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CONTENTS.

Editorial Notes.....	299
Removal.....	300
The Colusa-Parrott Purchase.....	300
Australian Gold Production.....	300
Mining Dividends in February.....	301
The Canadian Mining Institute.....	301
*Boundary District of British Columbia..... E. Jacobs.	302
*The Osceola, Nevada, Tungsten Deposits..... F. D. Smith.	304
Coal and Coke Shipments.....	305
Prospecting for Petroleum in Mexico.....	306
Mechanical Coal Cutters at a French Colliery.....	306
Gold Mines near Port Arthur, China.....	306
American Export Orders.....	306
*Electricity in Mining..... George H. Gibson.	307
Artificial Graphite..... Francis A. J. Fitzgerald.	310
The British Coal Export Tax.....	310
*The Anaconda Copper Company's New Reduction Works.....	311
*The Mining Revival at Tombstone.....	314
New York Exports.....	315
Recent Decisions.....	316
Abstracts of Official Reports.....	316
New Publications.....	317
Correspondence.....	318
Questions and Answers.....	320
*A New Precision Level.....	320
*The Wright Emergency Steam Trap.....	321
The Godbe Agitation Method of Leaching.....	321
Portable Electric Railroads.....	321
*Rotary Fine Crusher.....	322
Quick Speed Self-Hardening Steel.....	322
*Patents.....	322

DEPARTMENTS

Assessments.....	332
Chemicals, New York, Liverpool.....	334
Coins, Foreign.....	336
Dividends.....	332, 339
Financial Notes.....	335
Industrial Notes.....	324
Markets: Coal, United States and Foreign.....	332
Iron and Steel.....	333
Metals: Gold, Silver, Copper, Tin, Lead, Spelter, Antimony, Platinum, Quicksilver, etc.....	336
Minerals: New York, Liverpool.....	334
Mining News: United States and Foreign.....	325
Mining Stocks: United States and Foreign.....	331
Obituary.....	324
Personal.....	324
Prices Current of Chemicals, Minerals, etc.....	340
Schools, Technical.....	324
Societies.....	324
Stock Market Review: United States and Foreign.....	331
Stock Quotations.....	338
Trade Catalogues.....	325

THE DESTRUCTION of several assay offices in the Cripple Creek District, which is reported in our news columns, is an outrage, the motive for which does not seem to be at all clearly indicated by the accounts so far received. Whatever the real cause may be, the affair is very much to be regretted, as it shows the existence of a lawless spirit in the district which has been developing gradually for some time past. Such outrages cannot fail to injure the Cripple Creek and to affect values injuriously to a degree which cannot be overcome by the known richness and prosperity of the region. It is to be hoped that the perpetrators of the outrage will be apprehended and punished.

THE MEETING of the Canadian Institute of Mining Engineers at Montreal next week promises to bring together a number of representatives of the varied mining interests of Canada, drawn from all points of the Dominion. Some questions of much interest to mining engineers everywhere are to be submitted for discussion, and the long list of papers to be presented includes a great variety of subjects. Past meetings of the Institute have been very successful and have been the occasions of valuable contributions to mining literature; and we trust that the coming gathering will be fully equal in interest and importance to any of the previous ones—as it fairly promises to be.

THE DEVELOPMENT of electricity as a means for transmitting power in mines is one of the prominent features in modern practice. The improvement of electrical motors and their various applications to mining machinery constitute a new progress which every mining engineer must follow with much interest. In addition to many economies in mine operation which have resulted, the use of electricity has made it possible to utilize sources of power which have not hitherto been available. Water powers which have been too remote or too inaccessible to be used are now important factors in mine development, while the transmission of power from centrally located stations to distant points may permit important reductions in expenses. An article on another page describes some of the recent applications of electricity in mining, and will be read with interest.

A FEW months ago we referred to the resuscitation of the Smelting Company of Australia, which owns works at Dapto, New South Wales. The directors now state that although the properties have not yet been transferred to the new company, they have been going ahead with their negotiations for supplies of ore and for the reduction of railway rates, and so far have met with encouraging success. Two American metallurgists, Messrs. Palmer and Rogers, of the American Smelting and Refining Company's Works at Denver, have been appointed business manager and technical manager respectively at the works. Some influence has been also acquired by the election of Sir E. Wittenoom to the board of directors. It remains to be seen whether the many adverse circumstances mentioned by us previously can be overcome, but, at any rate, the management is evidently hustling and doing their best to make the scheme a success.

REPORTS FROM Dawson are to the effect that much excitement has been caused in the Yukon region by a grant made by the Dominion Government to the Treadgold Water and Mining Syndicate. This grant, as reported, covers all the placer claims on Hunker, Bear and Bonanza creeks in the Klondike, which have lapsed on account of the failure of the holders to comply with the mining laws. This would include a large area of both creek and bench claims, some of which are said to be still very rich. The syndicate which has obtained the grant purposes to work its grant on a large scale by the hydraulic method. It is reported to be in command of large capital, and is headed by A. N. C. Treadgold and Sir Thomas Tanced. From Ottawa it is stated that the terms of the grant include full safeguards for the rights of miners who own and are working individual claims in the region, and it is claimed that the opportunity given for the application of capital in a large way ought to benefit the district in many ways.

