strike of the Alabama coal miners this week. This is local entirely, has no relation to the anthracite troubles; but if not soon arranged it will affect the output of the Southern blast furnaces, few of them having much coke stored ahead.

Foreign pig iron and steel are coming in so freely now that they are regularly quoted in Eastern markets. German steel billets are offered in Philadelphia at \$2.50 to \$3 below quotations for domestic billets.

Birmingham, June 30.

(From Our Special Correspondent.)

The first month of the last half of the year starts off under very discouraging auspices. A strike among the coal miners and day laborers in the mines is about to be inaugurated, and there is no telling how long it will last. Already preparations are being made to bank the fires in several furnaces in this district. While it is admitted that there is coal on hand which will last for some little time, it is not certain how long the strike is going to last.

The shipments of iron from this district have been steady, and there has been no accumulation. The production for the balance of the year has been provided for. As far as can be learned no sales for 1903 delivery have been made by producers in this district. The report in the North that some of the Alabama manufacturers had opened their sales books for 1903, and were receiving business, is not verified by inquiry.

The following quotations are given: No. 1 foundry, \$16.50; No. 2 foundry, \$16; No. 3 foundry, \$15@ \$15.50; No. 4 foundry, \$14.50@ \$15; gray forge, \$14; No. 1 soft, \$16.50; No. 2 soft, \$16.

The statement has been reiterated that small lots of iron recently sold at \$17.50 and \$18 for No. 1 foundry, but all such sales have been made by the smaller producers.

In the finished iron and steel trades there is still much activity, and, with the exception of fuel, there is plenty of raw material on hand to last for a while. At the steel plant at Ensley steady work is going on with a good output.

The machine shops and foundries have been keeping up their progressive movements right along. Some trouble with labor is anticipated at the machine shops, the men demanding 8 hours as a day's work.

Buffalo. July 1.

(Special Report of Rogers, Brown & Co.)

There is a growing interest in the matter of supply for the first half of next year; inquiries are frequent and a number of good sized orders have been placed. The curtailment of production in the Pennsylvania districts, owing to the lack of fuel, caused by the strikes in the coal-fields, has been severely felt throughout this section. This is unfortunate on account of the great difficulty in obtaining iron for early shipment from other sources. The market in general continues very strong, and consumption goes on at a rapid rate. We quote below on the cash basis, f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, \$23.35; No. 2, \$22.25; Southern soft, No. 1, \$23.25@ \$23.75; No. 2, \$22.25@ \$22.75; Lake Superior charcoal iron, \$23.50.

Chicago, June 30.

(From our Special Correspondent.)

Local furnaces are practically sold out for 1902, and are booking orders large and small for 1903. Buyers who wish deliveries sooner than the first of next year are turning to Southern iron, which has heretofore kept with Northern as to price for deliveries in the last quarter of this year, but is running about \$1 per ton less for 1903 delivery. The price of Northern is now \$22@ \$22.50 for No. 1, \$21.50@ \$22 for

No. 2, and \$21@ \$21.50 for No. 3. Southern is quoted for actual sales for No. 2, with other grades proportional, in the last quarter of 1902, at \$21.65@ \$22.35, Chicago. There are a few small lots of Lake Superior charcoal occasionally obtainable, which find ready sale at \$24@ \$24.50.

Coke is soaring and giving furnacemen and foundry proprietors much anxiety. The furnaces are taking all they can get, and diverting much foundry coke, yet for furnace purposes the supply is so scanty as to cause much apprehension as to the possibilities of fulfilling orders for deliveries of iron. The price of coke is now \$6@ \$6.50, for West Virginia, Connellsville being still out of the market.

Cleveland. July 1.

(From Our Special Correspondent.)

Iron Ore.—The shipment of iron ore continues brisk, and a new record has probably been made in the movement for the month of June. Just now the boats are collected at the head of the lakes in larger numbers than the shippers can employ with assurance that all will get dispatch in loading. Nevertheless all of them are being chartered and they are waiting their turns. The supply of cars at the lower lake ports is sufficient to insure quick shipment from the boats to the furnace stock piles. The rates are unchanged at 75c. from Duluth; 65c. from Marquette; and 55c. from Escanaba. The selling prices do not change from \$4.25 for bessemer old range; \$3.25 for non-bessemer old range and bessemer Mesabi; \$2.75 for non-bessemer Mesabi. The sales are light.

Pig Iron.—The supply of foundry iron for immediate shipment has almost entirely disappeared, and sales of even car-load lots are few. All that are made are on the basis of \$22 in the Valleys for No. 2. A few sales of foundry are still being made for 1903 delivery, on which the prevailing prices hold good. There is still some talk of a sale of bessemer for second quarter delivery of 1903, but nothing has been done, and no prices fixed. The basic trade is dull, there being no material for sale now, and no inclination to order ahead.

Finished Material.—Some mills are on the market now offering deliveries of steel plate within four or five weeks. They do not offer any large amount of material, and are exacting for it a good premium over association prices, being able to obtain 2c. generally. Some other sales are being made now for fourth quarter delivery on which the mills have asked and obtained 1.80c., but special conditions prevailed which brought the price below the general market for that period. The demand for structural steel keeps up, but there is none now to be had on the market. The demand is so evidently beyond the possibilities of the mills to meet it, that a good business is assured in that line for an indefinite period ahead. This is causing heavy sales, entailing deliveries as far ahead as the opening of the third quarter of next year. The prices are holding firm at 1.70c., regardless of the extraordinary demand. The production of sheets is becoming manifestly greater than the market calls for, and the mills are in that peculiar state where the price of raw material will prevent a general reduction, and yet the condition of the trade calls for some such stimulus to buying. Some mills, regardless of the cost of raw material, have come upon the market offering to accept reductions, and some sales on the lower plane have been made. The demand for bars is steady, and the sales out of stock are large at old prices, except on large rounds, which are commanding a premium. The quotations are: 1.60c. Pittsburgh for bessemer steel bars; 1.70c. Pittsburgh for open-hearth steel bars; and 1.80c. nominally for bar iron.

Philadelphia. July 3.

(From Our Special Correspondent.)

Pig Iron.—The situation is very unsettled. The anthracite strike has upset all calculations. Dealers and agents of furnaces have nothing to say that is calculated to help out consumers. The possibilities of a termination of the strike to which the newspapers are referring, are not regarded in the same light by the iron people. The restriction in production is being felt in an actual and in a speculative way. Prices have nominally moved up 50c. on foundry iron. Forge iron is about the same, though no large lots have been sold. For No. 2 iron the necessities are urgent. The supply of gray forge appears to be equal to present necessities. Considerable foreign iron is arriving. Several negotiations are pending at this time for the earliest possible deliveries. No. 1 X foundry may be quoted at \$23.50; No. 2 X, \$22.50; No. 2 plain, \$22; gray forge, \$20; for standard, and \$19 for ordinary; basic, \$21; low phosphorus, \$23; Middleboro iron, \$22; Scotch iron, \$23.

Billets.—Foreign billets are now quoted at \$30.50; one quotation is given at \$29.50. There is talk of getting billets at less than that. American steel is quoted at \$34. The tone of the steel market is easier.

Bar Iron.—The bar iron market is unsettled. Steel bars are 2c. There are plenty of buyers at that. Refined iron is 2@ 2.10c. in a small way. Stores are doing a good deal of business, despite this is the holiday season. The mill suspension will be very short.

Sheet Iron.—Quotations still range at 2.40@ 3.50c. The shortage of fuel is being felt at some mills.

Merchant Steel.—The market is strong, considering all the unsettling influences at work. Western consumptive requirements are very heavy, and there are inquiries in from large Eastern consumers for very large quantities.

Pipes and Tubes.—Pipes and tubes are dull so far as orders are concerned, but very strong so far as quotations go.

Plates.—Business on the whole is better than two weeks ago. July requirements are being anticipated by several dealers. Universals are 2@ 2.10c.; flange, 2.10@ 2.20; fire-box, 2.30; marine, 2.35c.