SILVER SHIPMENTS to the East in January showed a decline as compared with the corresponding month last year. The silver sent to China this year went from San Francisco, no shipments being reported from London. The total values are given in the table below, with the approximate quantities, calculated at the average price of the metal:

	1901.	1902.	Changes.
China, from San Francisco	\$275,712	\$480,854	I. \$205,142
China, from London.....	215,958	.....	D. 215,958
Total, China.....	\$491,670	\$480,854	D. \$10,816
India.....	3,970,713	3,201,491	D. 769,222
Total value.....	\$4,462,383	\$3,682,345	D. \$780,038
Total, ounces.....	7,103,443	6,627,700	D. 475,743

The decrease in values was 17.5 per cent, but in quantities only 6.7 per cent; showing the effect of the lower price of silver this year. The exports to China therefore showed an actual increase in quantity, though the value was lower. A larger demand in silver may be expected from that country, as business becomes more settled. To India the falling off was in quantity as well as value.

A DESPATCH from Toledo which found its way into some of the daily papers this week described a mysterious contrivance called a "trimounter," which develops power without the use of gas, oil, coal or other fuel. It is said that the invention "can only be described by an expert mechanic"—we should think he must be a very expert one—but its working is vouched for by "reliable citizens." This contrivance reminds us of a device, the merits of which were set forth two or three years ago in several Georgia papers by the inventor, a Mr. Telfair. He proposed to do away with all mining, milling and other clumsy contrivances for obtaining the metal from ores of various kinds. It was only necessary to put his machine in place and start it up; the result would be to electrolyze the whole deposit, the metallic contents being drawn into the machine and the earthy debris left neatly in its original place. Unfortunately Mr. Telfair—according to local accounts—died in jail pending a controversy over the ownership of a mule, before his machine could be tested on a large scale. If his process could only be carried out, with power furnished by the new "trimounter," it would matter little how low the price of copper may go, since the cost of procuring it would practically disappear. The grade of gold ores would be a matter of no importance when the machines were

once paid for. If the combination can only be made, the "Trimounter-Telfair Process" will have a boom which will beat all records.



REPORTS FROM the Boundary District of British Columbia indicate an improvement in the lead situation there. Conditions had been somewhat unsatisfactory owing to the rapid decline in London prices, but the market has begun to strengthen and by the action of the railways and smelters the cost of freight and treatment has been reduced \$4 per ton as compared with last year, and the general outlook for the district is much brighter. The same cannot be said in regard to copper. Better prices are hoped for, and are needed. The copper ores throughout the district, including Rossland, yield on an average about 1.3 per cent copper, and the decline in price of that metal meant at least \$1.50 per ton. The margin at best is small, and this decline was a serious blow. In Rossland the ores have a gold value of from \$8 to \$10, which materially helps matters. The Boundary ores carry less gold values, but this is partly offset by the fact that they are now cheaply mined and smelted.



REMOVAL.

Between March 1st and 15th, the offices of THE ENGINEERING AND MINING JOURNAL will be removed from the present quarters at 253 Broadway to the second floor of 261 Broadway, corner of Warren street. The new offices are one short block north of the old ones. By this change much larger and more convenient accommodations are secured. The new offices, which will face on both Broadway and Warren street, will have a total floor space of 3,000 square feet, more than 50 per cent larger than the present quarters. A special feature provided for in the arrangement of these new offices is a room set apart for the reception and accommodation of mining engineers, metallurgists and others, where desks, stationery and like facilities for correspondence, etc., will be provided. Mining men, engineers, geologists, and other readers and customers are invited to make the office of the ENGINEERING AND MINING JOURNAL their headquarters, and to have their mail addressed in its care. The books of reference in the JOURNAL's library are always at the service of visiting engineers, and any book relating to mining or the allied industries can be consulted at the visitor's leisure.

During the 37 years of its existence, THE ENGINEERING AND MINING JOURNAL has been quartered in the same vicinity. Its first offices were located in the old World Building in Park Row, now the site of the Potter Building. Its first move was to 27 Park place, corner of Church street, where it remained for 25 years. Seven years ago it moved to the then new Postal Telegraph Building at 253 Broadway, corner of Murray street. All of these offices have been in the immediate neighborhood of the City Hall Park. The new offices face the park and are within easy access of the business and financial centers.



MARKET CONDITIONS.

The iron market continues in full activity, the demand both for finished and raw materials being unabated. Bars, plates and structural steel are especially wanted. While prices are nominally little changed, some increases are reported in the way of premiums paid for deliveries at specified dates. This is especially the case in structural material, where builders who need the steel are forced to pay considerable advances to holders at second hand for

small lots. Orders continue to go abroad for pig iron and steel billets, some estimates being that 100,000 tons of German material have been taken during the week, though others consider this figure altogether too high. An extreme case of future business is reported in the shape of contracts for pig iron, with deliveries running into the first quarter of 1903.

The copper market continues in an unsatisfactory condition. Prices are weak, perhaps a shade lower, and there is no strong disposition shown to buy at the present decline. The market is dull and no tendency to improvement is shown here. Foreign conditions are somewhat better, the amount of business done being larger; but there is still hesitation as to buying far ahead.

In other metals conditions are very good. The demand for tin, lead and zinc is large and consumption continues heavy. In lead especially sales to consumers have been large.

The coal trade both in the East and the West is active, and business done, as for some weeks past, has been limited only by transportation facilities. These have been to some extent interfered with by stormy weather; and this has been the only hindrance to the trade.



THE COLUSA-PARROTT PURCHASE.

The reported purchase by the Amalgamated Copper Company of the Colusa-Parrott and adjoining claims overlying the dip of the Neversweat and Anaconda claims at Butte, Montana, marks the end of an important, bitter and expensive litigation, which was, perhaps, continued through several years by reason of the personal and political hostility between Mr. Clark and the late Marcus Daly. At all events, the settlement now reported did not appear to be practicable before Mr. Daly's death, and while he was still the ruling spirit in the affairs of the Anaconda, now practically absorbed into the Amalgamated Company. Another thing is indeed possible, namely, that so long as Mr. Clark, owning the Colusa-Parrott claims, could expect to capture, by reason of the prior date of those claims, the apex-rights of the Anaconda Company, he was not likely to desire a compromise when the law might give him everything involved in the contest. But the famous Colusa-Parrott case resulted in a decisive defeat for Mr. Clark; and, the death of Mr. Daly having removed an element of personal antagonism, an amicable settlement became possible.

The case above-mentioned was peculiar in several respects. It did not involve any new questions in the interpretation of the "fearfully and wonderfully made" United States mining law; but it did turn directly and more legitimately, I might fairly say, than most of the recent great mining law-suits upon expert testimony. The trial, held at Butte before Judge Knowles, of the Federal District Court, without a jury, was complicated by the admission, on both sides, of testimony concerning underground developments made during its progress in court—a practice which, I believe, has been declared inadmissible in the United States courts of other districts, where the parties are held to proof of the state of facts existing at the commencement of the hearing. There is something to be said on both sides of this question. In the present instance, the rule of the court operated first somewhat favorably, and afterward very unfavorably, to Mr. Clark's side. At all events, the decision was unqualifiedly against him.

But the leading feature in the conflict was, that the real prize contemplated and longed for by both parties was not mentioned in pleadings or testimony, and was not to be found under the surface of any location named in court. This prize was the extralateral right to the ground on the dip of the lode or lodes in question, beyond the surface-boundaries

of either party. By the purchase now announced, this valuable right has been, as I infer, acquired by the Amalgamated Company, at least so far as it could ever have been claimed under either the Anaconda, the Neversweat, the Micawber or the Colusa-Parrott locations. It is never safe to say that, under the United States law, unexpected and queer, yet dangerous hostile claims may not be raised to cloud mining titles and vex mining companies; but so far as I can now see, the horizon, at this particular spot, shows no threatening signs.

The rights thus acquired by the Amalgamated Company are likely to be immensely valuable.

R. W. RAYMOND.



AUSTRALIAN GOLD PRODUCTION.

The production of gold in Australasia—including the newly organized Commonwealth of Australia and the colony of New Zealand, which is still outside of the Union—showed some vicissitudes in 1901, but the total was greater than in 1900; and reached a very large amount. We find in the *Australian Mining Standard* a statement of the output of the year, which we give in the table below, adding an estimate for the production of South Australia, which is very small in comparison with that of the other colonies. The quantities given are in ounces of fine gold:

	1900.		1901.	
	Fine oz.	Value.	Fine oz.	Value.
West. Australia.....	1,414,273	\$29,233,033	1,700,980	\$35,159,257
Victoria.....	760,142	15,712,140	743,467	15,367,463
Queensland.....	662,036	13,684,284	576,920	11,924,936
N. S. Wales.....	281,207	5,812,539	216,874	4,482,785
Tasmania.....	73,578	1,520,867	52,627	1,087,800
S. Australia.....	25,713	531,498	25,000	516,750
Total Australia.....	3,216,949	\$66,494,361	3,315,868	\$68,538,991
New Zealand.....	337,337	6,972,749	412,189	8,519,947
Total.....	3,554,286	\$73,467,110	3,728,057	\$77,058,938

The changes for the year, as compared with 1900, are shown in the following table, in which the values are given:

		Changes.	
		Amount.	Per cent.
Western Australia.....	I.	\$5,926,224	20.3
Victoria.....	D.	344,677	2.2
Queensland.....	D.	1,759,348	12.9
New South Wales.....	D.	1,329,754	22.9
Tasmania.....	D.	433,067	28.5
South Australia.....	D.	14,748	2.8
Total Australia.....	I.	\$2,044,630	3.1
New Zealand.....	I.	1,547,198	22.2
Total.....	I.	\$3,591,828	4.9

Before commenting further on the tables, we have to congratulate our Australian contemporary on the care it has taken and the labor it has expended in reducing the returns made by the mines departments of the different States to the common standard of fine gold. Of course that is the only proper way in which to report results; but we know by long experience the reluctance of many mine officers and mine departments to give up the old plan, and the difficulty of establishing a standard for the reduction of the bullion of varying values so frequently reported as gold. The *Mining Standard* is doing excellent work in impressing on its Australian readers the necessity of correct reports. How far out of the way some of these reports have been is shown by the fact that the Queensland report for last year gave as gold 816,592 ounces of bullion, which averaged only .706 fine, the actual quantity of fine gold being only 576,920 ounces.