Structural Material.—The only business done within a week, has been at considerably above market quotations. Several small buyers are around to-day wanting material at once. Local builders have neglected ordering, and will be obliged to go elsewhere to get the deliveries they are insisting upon.

Old Rails.—Old iron rails are quoted at \$25.50.

Scrap.—Short length steel rails, \$21.50; railroad scrap, \$24; cast borings, \$10; low phosphorus scrap, \$25; light forge, \$19.

Pittsburg. July 1.

(From Our Special Correspondent.)

The iron and steel markets are extremely firm but quiet. Sales are limited, as nearly all the buying for the current year has already been done. The mills are sold up, and there is nothing to do but fill orders on the books. But little activity is expected in the markets before September, and then it is likely to continue and run over into next year. Pig iron is unusually strong, and fancy prices can readily be had for early delivery. The furnaces are having some difficulty in promptly meeting specifications on contracts already booked, and it is almost impossible to take on any new business. A few small orders are being accepted at the highest prices paid this year. Gray forge is in better demand than last week, and some business for next year has been done. The buying of foundry iron still continues to be heavy. A considerable tonnage of Southern iron is coming into this market, but with the exception of one interest the Southern furnaces are not selling into next year. Most of the furnaces are well sold up on foundry iron for the year at prices almost equal to the rates for the Northern product.

The steel market has eased up somewhat, but prices continue high, and independent sheet mills are being forced to suspend operations. Sheets and wire products continue to be the only weak points in the general markets, and this is due to the fact that the productive capacity of the country is greatly in excess of the requirements. The plate market is in exceptionally good shape. A number of small sales have been made this week for delivery within the next few months at 0.20 and 0.30c. above the pool price, but for delivery in November and December and into 1903 the pool price is quoted. The United States Steel Corporation has adhered strictly to the fixed rate, and is well sold up for the year. Some large orders have been taken for extended future delivery. Most of the business now being done in structural material is for delivery in 1903. Some mills are said to be behind in deliveries and are being operated to their fullest capacity. Most of the plants will close on the Fourth of July, but will resume on the following day or Sunday. During the shut down much needed repairs will be made. The big works of the Carnegie Steel Company will resume operations on Sunday at 6 a. m.

Labor troubles in the Pittsburg District are being satisfactorily settled without strikes, except in the melting departments of the Crucible Steel Company's plant. The machinists have reached an agreement compromising on a 5 per cent advance and recognition of the Union. The strike of the inside structural iron workers of the American Federation of Labor is practically settled, and all of the men will be back at work before the end of the week. The strike of the unorganized structural iron workers at the Jones & Laughlins plant is still on. It is reported, and while not officially confirmed is not denied, that the United States Steel Corporation has authorized an advance in wages for all unskilled workmen at the various plants throughout the country. The men at the different works of the Carnegie Steel Company, including Homestead, Braddock, Duquesne and the blast furnaces, were given an advance of 10 per cent on Saturday. It came in the nature of a surprise, the men having no intimation of the intention of the company until they received their pay envelopes.

Pig Iron.—Prices are a trifle higher this week. Several hundred tons of bessemer were sold at \$21.75@

\$22, Valley furnaces, for prompt delivery. For the fourth quarter \$21 is quoted, but there is little to be had. Gray forge is strong, although no large sales were made. It is quoted at \$20.75@21.25, Pittsburg. Southern gray forge is being delivered in this market at \$20.25@20.75. Foundry No. 2 for this year's delivery is quoted at \$22.50@23, Pittsburg, and for the next year \$21@21.50 is asked.

Steel.—A few sales of odd lots of bessemer steel billets were made at \$34 at mill. For extended delivery \$32 to \$33 is quoted. Sheet bars range about 50c. higher. The demand for plates is good, and while the leading interest adheres to the pool price of 1.60c., and is making large sales into next year at that rate, lots for prompt shipment bring from 1.80 to 1.90c.

Sheets.—There is but little new business in sheets, and prices are weak. It is reported that the leading interest has shaded the price of galvanized sheets \$5 a ton on several desirable orders. No. 28 gauge black sheets are quoted at 3@3.10c., and galvanized at 4.50c. in car-load lots.

Ferro-manganese.—No domestic ferro-manganese is on the market. Quotations on the English product continue at \$52@55, and the German at \$49@50.

New York. July 3.

Pig Iron.—The market is quiet, but with Southern furnaces affected by shortages of fuel as well as some in the East there is increasing difficulty in getting iron for anything like prompt delivery. We quote for tide-water delivery: No. 1X foundry, \$22@23.50; No. 2X, \$21@22; No. 2 plain, \$21. For Southern iron on dock, New York, No. 1 foundry, \$22@22.50; No. 2, \$20@21; No. 3, \$19@20. These quotations are for delivery up to 1903, but are purely nominal.

Bar Iron and Steel.—Demand is still good. We quote on large lots on dock: Refined bars, 1.95@2c.; soft steel bars, 2c. Small lots for prompt delivery are higher.

Plates.—The market remains very firm. We quote for tide-water delivery in car-loads: Tank, 1/4-in. and heavier, 2.05@2.15c.; flange, 2.10@2.20c.; marine, 2.20@2.40c.; universal, 1.95@2.10c. The basis price for tank is 1.78c., but mills are free to take as high a price as they can get.

Steel Rails.—There have been no developments of moment during the week. Standard sections are quoted at \$28 for 1903 delivery; light rails \$30@33, according to weight.

Structural Material.—Imports of structural shapes, mostly in small lots, continue. The outlook favors a heavy local demand throughout 1903. We quote for forward delivery on large lots at tidewater as follows: Beams, 2@2.20c.; tees, 1.95@2.15c.; angles, 1.95@2.25c.

Cartagena, Spain. June 14.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Shipments reported are one cargo 3,300 tons dry ore to Newcastle; total shipments to date, 146,750 tons. Since last report several sales of both iron and manganiferous ores are reported for delivery over the rest of the year; also a few odd cargoes for prompt shipment. Trade generally continues brisk and the competition in this sierra for good iron ores is very keen, with tendency to raise prices.

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.

Other Exports.—Other exports include 380 metric tons iron pyrites to Venice; 320 tons iron pyrites to Genoa; 182 tons ocher to Swansea. Quotations for iron pyrites, 40 per cent iron and 43 per cent sulphur, are 11s (\$2.65) per ton, f. o. b. Cartagena.

CHEMICALS AND MINERALS.

New York. July 3.

Heavy Chemicals.—The market is seasonably quiet, while prices fluctuate but little. Further large orders for domestic high-test alkali and caustic soda for forward shipment have been booked at quotations below. Trade in foreign chemicals is best described by the following figures, showing imports into the United States in the 5 months ending May 31: Bleaching powder, 54,317,366 lbs. against 47,342,666 lbs. last

year; showing an increase of 6,974,700 lbs. caustic soda, 1,831,915 lbs., against 1,487,472 lbs., an increase of 344,443 lbs.; alkali, 12,060,741 lbs., against 12,554,946 lbs.; a decrease of 494,205 lbs.; sal soda, 1,403,444 lbs., against 2,256,257 lbs.; a decrease of 852,813 lbs.; chlorate of potash, 584,201 lbs., against 348,885 lbs.; an increase of 235,316 lbs.

Domestic chemicals, we quote, per 100 lbs., f. o. b. works, as follows: High-test alkali, in bags, 80@85c. for prompt shipment, and 75@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, \$7.75; 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, 90@92 1/2c.; caustic soda, high-test, \$2.25; sal soda, 67 1/2@70c.; chlorate of potash, \$10 1/4@10 3/4; bleaching powder, prime brands, Liverpool, \$1.75; Continental, \$1.50@1.70.

Acids.—Contract deliveries are good for this season. Prices are firm. It is reported that a large sulphuric acid plant will be erected at Beaumont, Texas, by Northern parties. Oil will be used as fuel, and the acid will be made from smelting zinc ore to be brought from Missouri and Kansas, where the company's promoters are said to be interested in some mines. The acid will be supplied principally to the Texas oil refineries.