To return to our tables, we find that in the Commonwealth of Australia the entire gain reported was in Western Australia, all the other States showing decreases. The leading State showed a gain of 20.3 per cent last year, and its total was more than twice that of any other State. The opening of some new mines, a largely increased yield from some of the well known properties, and the partial success attained in treating the lower grade sulphide ores by various processes, all contributed to the large gain of the year.

Victoria last year took the second place, and shows a comparatively small decrease. As the returns from this State showed a considerable improvement during the closing months of 1901, it is believed that there is a better prospect for the current year. The large decrease in Queensland was the result of the pro-

longed drought and the scarcity of water, which seriously affected the working of some of the noted mines, like the Mount Morgan. The drought still continues, and its effects are apparent in the monthly returns so far received for 1902.

Gold production in New South Wales has long been a very variable quantity. The loss of 22.9 per cent last year is a large one, and was in great part due to the drought, as in the Queensland mines. A heavy falling off in placer mining was due in part to the short water supplies, and in part to the diversion of labor to the coal mines and other industries. The production of Tasmania and South Australia is comparatively small, and does not materially affect the general result.

New Zealand shows the large gain of 22.2 per cent, a part of which can be credited to the extensive dredging operations in the colony; more is the result, however, of the success in deep mining in the Hauraki and other districts, and to the better saving secured with some of the ores.

Upon the whole the showing made in 1901 was a very good one, especially when the drawbacks in some of the more important mining districts are considered. It is shown that Australasia is not losing its place as one of the great gold producers of the world; but on the contrary has opportunities for decided improvement in the future.

MINING DIVIDENDS IN FEBRUARY.

February disbursements were considerably heavier than those of the previous month, owing to the payment of \$8,927,933, or 1 3/4 per cent on the preferred stock, of the United States Steel Corporation. In all 34 companies in this county reported dividends of \$12,789,890, of which 25 metal mines yielded \$2,480,122, or 20 per cent, and 9 industrial corporations, identified with the mineral industry, \$10,309,768.

The copper properties lead the metal mines with \$1,038,356, which was paid by the Arizona Copper Company, controlled in Great Britain, and the Quincy, of Michigan. The latter company, owing to lower metal prices has reduced its semi-annual dividend from \$6 to \$4 per share, or \$200,000 on its issued capital. Twenty-five gold, silver and lead properties, principally in Utah and Colorado, paid \$741,766. The two largest payers in this group were the Quincy and Consolidated Mercur, of Utah, each distributing \$125,000, the former at the rate of \$1 per share monthly, and the latter 12 1/2 c. quarterly. Only one zinc concern—the New Jersey Zinc Company—paid a dividend of \$700,000, being a regularly quarterly of 3 per cent, and an extra of 4 per cent on \$10,000,000 capital. A good part of this company's revenue came from the sale of zinc oxide, the demand for which is growing both here and abroad.

In the industrial list, besides the United States Steel Corporation dividend noted above, two other steel corporations paid \$1,034,375, making the total \$9,962,308 to the credit of iron and steel. Four coal properties, headed by the Consolidation Coal Company, of Maryland, distributed a total of \$327,460. Two petroleum companies paid \$20,000.

Adding the February dividends of \$12,789,890 to those reported for January, of \$7,927,762, we have a total for the two months of \$20,717,652 distributed by 85 companies identified with the mining and metallurgical industry of the United States. The total amount would be much larger were it possible to include the heavy disbursements by private and close corporations that do not report.

Concerning the dividends paid during the past two months by foreign properties we learn that 10 Mexican mines and reduction works distributed \$166,334; one Central American Mine, \$30,000, two British Columbian, \$22,594, and one Nova Scotian, \$120,000, making a total of \$338,928 by 14 companies.

DEEP BORING IN THE TRANSVAAL.

The most interesting recent developments on the Witwatersrand have been in connection with the deep borings on the Turf Club grounds near Johannesburg. A recent issue of *South Africa* says: "In our issue of August 10 last year, we recorded the striking of the main reef series by a diamond drill at a depth of 4,825 feet, and gave many interesting details. In the second borehole to the west the main reef was subsequently encountered at a depth of 4,842 feet, thus confirming the conclusion based on the success in the first borehole, that the whole formation continues to a depth far beyond that calculated upon till the diamond drill ended the controversy. After striking the reef in this second borehole the work was continued to a depth of 5,083 feet, doubtless with the object of comparing the formation underlying the main reef series at this point with that cut into by the No. 1 borehole. The work, after proceeding for 10 months, has now been stopped, and it is interesting to note the rate of progress made. In this second borehole the drilling was carried out at the rate of 508 feet per month; in the first it averaged 470 feet, and in the Bezuidenville 406 feet. We illustrated our article last year with a photograph of the Sullivan drill used by the Chester Diamond Drilling Company at the first borehole. The success attendant on this borehole is likely to have a large effect on extending the gold-mining area of the Rand; for doubtless the possibility of getting the reef at such a distance from the outcrop will give a great stimulus to similar enterprises far away from the centre of the industry. Especially will this be the case to the eastward of the Rand, where prospectors are already very busy; and the good results achieved by such boreholes as have already been sunk have led to the eager acquisition for mining purposes of claims situated at long distance from the outcrop. Deep boring in all directions promises to be one of the most striking features of the revival of the Transvaal gold industry, and the results achieved will be keenly watched not only by those with a monetary interest in them, but by geologists with varying theories as to the nature, extent, and possibilities of the Rand formation."

THE CANADIAN MINING INSTITUTE.

The annual general meeting of the Canadian Mining Institute will be held in Montreal. The opening session will be on Wednesday, March 5, and the meeting will continue on March 6 and 7. The headquarters of the Institute will be at the Windsor Hotel. A large number of papers have been promised for this meeting, and much interesting material will be presented. The annual banquet will take place on the evening of March 7.

The subjects for special discussion at this meeting are as follows:

National Importance of Mining; discussion to be opened by J. E. Hardman, Montreal.

Compressed Air; discussion opened by W. L. Saunders, New York.

Power Drills; discussion opened by C. C. Henson, Montreal.

Mine Ventilation; discussion opened by Charles Fergie, Westville, N. S.

Mine Pumping; discussion opened by John P. Northey, Toronto.

Mine Haulage; discussion opened by William Blakemore, Montreal.

The list of papers to be presented at the meeting is as follows:

The Old and New Iron Industry Compared, by John Birkinbine, Philadelphia; On the Method of Extraction and Refilling at the Rio Tinto Copper Mines, by R. E. Palmer, Rio Tinto, Spain; A Method of Mining Low Grade Ore in Boundary Creek District, B. C., F. Keffer, Anaconda, B. C.; On the Characteristics of the Atlin Gold Fields, B. C., J. C. Gwillim, Nelson, B. C.; On the Hoisting and Hauling Plant at the Le Roi Mine, Bernard Macdonald, Rossland, B. C.; The Leaching of Cop-

per Ores by Sulphurous Acid at the Coconino Mill, Arizona, E. P. Jennings, Salt Lake City, Utah; Notes to Accompany Plan and Drawings of the Athabasca Mine, Todd Mountain, B. C., E. Nelson Fell, London, Eng.; Coarse Concentration in the Slocan District, B. C., S. S. Fowler, Nelson, B. C.; On the Harris Air Lift for Raising Water at the Deloro Mine, P. Kirkegaard, Deloro, Ont.; On Certain Fault Conditions in the Copper Mines at Butte, Wm. Braden, New York; Coal Mining in the North-West Territories and Its Probable Future, Frank B. Smith, Calgary, N. W. T.; On the Electro-metallurgy of Copper and Nickel as Applied to Canadian Ores and Mattes, Wm. Koehler, Cleveland, Ohio; Eastern Ontario: a Region of Varied Mining Industries, W. G. Miller, Kingston, Ont.; Notes on the Dry Ores of the Slocan District, B. C., R. C. Campbell-Johnston, Nelson, B. C.; On the Ores of the Boundary District, B. C., R. W. Brock, Ottawa; On the Origin and Distribution of Yukon Gold, R. G. McConnell, Ottawa; Notes on Gold Dredging, Dr. J. Bonsall Porter, Montreal; Notes on Gold Mining at Republic, Wash., Fritz Cirkel, Montreal; On the Analysis of Insolubles, Douglas Lay, Kimberley, B. C.; On the Hematite Ores at Kitchener, B. C., Wm. Blakemore, Montreal; On the Iron Ore Deposits of Western Ontario, F. Hille, Port Arthur, Ont.; Oil Furnaces for Milling and Assaying, Charles Brent, Rat Portage; Notes on the Limestone of the Phillipsburg Railway and Quarry Company, J. T. Donald, Montreal; On the Ventilation of Prospect Shafts and Tunnels, Alexander Sharp, Rossland, B. C.; A Review of the Canadian Iron Industry in 1901, Geo. E. Drummond, Montreal; Ancient Gold Mining in Spain, Theo. Briedenbach, Rat Portage; Canadian Chromite, Milton L. Hersey, Montreal; Gold Dredging on the North Thompson River, B. C., F. Satchell Clarke, Vancouver, B. C.; The Ores and Minerals of Hastings County and District, W. A. Hungerford, Deloro, Ont.; On the Economic Minerals of Vancouver Island, B. C., W. F. Best, Victoria, B. C.; Notes on Silver Lead Mining at Huanchaca de Bolivia, C. H. Macnutt, Pulacayo, Bolivia; Notes on Wire Rope, W. D. L. Hardie, Lethbridge, Alberta.

MINERAL IMPORTS AND EXPORTS OF SPAIN.—Imports of fuel into Spain for the 11 months ending November 30, included 1,955,641 tons of coal and 197,099 tons of coke. Imports of metals included 4,910 tons of pig iron, 6,398 tons of wrought iron and 22,607 tons of steel. Exports of minerals are reported by the *Revista Minera* as below, in metric tons:

	1900.	1901.	Changes.
Iron ore.....	6,637,613	7,823,270	D. 1,185,657
Copper ore.....	1,029,140	1,001,400	D. 27,740
Zinc ore.....	61,199	72,476	I. 11,277
Lead ore.....	5,170	1,874	D. 3,296
Salt.....	205,561	304,804	I. 99,243

Exports of metals were 33,876 tons pig iron, against 20,169 tons in 1900; 27,383 tons copper, against 20,083 in 1900; 2,391 tons spelter against 2,080 in 1900; 148,492 tons lead, against 153,954 tons in 1900.