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.....	\$4.50@4.62 1/2	Oxalic, com'l.....	\$4.60@ 5.00
Muriatic, 18 deg.	1.50	Sulphuric, 50 deg.,	bulk, ton.....
Muriatic, 20 deg.	1.62 1/2		13.50@15.50
Muriatic, 22 deg.	1.75	Sulphuric, 60 deg.	
Nitric, 30 deg....	4.00		1.00
Nitric, 38 deg....	4.25	Sulphuric, 60 deg.,	bulk.....
Nitric, 40 deg....	4.50		18.00@20.00
Nitric, 42 deg....	4.87 1/2	Sulphuric, 66 deg.	
			1.20
		Sulphuric, 66 deg.,	bulk.....
			21.00@23.00

Brimstone.—Excepting for the large imports the market would be uninteresting. Spot best unmixed seconds offer at \$23@23.25 per ton, and shipments at \$22.25, while best thirds bring about \$2 less. In the 5 months ending May 31, the imports into the United States aggregated 170,024 tons, as against 63,189 tons in the same period last year, showing an increase of 106,835 tons, due entirely to the heavier consumption by the paper trade.

Imports of brimstone into Great Britain in the 5 months ending May 31 aggregated 10,518 tons, against 7,753 tons last year, showing an increase of 2,765 tons.

Pyrites.—Trade is satisfactory, and prices generally good. Imports into the United States in the 5 months ending May 31 were 170,024 tons, containing approximately 81,612 tons of sulphur. In the corresponding period last year the imports were 10,386 tons less, or 159,638 tons, carrying 76,626 tons sulphur.

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@13c. 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.—Market shows some improvement. Spot gas liquor, 24@25 per cent, has sold around \$3.10 per 100 lbs., while shipments are worth about \$3.

Nitrate of Soda.—The market is very quiet. Spot is worth \$2.05 per 100 lbs., July shipment, \$2.02 1/2, August, \$1.95, and futures, \$1.92 1/2. Imports into the United States in the 5 months ending May 31, were 69,243 tons, as against 74,757 tons in the same period last year; showing a decrease of 5,514 tons in 1902.

In the European consuming markets stocks are large, and are accumulating, owing to the quiet business at this season. Shipments from Chile to Europe in June are cabled as about 50,000 tons, and loading July 1, as 32,300 tons. A year ago the shipments in June were 46,709 tons, and loadings on July 1, 53,517 tons. Low ocean freight rates favor large shipments this year, although high prices limit the consumption of nitrate soda.

In Chile the market is exceptionally quiet, as the European buying season is done, and holders ask more than purchasers care to pay.

Phosphates.—Quiet. In mining districts some inconvenience has been caused by the scarcity of labor. Florida is producing an increased quantity of phosphates, and also shows several large land transactions in the pebble district of Polk County.

The exports of all kinds of phosphate from the United States in the 5 months ending May 31, amounted to 283,303 tons, which compares with 294,845 tons in the same time last year; showing a decrease of 11,542 tons. Of the exports in 1902, there were 167,048 tons of high grade Florida rock, and 36,586 tons Tennessee rock, while the balance was Florida pebble and South Carolina rock.

The Swan Island phosphate beds located in the Caribbean Sea, are again to be worked by Boston,

Mass., parties, who obtained control of the property from the estate of the Pacific Guano Company.

We quote prices below:

Phosphates.	Per ton F. o. b.	C. I. f. Un. Kingdom or European Ports.	
		Unit.	Long ton.
*Fla. hard rock (78@80%)	\$6.50@7.00	6 1/4@8 1/4d.	\$9.75@10.53
*Fla. land peb. (68@73%)	3.00@3.25	4 1/2@5d.	6.65@ 7.00
*Fla. Peace Riv. (58@63%)	2.25@2.50	4 1/2@5d.	5.70@ 6.00
*Tenn., (78@80%) 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.	7.48@ 8.48
Algerian (58@63%).....		5 1/2@6d.	6.30@ 7.20
Algerian (53@58%).....		5 @5 1/4d.	5.50@ 5.78

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

METAL MARKET.

New York. July 3.

GOLD AND SILVER.

Gold and Silver Exports and Imports.
At all United States Ports in May and Year.

Metal	May.		Year.	
	1901.	1902.	1901.	1902.
Gold:				
Exports....	\$10,101,177	\$1,968,407	\$24,146,382	\$20,135,754
Imports....	1,772,334	1,841,044	12,067,226	9,204,551
Excess. E.	\$8,328,843	E. \$327,363	E. \$11,479,156	E. \$10,931,203
Silver:				
Exports....	\$4,398,376	\$3,782,305	\$23,865,097	\$19,284,558
Imports....	2,745,522	2,087,548	13,200,829	10,648,278
Excess. E.	\$1,652,854	E. \$1,694,757	E. \$10,664,268	E. \$8,736,280

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 July 3, and for years from January 1, 1902, 1901, and 1900:

Period.	Gold.		Silver.		Total Excess Exports or Imports.
	Exports.	Imports.	Exports.	Imports.	
Week ...	\$8,045	\$10,984	\$136,885	\$5,568	E. \$128,378
1902.....	16,509,807	1,228,216	18,804,555	670,575	E. 28,411,571
1901.....	24,959,291	1,425,972	17,291,515	1,977,054	E. 38,877,780
1900.....	20,583,192	1,532,955	20,826,032	2,237,170	E. 37,639,039

Gold exports this week, were to the West Indies, while silver went chiefly to London. Imports were from Central and South America and the West Indies.

Financial Notes of the Week.

An unfavorable point in the news this week is the possible damage to the wheat and corn crops by excessive rains. This has not yet had any apparent effect on general business. Money is less easy, and interest rates are higher in New York. The approaching holidays have had a quieting influence on the speculative markets.

The statement of the New York banks, including the 63 banks represented in the Clearing House, for the week ending June 28, gives the following totals, comparison being made with the corresponding weeks of 1901 and 1900:

	1900.	1901.	1902.
Loans and discounts...	\$808,468,500	\$892,331,300	\$893,871,800
Deposits	888,249,300	971,382,000	955,829,400
Circulation	23,124,700	30,535,800	31,456,000
Specie	166,679,600	172,311,600	173,634,500
Legal tenders.....	72,242,100	79,018,100	78,301,200
Total reserve....	\$238,921,700	\$251,329,700	\$251,935,700
Legal requirements..	222,062,325	242,845,500	238,957,350
Balance surplus..	\$16,859,375	\$8,484,200	\$12,978,350

Changes for the week this year were increases of \$4,856,700 in loans and discounts, \$4,876,800 in deposits, \$205,900 in circulation, \$7,410,300 in specie and \$6,252,900 in legal tenders; a decrease of \$2,548,500 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:

	1901		1902.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ad....	\$172,311,600		\$173,634,500	
England ...	192,082,740		194,633,295	
France ...	492,812,000	\$224,115,280	514,040,190	\$225,094,895
Germany ...	159,900,000	67,245,000	202,095,000	74,795,000
Spain	70,015,000	85,145,000	70,765,000	95,895,000
Neth'l'ds ...	29,982,500	28,882,000	23,836,500	34,077,500
Belgium ...	15,045,000	7,525,000	16,220,000	8,110,000
Italy	75,605,000	9,776,000	8,077,500	10,505,500
Russia ...	356,385,000	37,880,000	369,230,000	44,390,000

The returns of the Associated Banks of New York

are of date June 28, and the others June 26, 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.

The silver market has been quiet and no new features have developed, although the market to-day seems to have revived under orders for local business in London.

The United States Assay Office in New York reports receipts of 33,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to June 19 are reported by Messrs. Pixley & Abell's circular as follows:

Table with columns for 1901, 1902, and Changes. Rows include India, China, The Straits, and Totals.

Arrivals for the week, this year, were £105,350 in bar silver from the United States, and £8,000 from the West Indies; total £113,350. Shipments were £23,500 in bar silver to the Straits, and £87,000 to India; total, £110,500.