MAGNETIC MOVEMENTS OF DIFFERENT STEELS.—The London *Engineer* says that the permanent magnetic movements of a number of specimens of steel made at the Resitza Iron Works of the Austro-Hungarian Railway have been experimented on by Herr A. Abt. The collection of steels comprises ten carbon steels, two manganese steels, six steels with a specially high percentage of manganese, six chromium steels, six tungsten steels, two nickel steels, and two nickel-chromium steels. The magnetic moment reaches a maximum with a magnetizing current of 20 amperes, but the maximum in the case of the strong manganese steels is already attained with 10 amperes. The latter also has the smallest permanent magnetic moment. The highest permanent magnetism is shown by the nickel-chromium steel. One brand of manganese steel containing much manganese shows no permanent magnetism at all.

BOUNDARY DISTRICT OF BRITISH COLUMBIA.

By E. JACOBS.

The mining industry made substantial progress in the Boundary District during the year 1901, as demonstrated by the large increase in the tonnage of ore mined and smelted in the district, which embraces both the Kettle River and Grand Forks mining divisions.

The two striking features of the year are the very large increase in the tonnage of ore produced, as compared with the production of the previous year, and the singularly, if not phenomenally, successful operation of the two district smelters. It should be mentioned, however, that ore shipping in 1900 was confined almost altogether to the latter half of the year, shipments to June 30 having aggregated only about 4,000 tons.

Ore Shipments.—The following table shows the tonnage of ore shipped by individual mines during both 1900 and 1901, the aggregate tonnage for the two years having been 484,575 tons:

	1900. Tons.	1901. Tons.
Old Ironsides and Knob Hill Group...	64,531	231,762
Mother Lode	5,564	99,548
B. C.	19,618	47,517
Golden Crown	2,241	.....
City of Paris	2,000	.....
Winnipeg	1,076	1,040
Snowshoe	297	1,731
Athelstan	1,200	550
Carmi .....	.....	885
King Solomon .....	.....	850
No. 7 .....	.....	665
R. Bell .....	.....	480
Sunset .....	.....	800
Jewel	160	325
Brooklyn	150	.....
Ruby .....	.....	85
Sundry small shipments.....	1,000	500
Total	97,837	386,738

It is unfortunate that outside of three large properties the district produced so little ore—less than 8,000 tons—from more than a dozen mines that it is customary to designate as "shippers." The prospects are, though, favorable for an early and distinct improvement in this respect. It may be mentioned here that no account is taken above of the well-known Cariboo gold mine, at Camp McKinney, which, though now in the Kettle River Mining Division, is usually regarded as a Boundary District mine.

In 1901, as in the previous year, by far the greater part of the work done was on a comparatively few properties—the Granby Company's Old Ironsides and Knob Hill group, the B. C. Copper Company's Mother Lode Mine, and the B. C. Chartered Company's B. C. Mine. It is, however, gratifying to find that the Dominion Copper Company's Brooklyn and Stemwinder group, the Snowshoe Gold and Copper Company's Snowshoe, the Montreal & Boston Copper Company's Sunset and Crown Silver, the Winnipeg, Jewel, Morrison No. 7, King Solomon, R. Bell, Carmi and Ruby have together contributed materially to the district's progress, whilst the Golden Crown has lately once again joined the ranks of the active workers.

Old Ironsides and Knob Hill Group.—As shown in the table of ore shipments above, these mines sent out nearly two-thirds of the total output of the district last year. They commenced shipping on July 11, 1900, and during rather less than 18 months, to January 1, 1892, shipped altogether 296,293 tons of ore. The footage of development work done during 1901 totalled 3,909 lineal feet, of which 817 feet were sinking and raising and 3,092 drifting and cross-cutting. These figures show the number of feet done in underground development work proper, and leave out of consideration the numerous large drifts and raises made in the immense bodies of ore preliminary to opening out the big stopes characteristic of these mines. Added to the development done to January 1, 1901, this footage makes the grand total 13,982 lineal feet, 2,463 feet being sinking and raising and 11,499 feet cross-cutting and drifting. A phase of mining which attracts attention in the Boundary is that of the Granby Company's Knob Hill Mine, namely, the system of ore quarrying in the enormous masses of ore occurring here, which makes practicable a large output at comparatively low cost.

These large surface quarries have been opened on the north side of the hill, and southwards from their starting point, a distance of about 900 feet in ore, which is known to extend about 3,000 feet in length on the company's ground. Similar work has been commenced from the south end on the southern slope of the hill, working northwards. Where stripped on the northern slope this ore body has a width of from 300 to 400 feet, but it has not yet been worked to more than about a third of that width. As now opened the deepest face is about 80 feet, but a big cut is being run into the hill from a lower level that will eventually give an open face of more than 200 feet in maximum depth. The Knob Hill main tunnel is 84 feet vertically below the floor of the largest quarry as now opened, and six large raises have been made at intervals of 100 feet from the tunnel to the quarry. These serve as chutes down which the ore is thrown and is thence trammed through the tunnel to the ore bins. As the raises are also in ore there is now a workable face of ore 164 feet in depth down to the tunnel level. Arrangements are in progress to run the railway cars into the quarries and load them by means of steam shovels. When this big body of ore is considered the statement that it will