Indian exchange is steady, and the Council bills offered in London were taken at an average of 15.9d. per rupee. The Indian Government reports show holdings of 1,247 lakhs of rupees in silver in the Currency Department. So large an amount indicates that it will not be obliged to buy silver for coinage for some time to come.

The coinage executed at the mints of the United States in the fiscal year ended June 30, is reported by the Bureau of the Mint, Treasury Department, as below:

Table showing coinage statistics by denomination (Double eagles, Eagles, Half eagles, Quarter eagles, etc.) with columns for 1902 and 1901.

Compared with last year the total coinage shows a falling off of \$41,814,104, or 44.2 per cent, principally in gold.

The foreign merchandise trade of France for the five months ending May 31 is valued by the Ministry of Commerce as below:

Table with columns for 1901 and 1902. Rows include Imports, Exports, and Excess, imports.

This shows an increase of 24,288,000 fr. in imports; an increase of 69,861,000 fr. in exports, and a resulting decrease of 45,573,000 fr. in the balance of imports.

Prices of Foreign Coins.

Table listing prices for various foreign coins like Mexican dollars, Peruvian soles, etc., with columns for Bid and Asked prices.

OTHER METALS.

Daily Prices of Metals in New York.

Table showing daily prices for Silver, Copper, and Spelter in New York, with columns for different grades and dates.

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 is quiet. Manufacturers are still plentifully supplied for their present requirements,

but there has been some inquiry for fall delivery. We quote Lake copper at 12@12 1/4c.; electrolytic, in cakes, wirebars and ingots at 11 1/2@12c.; in cathodes at 11 1/2@11 3/4c.; casting copper at 11 1/2c.

The London market, which closed on June 25 at £52 17s. 6d. for spot, £53 for three months, opened on June 30 at £52 10s. and £52 15s. respectively, and held at about these figures until Thursday, when spot advanced to £53 2s. 6d. and three months to £53 10s.

Statistics for the second half of June show an increase in the visible supplies of 400 tons. Refined and manufactured sorts we quote: English tough, £57 @ £57 10s.; best selected, £57 10s. @ £58 10s.; strong sheets, £68; India sheets, £67; yellow metal, 6 1/4d.

Exports of copper from New York and Baltimore in the week ending July 2 are reported by our special correspondents as follows: Great Britain, 88 tons; Germany, 335; Holland, 628; Italy, 70; Russia, 30; Belgium, 55; Denmark, 10; total, 1,216 tons. Imports were 447 tons copper and 125 tons ore from Great Britain, and 11 tons copper from Mexico.

Imports of copper in all forms into the United States for the five months ending May 31, and re-exports of foreign copper, are reported by the Bureau of Statistics of the Treasury Department as below, in long tons:

Table with columns for 1901, 1902, and Changes. Rows include Imports, Re-exports, and Balance.

The statement of the Bureau gives the exports of domestic copper as below for the five months, also in long tons:

Table with columns for 1901, 1902, and Changes. Rows include Copper ore and matte, and Fine copper.

Mr. John Stanton's statement, heretofore published, gives the total exports reduced to fine copper at 33,185 long tons in 1901, and 83,939 long tons in 1902; an increase of 45,754 tons this year.

Tin.—Consumption is very good, and the new arrivals are being shipped into the country as fast as they get here. Spot stocks are very small. We quote spot tin at 28 1/4c.; July delivery at 28c.; August, 27 3/4c. The foreign market, which closed on June 25, at £125 10s. for spot, £121 10s. for three months, opened on Monday at £124 5s. for spot, £121 15s. for three months. On Tuesday it went down £1, but on Wednesday reacted to £124 15s. for spot, £122 for three months, and on Thursday advanced to £126 5s. and £124 respectively.

Statistics for the month of June show a decrease in the visible supplies of 1,600 tons.

Visible stocks of tin on July 1 are reported as below, in long tons:

Table with columns for Store, Afloat, and Totals. Rows include London, Holland, U. S., and Totals.

This is a decrease of 1,121 tons as compared with July 1 of last year.

Shipments of tin from the Straits to Europe and America in June were 4,970 long tons; an increase of 640 tons over June, 1901.

The imports of tin into the United States for the five months ending May 31 are reported as follows, in long tons of 2,240 lbs.:

Table with columns for 1901, 1902, and Changes. Rows include Straits, Australia, Great Britain, Holland, and Other countries.

The total increase this year was 8.7 per cent. This gain was in shipments direct from the East, as there was a decrease in imports through Great Britain.

Lead remains unchanged. We quote St. Louis at 3.97 1/2@4.05c., New York 4.05@4.10c.

The closing quotations in the London market are cabled as £11 3s. 9d@£11 5s. for Spanish lead, 5s. higher for English lead.

Imports of lead in all forms into the United States, and re-exports of imported lead refined here in bond, for the five months ending May 31 are reported by the Bureau of Statistics of the Treasury Department as below, in short tons:

Table with columns for 1901, 1902, and Changes. Rows include Lead in ores and base bullion, Lead, metallic, and Balance.

Of the total imports this year 41,270 tons, or 88.2 per cent, were from Mexico, and 4,215 tons, or 8.9 per cent, from Canada. In addition to the re-exports given above, there were 1,860 tons of domestic lead

exported this year, against 2,318 tons in the corresponding period last year.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of June 14, as follows: The price for silver during the week has been 13 reales per ounce. Exchange on London is lower, 34.23 pesetas to £1. Local quotations for pig lead on wharf has been 62.25 reales per quintal, which on current exchange is equal to £10 3s. 3d. per ton of 2,240 lbs. Exports have included 67 metric tons pig lead, and 10 tons lead ore to Marseilles.

Spelter.—The market has experienced a further advance, and a large business has been done at about 4.95c. St. Louis, 5.10c. New York.

The foreign market is strong, good ordinaries being quoted at £18 12s. 6d., specials 2s. 6d. higher.

Exports of spelter, or metallic zinc, from the United States for the five months ending May 31, are reported at 1,768 short tons, against 2,084 tons in the corresponding period of 1901; a decrease of 316 tons, or 15 per cent. Exports of zinc ore were 19,453 tons, against 13,909 tons last year; an increase of 5,544 tons, or 39.6 per cent.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of June 14, that demand for zinc ores is strong, with a tendency to higher prices. Recent exports include 907,800 kilograms blende to Swansea, Wales.

Antimony is unchanged. We quote Cookson's at 9 1/4c.; Hallett's at 8 1/2c.; Hungarian, Italian, Japanese and U. S. Star at 8c.

Imports of antimony into the United States for the five months ending May 31 are reported as below, in pounds:

Table with columns for 1901, 1902, and Changes. Rows include Metal and regulus, and Antimony ore.

The increase in metal and regulus this year was 35.8 per cent; the decrease in ore being 22.4 per cent.

Nickel.—The price continues firm at 50@60c. per lb., according to size and terms of order.

Exports of nickel, nickel oxide and nickel matte from the United States for the five months ending May 31 were 1,244,503 lbs., against 2,504,686 lbs. for the corresponding period in 1901; a decrease of 1,260,183 lbs., or 50.3 per cent.

Platinum.—Consumption continues good. Ingot platinum in large lots brings \$19 per oz. in New York.

Chemical ware (crucible and dishes), best hammered metal from store in large quantities, is worth 76c. per gram.

Imports of platinum into the United States for the five months ending May 31 were 3,245 lbs., against 2,861 lbs. in the corresponding period of 1901; an increase of 384 lbs., or 13.4 per cent.

Quicksilver.—The New York price is \$48 per flask for large lots; a slightly higher figure is asked for small orders. San Francisco quotations are \$46 per flask for domestic orders, and \$43.50 for export. The London price is £8 15s. per flask, with the same figure quoted from second hands.

Exports of quicksilver from all United States ports for the five months ending May 31 were 309,100 lbs., against 399,455 lbs. in the corresponding period of 1901; a decrease of 90,355 lbs., or 22.6 per cent, this year.

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

Table listing prices for various metals and alloys like Aluminum, Ferro-Tungsten, Magnesium, etc., with columns for Per lb. and Per lb.

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

Our correspondents report that the current price of tungsten powder (best), 96 to 98 per cent, in Great Britain is 1s. 5d. delivered Sheffield, or f. o. b. Liverpool.

Average Prices of Metals per lb., New York.

Table showing average monthly prices for Tin, Lead, and Spelter in New York, with columns for 1901 and 1902.

Average Prices of Copper.

Table with columns: Month, New York (Electrolytic, Lake, London Standard), and prices for 1901 and 1902.

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper.

Average Prices of Silver, per ounce Troy.

Table with columns: Month, London, N.Y., and prices for 1901 and 1902.

The New York prices are per fine ounce; the London quotes ton per standard ounce, .925 fine.

DIVIDENDS.

Table with columns: Name of Company, Date, Per Share, Total, and Total to Date.

ASSESSMENTS.

Table with columns: Name of Company, Location No., Delinq., Sale, and Amt.

STOCK QUOTATIONS.

NEW YORK.

Table of stock quotations for New York, listing companies and prices from June 26 to July 2.

*Per cent.

Coal, Iron and Industrial Stocks.

Table of coal, iron, and industrial stock quotations for New York, listing companies and prices from June 26 to July 2.

Total sales, 323,078 shares. †Ex-dividend

BOSTON, MASS.*

Table of stock quotations for Boston, Mass., listing companies and prices from June 26 to July 2.

* Official Quotations Boston Stock Exchange. Holiday. Total sales, 53,160 shares. †Ex-dividend.

PHILADELPHIA, PA. §

Table of stock quotations for Philadelphia, Pa., listing companies and prices from June 26 to July 2.

§ Reported by Townsend, Whelen & Co., 308 Walnut St., Philadelphia, Pa. Total sales 21,130 shares. †Ex-privileges.

are of date June 28, and the others June 26, 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.

The silver market has been quiet and no new features have developed, although the market to-day seems to have revived under orders for local business in London.

The United States Assay Office in New York reports receipts of 33,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to June 19 are reported by Messrs. Pixley & Abell's circular as follows:

	1901.	1902.	Changes.
India	£3,807,710	£3,503,045	D. £304,665
China	339,125	39,970	D. 299,155
The Straits	79,976	70,550	D. 9,426
Totals	£4,226,811	£3,613,565	D. £613,246

Arrivals for the week, this year, were £105,350 in bar silver from the United States, and £8,000 from the West Indies; total £113,350. Shipments were £23,500 in bar silver to the Straits, and £87,000 to India; total, £110,500.

Indian exchange is steady, and the Council bills offered in London were taken at an average of 15.9d. per rupee. The Indian Government reports show holdings of 1,247 lakhs of rupees in silver in the Currency Department. So large an amount indicates that it will not be obliged to buy silver for coinage for some time to come.

The coinage executed at the mints of the United States in the fiscal year ended June 30, is reported by the Bureau of the Mint, Treasury Department, as below:

Denomination.	Pieces.	Value.	1901.	Value.
Double eagles.....	1,852,088	\$37,041,760.00		\$52,800,820.00
Eagles	1,473,643	14,736,430.00		31,300,880.00
Half eagles.....	1,978,133	9,890,665.00		14,863,115.00
Quarter eagles.....	124,687	311,717.50		100,900.00
Total gold.....	5,428,551	\$61,580,572.50		99,065,715.00
Dollars	19,402,800	19,402,800.00		24,298,850.00
Half dollars.....	8,831,118	4,415,559.00		4,641,425.00
Quarter dollars.....	15,334,370	3,833,594.75		3,674,378.50
Dimes	24,644,157	2,464,415.70		2,650,845.00
Total silver.....	68,212,454	\$30,116,369.45		35,265,498.50
Total minor.....	117,778,501	\$2,429,736.17		\$2,009,568.08
Total coinage.....	191,419,506	\$94,526,678.12		\$136,340,781.58

Compared with last year the total coinage shows a falling off of \$41,814,104, or 44.2 per cent, principally in gold.

The foreign merchandise trade of France for the five months ending May 31 is valued by the Ministry of Commerce as below:

	1901.	1902.
Imports	Fr. 1,874,667,000	Fr. 1,898,955,000
Exports	1,680,051,000	1,749,912,000
Excess, imports.....	194,616,000	149,043,000

This shows an increase of 24,288,000 fr. in imports; an increase of 69,861,000 fr. in exports, and a resulting decrease of 45,573,000 fr. in the balance of imports.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	\$0.425	\$0.44
Peruvian soles and Chilean pesos.....	.385	.42
Victoria sovereigns.....	4.86	4.88
Twenty francs.....	3.86	3.88
Twenty marks.....	4.77	4.85
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

June-July	Silver		Copper		Spelter	
	Sterling Exchange	N. Y. Cbs.	Lake	Electrolytic	Lead	N. Y.
27	4.87 1/2	52 3/4	117 1/2	117 1/2	4.05	5.00
28	4.87 3/4	52 3/4	117 1/2	117 1/2	4.05	5.00
30	4.87 3/4	52 3/4	117 1/2	117 1/2	4.05	5.05
1	4.87 3/4	52 3/4	117 1/2	117 1/2	4.05	5.05
2	4.87 3/4	52 3/4	117 1/2	117 1/2	4.05	5.10
3	4.87 3/4	52 3/4	117 1/2	117 1/2	4.05	5.10

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 is quiet. Manufacturers are still plentifully supplied for their present requirements,

but there has been some inquiry for fall delivery. We quote Lake copper at 12@12 1/2c.; electrolytic, in cakes, wirebars and ingots at 11 1/2@12c.; in cathodes at 11 1/2@11 3/4c.; casting copper at 11 1/2c.

The London market, which closed on June 25 at £52 17s. 6d. for spot, £53 for three months, opened on June 30 at £52 10s. and £52 15s. respectively, and held at about these figures until Thursday, when spot advanced to £53 2s. 6d. and three months to £53 10s.

Statistics for the second half of June show an increase in the visible supplies of 400 tons. Refined and manufactured sorts we quote: English tough, £57 @ £57 10s.; best selected, £57 10s. @ £58 10s.; strong sheets, £68; India sheets, £67; yellow metal, 6 1/4d.

Exports of copper from New York and Baltimore in the week ending July 2 are reported by our special correspondents as follows: Great Britain, 88 tons; Germany, 335; Holland, 628; Italy, 70; Russia, 30; Belgium, 55; Denmark, 10; total, 1,216 tons. Imports were 447 tons copper and 125 tons ore from Great Britain, and 11 tons copper from Mexico.

Imports of copper in all forms into the United States for the five months ending May 31, and re-exports of foreign copper, are reported by the Bureau of Statistics of the Treasury Department as below, in long tons:

	1901.	1902.	Changes.
Imports			
Copper ore and matte.....	23,900	23,279	D. 621
Fine copper.....	12,183	11,936	D. 247
Re-exports:			
Copper ore and matte.....	5,378	6,712	I. 1,334
Fine copper.....	3,492	2,255	D. 1,237
Balance:			
Copper ore and matte.....	18,522	16,567	D. 1,955
Fine copper.....	8,691	9,681	I. 990

The statement of the Bureau gives the exports of domestic copper as below for the five months, also in long tons:

	1901.	1902.	Changes.
Copper ore.....	3,578	10,693	I. 7,115
Fine copper.....	39,682	77,436	I. 37,754

Mr. John Stanton's statement, heretofore published, gives the total exports reduced to fine copper at 33,185 long tons in 1901, and 83,939 long tons in 1902; an increase of 45,754 tons this year.

Tin.—Consumption is very good, and the new arrivals are being shipped into the country as fast as they get here. Spot stocks are very small. We quote spot tin at 28 1/2c.; July delivery at 28c.; August, 27 3/4c. The foreign market, which closed on June 25, at £125 10s. for spot, £121 10s. for three months, opened on Monday at £124 5s. for spot, £121 15s. for three months. On Tuesday it went down £1, but on Wednesday reacted to £124 15s. for spot, £122 for three months, and on Thursday advanced to £126 5s. and £124 respectively.