was 99,548 tons of ore, and about 30,000 tons more were broken down and now await hoisting from the underground stopes. The mine employed throughout the year from 120 to 150 men in mining, and in making substantial improvements. The "pillar and stope" system having been adopted, much work was done in arranging the mine for permanent operation, accordingly, from 300 to 400 feet of raising was done in connection with opening up the stopes. A raise was also made from the 300-ft. to the 200-ft. level, and some 450 feet of cross-cutting and drifting was done on the former level. A large surface quarry, known as No. 1 quarry, was opened in ore well up the side of the Mother Lode Hill; a tunnel—No. 2 quarry—was driven 170 feet at a lower level and connection made between this and No. 1 by means of a raise, and still lower down workings, known as No. 3 quarry, were carried 200 feet into the hill and from them a raise made to No. 2, the vertical depth from No. 1 to No. 3 being 110 feet. In preparation for a materially increased output from the quarries, which last year contributed about 45,000 tons of the mine's total output, a large Farrel rock crusher, made by the Jenckes Machine Company—the largest crusher yet brought into the



MOTHER LODE MINE, BOUNDARY DISTRICT, B. C.

be practicable ere long to ship from 1,000 to 1,200 tons of ore a day from these quarries loses all appearance of exaggeration. A large output can be maintained as well from the underground workings of the Old Ironsides and adjoining Victoria, both of which mines have extensive reserves of ore blocked out and available whenever the company shall carry out its announced intention to increase the treatment capacity of its smelter to 2,000 tons a day. The sinking of a 5-compartment main working shaft, to serve all three of the company's developed mines, has been commenced and connection thus made with the Victoria 200-level, while other development work has been kept well ahead. In addition to the footage of work mentioned above some 2,700 feet of diamond drill holes have been put in and assurance has been received by the writer from an authoritative source that the drill proved the continuation of the ore down to a depth of at least 800 feet. During the year, among other additions to the plant, a timber-framing machine was put in—a single-ended framer, complete, with wedge sawing machine and having a swinging cut-off saw, framer and carriage, made by the Denver Engineering Works. Power is supplied by a 45-horse power Meyers cut-off engine, made by the Jenckes Machine Company. New buildings erected during the year were a 40 by 60 house for the framer and six more cottages for married employees. About 3,000 feet more of railway track were laid about the mines. The number of men on the pay-roll at the close of the year was 230.

Mother Lode.—The output of this mine during 1901

Boundary—is now being installed. Its stated capacity is to crush to a size not exceeding 5 to 6 inches, 800 tons of rock per day of 10 hours. The 35-drill improved cross compound condensing Corliss-valve Ingersoll-Sergeant air compressor, the 300-horse power double cylinder Corliss-valve first motion Jenckes hoisting engine, the Robins belt-conveying plant, the No. 5 Gates rock crusher with accompanying Nagle engine, the 250-light Westinghouse dynamo, and other plant ordered in 1900, were all completed and in running order early in 1901, and later a machine shop was equipped at the mine. Building improvements include a large general merchandise store, new blacksmith's shop, shaft houses, new ore bins, giving an additional ore storage capacity of 500 tons, and several more cottages for married employees. By next month this mine will have to be in shape for shipping from 700 to 800 tons of ore a day, the second furnace now nearly completed at the company's smelter requiring the production to be increased to at least that quantity unless the supply of custom ores considerably lessens the quantity this mine will have to furnish.

B. C. Mine.—The B. C. Chartered Company's B. C. Mine shipped 47,517 tons of ore during 1901, and some 3,000 tons remain in the mine bins, so its production for the year was about 50,500 tons. Adding 19,618 tons shipped in 1900, this mine's aggregate output may be placed at 70,000 tons. The past year's development work totalled 1,441 feet, in the following proportions: Deepening main shaft, 22 feet; upraising, 164 feet; drifting, 603 feet, and cross-cutting, 652 feet. Previous development to-

talled 4,435 lineal feet, so that 5,876 feet is the aggregate footage to the end of 1901. Last year a lot of diamond drilling was also done, both laterally and downwards, besides much surface trenching in prospecting for other ore bodies. No new machinery was put in but a bunk house, costing \$3,000, was erected.

Snowshoe.—The development work done on the Snowshoe during 1901 included 590 feet of sinking and raising and 1,542 feet of cross-cutting and drifting, a total of 2,132 feet. Work done prior to 1901 consisted of 650 feet of sinking and raising and 2,466 feet of cross-cutting and drifting, the total to end of 1901 being, therefore, about 5,250 feet. Considerable prospecting was also done with the diamond drill, besides which a large area of surface was stripped, exposing the ore ready for extraction by quarrying or mining at a low cost. Some of the ore taken out as development proceeded was sent to the smelter, generally as test shipments, to ascertain bulk values of ore taken from different parts of the mine. In this way 1,731 tons in all were shipped to the smelter. The first half of a Rand-Corliss 30-drill air compressor, to have a working pressure of 125 lbs., a combined machine to be driven by either steam or electricity, and two 80-horse-power horizontal return tubular boilers with a working pressure of 150 pounds have been ordered for this mine from the Jenckes Machine Company. The air end of the compressor is to be fitted with Corliss valves, similar to the machines at the Le Roi, Nickel Plate and Center Star mines at Rossland. The boilers will be the first of this high-pressure class brought into the Boundary. Building improvements made during the year were the erection of a two-story bunk house, boarding house, mine offices, residence cottages for superintendent and foreman, respectively; ore bins, powder house and water tanks, and a railroad switch and siding were put in. The average number of men employed during the year was 35. Mr. J. W. Astley, C. E., of Rossland, previously visiting consulting engineer, has been appointed mine superintendent and now resides at the mine.