Statistics for the month of June show a decrease in the visible supplies of 1,600 tons.

Visible stocks of tin on July 1 are reported as below, in long tons:

	Store.	Afloat.	Totals.
London	3,659	3,752	7,411
Holland	1,400	392	1,792
U. S., exc. Pacific ports.....	3,306	3,388	6,694
Totals	8,365	7,532	15,897

This is a decrease of 1,121 tons as compared with July 1 of last year.

Shipments of tin from the Straits to Europe and America in June were 4,970 long tons; an increase of 640 tons over June, 1901.

The imports of tin into the United States for the five months ending May 31 are reported as follows, in long tons of 2,240 lbs.:

	1901.	1902.	Changes.
Straits	7,835	9,515	I. 1,680
Australia	232	135	D. 97
Great Britain.....	6,269	5,797	D. 472
Holland	502	596	I. 94
Other countries.....	55	143	I. 88
Totals	14,893	16,186	I. 1,293

The total increase this year was 8.7 per cent. This gain was in shipments direct from the East, as there was a decrease in imports through Great Britain.

Lead remains unchanged. We quote St. Louis at 3.97 1/2@4.05c., New York 4.05@4.10c.

The closing quotations in the London market are cabled as £11 3s. 9d@£11 5s. for Spanish lead, 5s. higher for English lead.

Imports of lead in all forms into the United States, and re-exports of imported lead refined here in bond, for the five months ending May 31 are reported by the Bureau of Statistics of the Treasury Department as below, in short tons:

	1901.	1902.	Changes.
Lead in ores and base bullion.....	56,587	45,163	D. 11,424
Lead, metallic.....	105	2,134	I. 2,029
Total imports.....	56,692	47,297	D. 9,395
Re-exports	45,595	38,138	D. 7,457
Balance	11,097	9,159	D. 1,938

Of the total imports this year 41,270 tons, or 88.2 per cent, were from Mexico, and 4,215 tons, or 8.9 per cent, from Canada. In addition to the re-exports given above, there were 1,860 tons of domestic lead

exported this year, against 2,318 tons in the corresponding period last year.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of June 14, as follows: The price for silver during the week has been 13 reales per ounce. Exchange on London is lower, 34.23 pesetas to £1. Local quotations for pig lead on wharf has been 62.25 reales per quintal, which on current exchange is equal to £10 3s. 3d. per ton of 2,240 lbs. Exports have included 67 metric tons pig lead, and 10 tons lead ore to Marseilles.

Spelter.—The market has experienced a further advance, and a large business has been done at about 4.95c. St. Louis, 5.10c. New York.

The foreign market is strong, good ordinaries being quoted at £18 12s. 6d., specials 2s. 6d. higher.

Exports of spelter, or metallic zinc, from the United States for the five months ending May 31, are reported at 1,768 short tons, against 2,084 tons in the corresponding period of 1901; a decrease of 316 tons, or 15 per cent. Exports of zinc ore were 19,453 tons, against 13,909 tons last year; an increase of 5,544 tons, or 39.6 per cent.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of June 14, that demand for zinc ores is strong, with a tendency to higher prices. Recent exports include 907,800 kilograms blende to Swansea, Wales.

Antimony is unchanged. We quote Cookson's at 9 3/4c.; Hallett's at 8 1/4c.; Hungarian, Italian, Japanese and U. S. Star at 8c.

Imports of antimony into the United States for the five months ending May 31 are reported as below, in pounds:

	1901.	1902.	Changes.
Metal and regulus.....	1,514,779	2,057,047	I. 542,268
Antimony ore.....	288,903	224,135	D. 64,768

The increase in metal and regulus this year was 35.8 per cent; the decrease in ore being 22.4 per cent.

Nickel.—The price continues firm at 50@60c. per lb., according to size and terms of order.

Exports of nickel, nickel oxide and nickel matte from the United States for the five months ending May 31 were 1,244,503 lbs., against 2,504,686 lbs. for the corresponding period in 1901; a decrease of 1,260,183 lbs., or 50.3 per cent.

Platinum.—Consumption continues good. Ingot platinum in large lots brings \$19 per oz. in New York.

Chemical ware (crucible and dishes), best hammered metal from store in large quantities, is worth 76c. per gram.

Imports of platinum into the United States for the five months ending May 31 were 3,245 lbs., against 2,861 lbs. in the corresponding period of 1901; an increase of 384 lbs., or 13.4 per cent.

Quicksilver.—The New York price is \$48 per flask for large lots; a slightly higher figure is asked for small orders. San Francisco quotations are \$46 per flask for domestic orders, and \$43.50 for export. The London price is £8 15s. per flask, with the same figure quoted from second hands.

Exports of quicksilver from all United States ports for the five months ending May 31 were 309,100 lbs., against 399,455 lbs. in the corresponding period of 1901; a decrease of 90,355 lbs., or 22.6 per cent, this year.

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

	Per lb.	Per lb.
Aluminum.....	33@37c.	26c.
No. 1, 99% ingots.....	31@34c.	Magnesium.....\$2.75
No. 2, 90% ingots.....	4c up	Manganese, pure (N.Y.)...60c.
Rolled sheets.....	20@23c.	Mangan'e Cop. (20% Mn) 32c.
Alum-bronze.....	33@39c.	Mangan'e Cop. (30% Mn) 38c.
Nickel-alum.....	1.50	Molybdenum (Best).....\$1.82
Bismuth.....	80c.	Phosphorus.....50c.
Chromium, pure (N.Y.).....	50c.	American.....70c.
Copper, red oxide.....	1.25	Sodium metal.....50c.
Ferro-Molyb'dum (50%).....	90c.	Tungsten (Best).....62c.
Ferro-Titanium (10%).....	55c.	
Ferro-Titanium (20@25% N. Y.).....	55c.	

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

Our correspondents report that the current price of tungsten powder (best), 96 to 98 per cent, in Great Britain is 1s. 5d. delivered Sheffield, or f. o. b. Liverpool.

Average Prices of Metals per lb., New York.

Month.	Tin.	Lead.	Spelter.
	1902.	1901.	1902.
January	23.54	26.51	4.00
February	24.07	26.68	4.075
March	26.32	26.08	4.075
April	27.77	25.98	4.075
May	29.85	27.12	4.075
June	29.36	28.60	4.075
July	27.85	27.85	4.350
August	26.78	26.78	4.350
September	25.31	25.31	4.350
October	26.62	26.62	4.350
November	26.67	26.67	4.350
December	24.36	24.36	4.153
Year	26.54	26.54	4.334

Average Prices of Copper.

Table with columns: Month, New York (Electrolytic, 1901, 1902), Lake (1901, 1902), London Standard (1901, 1902). Rows: January to December, Year.

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: Month, London (1901, 1902), N. Y. (1901, 1902). Rows: January to December, Year.

The New York prices are per fine ounce; the London quotes in per standard ounce, .925 fine.

DIVIDENDS.

Table with columns: Name of Company, Date, Latest Dividend (Per Share, Total), Total to Date. Rows: American Cement, Am. S. & Ref., Bald Butte, Bunker Hill & Sull., Central Coal & Coke, etc.

ASSESSMENTS.

Table with columns: Name of Company, Location, No., Delinq., Sale, Amt. Rows: Addie, Andes, Annadale, Baker Divide, Best & Belcher, etc.

STOCK QUOTATIONS.

NEW YORK.

Table with columns: Company and Location, par val, June 26, 27, 28, 30, July 1, 2. Rows: Alice, Mont., Amalgamated c. Mont., Anaconda c. Mont., etc.

*Per cent.

Coal, Iron and Industrial Stocks.

Table with columns: Company and Location, par val, June 26, 27, 28, 30, July 1, 2. Rows: Am. Agr. Chem., U.S., Am. Agr. Chem. pf. U.S., Am. Sim. & Ref., U.S., etc.

BOSTON, MASS.*

Table with columns: Name of Company, par val, Shares listed, June 26, 27, 28, 30, July 1, 2. Rows: Adventure Con., Aetna, Allouez, Amalgamated, Am. Z. L. & Sm., etc.

* Official Quotations Boston Stock Exchange. Holiday. Total sales, 53,160 shares. †Ex-dividend.

PHILADELPHIA, PA. §

Table with columns: Name and Location of Company, par val, June 26, 27, 28, 30, July 1, 2. Rows: Am. Alkali, Mich., Am. Cement, Cambria Iron, Pa., etc.

§Reported by Townsend, Whelen & Co., 300 Walnut St., Philadelphia, Pa. Total sales 21,130 shares.

†Ex-privileges.

Total sales, 323,078 shares. †Ex-dividend

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.*

Table with columns: Name of Company, par val, June 23, June 24, June 25, June 26, June 27, June 28, Sales. Lists various mining companies like Acacia, Alamo, Am. Con., etc.

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 249,950 shares.

Colorado Springs (By Telegraph.)

Table with columns: Name of Company, par val, June 28, June 29, June 30, July 1, July 2. Lists companies like Acacia, Alamo, Anaconda, etc.

MEXICO.

June 21.

Table with columns: Name of Company, Shares, Last div'd, Prices (Bid, Ask), Name of Company, Shares, Last div'd, Prices (Bid, Ask). Lists companies like Durango, Ca. Min. de Penoles, etc.

ST. LOUIS, MO.* June 30.

Table with columns: Name, Shares, Par Val, Bid, Ask. Lists companies like Am.-Nettie, Colo., Catherine Lead, Mo., etc.

*From our Special Correspondent.

SPOKANE, WASH.* June 27.

Table with columns: Name of Company, Par Val, H, L, Sales. Lists companies like American Boy, Black Tail, Lone Pine-Surp. Con., etc.

Total sales 70,000 shares. *Reported by Hunner & Harris.

LONDON.

June 21.

Table with columns: Name and Country of Company, Authorized Capital, Par value, Last dividend (Amt, Date), Quotations (Buyers, Sellers). Lists companies like Anaconda, c. s., Montana, De Lamar, g. s., Idaho, etc.

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

PARIS.

June 12.

Table with columns: Name of Company, Country, Product, Capital Stock, Par value, Latest divs., Prices (Opening, Closing). Lists companies like Acieries de Creusot, Bata-Bank, etc.

SALT LAKE CITY.* June 28.

Table with columns: Name of Company, Shares, Par Val, High, Low, Sales. Lists companies like Ajax, Ben Butler, California, etc.

TORONTO, ONT. June 30.

Table with columns: Name of Company, par val, High, Low, Sales. Lists companies like Ontario, Olive, British Columbia, etc.

Total sales, 12,000 shares. †Ex-dividend.

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.

COAL, IRON AND INDUSTRIALS.

Table listing dividends for Gold, Silver, Copper, Lead, Quicksilver, and Zinc companies. Columns include Name and Location of Company, Authorized Capital Stock, Shares (Issued, Par Val), Dividends (Paid 1902, Total to Date, Latest Date), and Amt.

Table listing dividends for Coal, Iron, and Industrial companies. Columns include Name and Location of Company, Authorized Capital Stock, Shares (Issued, Par Val), Dividends (Paid 1902, Total to Date, Latest Date), and Amt.

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Table listing dividends for companies in Canada, Central and South America, and Mexico. Columns include Name and Location of Company, Authorized Capital Stock, Shares (Issued, Par Val), Dividends (Paid 1902, Total to Date, Latest Date), and Amt.

CHEMICALS, MINERALS, RARE EARTHS, ETC. CURRENT WHOLESALE PRICES.

Abrasives—		Barium—		Graphite—Am. f.o.b. Provi-		Paints and Colors—	
Cust. Meas.	Price.	Cust. Meas.	Price	Cust. Meas.	Price	Cust. Meas.	Price
Carborundum, f.o.b. Niagara Falls, Powd., F. FF. FFF. lb.	\$0.08	Oxide, Am. hyd. cryst. lb.	\$0.02 1/2	dence, E. 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.	.01 1/2 @ .01 1/2	Ocher, Am. common	9.25 @ 10.00
Chester, Mass.	.04 1/2 @ .05	Am. Crude, No. 1. sh. ton	9.00	Best pulverized	.01 1/2 @ .02	Best	21.25 @ 25.00
Barry's Bay, Ont.	.07 1/2 @ .09 1/2	Crude, No. 2.	8.00	Ceylon, common pulv.	.02 1/2 @ .03 1/2	Dutch, washed	lb. .04 1/2
Crushed Steel, f.o.b. Pittsburg	.05 1/2	Crude, No. 3.	7.75	Best pulverized	.04 @ .08	French, washed	.01 1/2 @ .01 1/2
Emery, Turkish flour, in kegs.	.03 1/2	German, gray	14.50	Italian, pulv.	.01 1/2	Orange mineral, Am.	.07 1/2 @ .08
Grains, in kegs.	.05 @ .05 1/2	Snow white	17.00	Gypsum—Ground. sh. ton	8.00 @ 8.50	Foreign, as to make	.08 1/2 @ .11 1/2
Naxos flour, in kegs.	.03 1/2	Bauxite—Ga. or Ala. mines:		Fertilizer	7.00	Paris green, pure, bulk.	.12
Grains, in kegs.	.05 @ .05 1/2	First grade. lg. ton	5.50	Rock	4.00	Red lead, American	.05 1/2 @ .08
Chester flour, in kegs.	.03 1/2	Second grade	4.75	English and French	14.00 @ 16.00	Foreign	.09 1/2 @ .08
Grains, in kegs.	.05 @ .05 1/2	Bismuth—Subnitrate. lb.	1.40	Infusorial Earth—Ground.		Turpentine, spirits	gal. .47 1/2
Peekskill, f.o.b. Easton, Pa., flour, in kegs.	.01 1/2	Subcarbonate	1.65	American, best	20.00	White lead, Am., dry	lb. .04 1/2 @ .04 1/2
Grains, in kegs.	.02 1/2	Bitumen—"B"	.08 1/2	French	37.50	American, in oil	.05 1/2 @ .05 1/2
Crude, ex-ship N. Y.: Ab bott (Turkey) lg. ton	26.50 @ 30.00	"A"	.05	German	40.00	Foreign, in oil	.07 1/2 @ .09 1/2
Kuluk (Turkey)	22.00 @ 24.00	Bone Ash	.02 1/2 @ .02 1/2	Iodine—Crude. 100 lbs	2.45	Zinc, white, Am., ex dry	.04 1/2 @ .04 1/2
Naxos (Greek) h. gr.	.26.00	Borax	.07 1/2 @ .07 1/2	Nitrate, com'l.	.40	American, red seal	.06 1/2
Garnet, as per quality	sh. ton 25.00 @ 35.00	Bromine	1.40	True	.04	Green seal	.07
Pumice Stone, Am. powd.	lb. .01 1/2 @ .02	Cadmium—Metallic	1.40	Oxide, pure copperas col.	.05 @ .10	Foreign, red seal, dry	.05 1/2 @ .08 1/2
Italian, powdered	.01 1/2	Sulphate	2.00 @ 2.50	Purple-brown	.02	Green seal, dry	.06 1/2 @ .08 1/2
Lump, per quality	.04 @ .40	Calcium—Acetate, gray.	1.30	Venetian red	.01 @ .01 1/2		
Rottenstone, ground.	02 1/2 @ .04 1/2	"brown"	.90	Scale	.01 @ .03	Potash—	
Lump, per quality	.06 @ .20	Carbide, ton lots f.o.b. Niagara Falls, N. Y. or Jersey City, N. J.	sh. ton 75.00	Kaolin—(See Clay, China.)		Caustic, ordinary	.04 1/2 @ .05
Rouge, per quality	.10 @ .30	Carbonate, ppt.	lb. .05	Kryolith—(See Cryolite.)		Elect. (90%)	.08 1/2
Steel Emery, f.o.b. Pittsburg.	.07	Chloride	sh. ton 9.00 @ 10.00	Acetate, white	.07 1/2 @ .08	Potassium—	
		Cement—		Brown	.06	Bicarbonate cryst.	.03 1/2
		Portland, Am., 400 lbs.	bb. 1.70 @ 1.90	Nitrate, com'l.	.06 1/2	Powdered or gran.	.08 1/2
		Foreign	1.65 @ 2.25	"gran.	.08 1/2	Bichromate, Am.	.08 1/2 @ .09 1/2
		"Rosendale," 300 lbs.	.75	Lime Com. abt. 250 lbs. bbl.	.50	Scotch	.06 1/2 @ .09
		Slag cement, imported	1.65	Finishing	.90	Carbonate	.02 1/2 @ .03 1/2
		Ceresine—		Magnesite—Greece.		Chromate	.35
		Orange and Yellow	lb. .12	Crude (95%)	lg. ton 6.50 @ 7.00	Cyanide (98 @ 99%)	.23
		White	.13 1/2	Calced	sh. ton 14.00 @ 15.00	Kalnit.	9.05
		Chalk—Lump, bulk. sh. ton	2.50	Bricks	M 170.00	Manure salt, 20%	100 lbs. .66
		Ppt. per quality	lb. .03 1/2 @ .06	Am. Bricks, f.o.b. Pittsburg.	175.00	Double Manure salt, 48 @ 53%	1.12
		Chlorine—Liquid.	.30	Magnesium—		Muriate, 80 @ 85%	1.83
		Water	.10	Carbonate, light, fine pd.	lb. .05	95%	1.86
		Chrome Ore—		Blocks	.07 @ .09	Permanganate	lb. .09 1/2 @ .10
		(50% ch.) ex-ship N. Y.	lg. ton 24.75	Chloride, com'l.	.01 1/2	Prussiate, yellow	.13 1/2 @ .14
		Sand, f.o.b. Baltimore	33.00	Fused	.20	Red	.36
		Bricks, f.o.b. Pittsburg	M 175.00	Nitrate	.60	Sulphate, 90%	100 lbs. 2.11
		Clay, China—Am. com., ex-dock, N. Y. lg. ton	8.00	Sulphate	100 lbs. .75 @ .95	96%	2.14
		Am. best, ex-dock, N. Y.	9.00	Manganese—Powdered,		Sylvinit.	unit 3.94
		English, common	12.00	70 @ 75% bioxide	lb. .01 1/2 @ .01 1/2	Quartz—(See Silica.)	
		Best grade	17.00	Crude, pow'd.		Salt—N. Y. com. fine	sh. ton 2.00
		Fire Clay, ordinary	sh. ton 4.25	75 @ 85% bioxide	.01 1/2 @ .02 1/2	N. Y. agricultural	1.50
		Best	6.00	85 @ 90% bioxide	.02 1/2 @ .03 1/2	Saltpetre—Crude. 100 lbs.	3.45 @ 3.50
		Slip Clay	5.00	90 @ 95% bioxide	.03 1/2 @ .05 1/2	Refined	4.25 @ 4.62 1/2
		Coal Tar Pitch	gal. .08	Carbonate	.16 @ .20	Silica—Best foreign. lg. ton	10.00 @ 11.00
		Cobalt—Carbonate. lb.	1.75	Chloride	.04	Ground quartz, ord.	sh. ton 6.00 @ 8.00
		Nitrate	1.50	Ore, 50% Foreign	unit .20 @ .21	Best	12.00 @ 13.00
		Oxide—Black	2.26 @ 2.30	Domestic	.30	Lump quartz	2.50 @ 4.00
		Gray	2.28 @ 2.40	Marble—Flour. sh. ton	6.00 @ 7.00	Glass sand	2.75
		Smalt, blue ordinary	.06	Mercury—Bichloride	lb. .77	Silver—Chloride. oz.	.65
		Best	.20	Mica—N. Y. gr'nd, coarse	.03 @ .04	Nitrate	.85
		Copperas. 100 lbs.	30 @ .35	Fine	.04 @ .05	Oxide	.85 @ 1.10
		Copper—Carbonate	lb. .18 @ .19	Sheets, N. C. 2x4 in.	.30	Sodium—	
		Chloride	.25	3x3 in.	.80	Bichromate	lb. .06 1/2
		Nitrate, crystals	.35	3x4 in.	1.50	Chlorate, com'l.	.07 1/2 @ .08 1/2
		Oxide, com'l.	.19	4x4 in.	2.00	Hyposulphite, Am.	100 lbs. 1.60 @ 1.65
		Cryolite	.06 1/2	6x6 in.	3.00	German	1.70 @ 1.90
		Blasting powder, A.	25 lb. keg 2.65	Mineral Wool—		Peroxide	lb. .45
		Blasting powder, B.	1.40	Slag, ordinary	sh. ton 19.00	Phosphate	.02 1/2
		"Rackarock," A.	lb. .25	Selected	25.00	Prussiate	.11 @ .11 1/2
		"Rackarock," B.	.18	Rock, ordinary	32.00	Silicate, conc.	.05
		Judson R. R. powder	.10	Selected	40.00	Com'l.	.01
		Dynamite (30% nitro-glycerine)	.13	Nickel—Oxide, No. 1. lb.		Sulphate, com'l.	100 lb. 75 @ 82 1/2
		(30% nitro-glycerine)	.14	No. 2.	.60	Sulphide	lb. .01 1/2
		(40% nitro-glycerine)	.15	Sulphate	.20 @ .21	Sulphite crystals	.02 1/2
		(50% nitro-glycerine)	.16 1/2	Oils—Black, reduced 29 gr.:		Sulphur—Roll. 100 lbs.	1.85
		(60% nitro-glycerine)	.18	25 @ 30, cold test.	gal. .09 1/2 @ .10 1/2	Flour	1.90
		(75% nitro-glycerine)	.21	15, cold test.	.10 1/2 @ .11 1/2	Flowers, sublimed	2.15
		Glycerine for nitro (32 2-10° Be.)	1.27 @ .13	Zero	.11 1/2 @ .12 1/2	Talc—N. C., 1st grade. sh. ton	13.75
		Feldspar—Ground. sh. ton	8.00 @ 9.00	Summer	.09 1/2 @ .09 1/2	N. Y., Fibrous, best	10.20
		Flint Pebbles—Danish, Best. lg. ton	14.75	Cylinder, dark steam ref.	.08 1/2 @ .10 1/2	French, best	1.25
		French, Best.	11.75	Dark, filtered	.11 1/2 @ .15 1/2	Italian, best	1.62 1/2
		Fluorspar—		Light filtered	.14 1/2 @ .17 1/2	Tar—Regular. bbl.	1.85
		Am. lump, 1st grade	sh. ton \$14.40	Extra cold test.	.21 1/2 @ .23 1/2	Oil barrels	4.20
		2d grade	13.90	Gasoline, 86° @ 90°	.14 @ .19	Tin—Crystals. lb.	1.64
		Gravel and crushed, 1st gr.	13.40	Naptha, crude, 68° @ 72°	bb. 9.05	Oxide	.45
		2d grade	12.40	"Stove"	gal. .12	Uranium—Oxide. sh. ton	2.25 @ 3.00
		Ground, 1st grade	17.90	Linseed, domestic raw	.65 @ .67	Zinc—Metallic, ch. pure	.07 @ .09 1/2
		2d grade	16.50	Boiled	.69	Carbonate, ppt.	.09
		Foreign, lump	8.00 @ 12.00	Calcutta, raw	.85	Chloride solution, com'l.	.02 1/2
		Ground	11.50 @ 14.00	Zeokarite. lb.	1.14	"granular.	.44 @ .04 1/2
		Fuller's Earth—Lump. 100 lbs.	.75	Paints and Colors—		Dust	.04 1/2 @ .04 1/2
		Powdered	.80	Chrome green, common	.05	Sulphate	.02 1/2 @ .02 1/2

THE RARE EARTHS.

Cust. Meas.	Price
Boron—Nitrate	lb. \$1.50
Calcium—Tungstate (Scheelite)	.80
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. 06 1/2 @ .07
Thorium—Nitrate 48 @ 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. See also Market Reviews.