Sunset and Crown Silver.—Operations have been continuous at these mines throughout the year. Information supplied by the mines' office is that in the Sunset 193 feet of raising and 483 feet of cross-cutting and drifting and 402 feet of cross-cutting and drifting in the Crown Silver were done in 1901, this work bringing the total number of lineal feet done in development up to 4,516. A large body of ore was opened up near the surface, and 800 tons shipped to the smelter. Several cross-cuts from the underground levels ran into ore, and the mine is now reported to be equal to maintaining a considerable daily output of ore. An electric light plant was lately installed and a 100-horse-power Jenckes double cylinder double drum link motion hoisting engine is being substituted for the smaller hoist heretofore in use. Building improvements comprise a new bunk house, two-story boarding house, 30 by 50; ore bins, with a holding capacity of 2,000 tons, and a connecting covered elevated tramway from mouth of main shaft, railway spur, and other facilities and accommodations. There were 56 men on the payroll at the end of the year. These properties are owned by the Montreal & Boston Copper Company, organized last year with a nominal capital of \$3,000,000, and which American mining journals lately reported has been pushing sale of its stock in New York, Boston and Philadelphia. It is now negotiating for the purchase of a smelter.

Other Mines.—No official information is available as to progress made on the Dominion Copper Company's mines Brooklyn, Stewwinder, Idaho and Rawhide, but it is known that during the greater part of the year from 50 to 90 men were employed in development work chiefly on the Brooklyn, and that the first half of a 20-drill air compressor was brought in to that mine. A shaft was sunk on the Idaho and some cross-cutting done, while on the Rawhide a shaft was put down 184 feet and connection thereby made with a 600-ft. tunnel driven into the hill at a lower level, some good ore having been passed through by the shaft.

At the Winnipeg 1,100 feet of sinking and raising and 200 feet of drifting and cross-cutting were done last year, this work bringing the total footage up to 3,877 feet. The ore shipped was 1,040 tons, making with the output for 1900, 2,116 tons in all. A small hoisting engine was added to the plant and a new bunk house, assay office and gallows frame and ore bins at No. 2 shaft were erected. A large vein of concentrating ore was discovered first at the 300-ft. level, and later at the 200, and another ledge, work upon which had been discontinued, was again sunk on with the result that the ore widened from 12 inches to between 6 and 7 feet. Other developments were encouraging, and the mine is now in better shape than for several years.

On the Jewel a long tunnel was driven at the 230-ft. level, but this did not cut the ledge it was expected would be found here. A cross-cut, however, proved the continuance of the main Jewel ledge beyond where it had faulted. Late in the year a body of ore of generally higher grade than that occurring in quantity in other parts of the mine was encountered. The year's work included the sinking of another shaft 150 feet, in addition to considerable cross-cutting at the 230-ft. level. A small hoist and gallows frame were placed over this shaft. The total footage of development work done to date is about 3,000 feet. During 1901 the mine shipped 325 tons of gold-quartz ore to the district smelters, making its total output shipped 485 tons.

Recent figures are not available to show the work done on the Morrison, but in May last a mining engineer's published report gave cross-cutting and drifting at that time as 2,175 feet, and sinking and raising 375 feet, a total of 2,550 feet. Development work has been continuously in progress since that date, and the diamond drill has been in use at the 300-ft. level, it is stated, with the result that an ore body has been located at that depth. An 80-horse-power boiler was added to the plant during the year. The directors recently announced that this property had been sold on terms for \$185,000, only a small proportion of which has, however, been paid.

The No. 7 Mine is owned by a New York company, the No. 7 Mining Company. Prior to 1901 a shaft had been sunk 130 feet and drifts run on the vein at 60 and 120 feet depths, respectively. Substantial mine buildings had also been erected. Late in 1900 work was resumed after a rather long suspension. A power plant, consisting of a Class A Ingersoll-Sergeant straight-line air compressor rated at 5 drills, 6 one-man machine drills, air receiver, 100-horse-power boiler, 25-horse-power hoisting engine, and a Cameron sinking pump were ordered, and by the following spring were in operation. During last year the prospect shaft was enlarged to a two-compartment shaft and deepened to 230 feet, drifts were extended at both levels and a cross-cut was run at the 220-ft. level, cutting the vein at 40 feet from the shaft. Preparations are being made to drift on this lowest level, the sinking of the shaft being meanwhile continued. Total footage of underground work to the end of 1901 was 1,350 lineal feet. The quartz ore occurring here varies in width from 18 inches to 7 feet, and it is mineralized with gold, silver, lead and zinc. Several stopes have been started and in one of them a 3-ft. shoot of the highest grade ore yet found in the mine was recently encountered. The absence of snow during the last two months and previous copious rains and consequent bad roads prevented ore being hauled to the railway during three months, the output having been restricted to 665 tons, which quantity was treated at the British Columbia Copper Company's smelter. From 17 to 20 men have been employed since work was resumed. The question of putting in a concentrator near this mine is now under consideration.

The King Solomon during 1901 made its first shipments of ore and sent out in all about 850 tons of copper ore of a grade above the average of the district. Work was suspended here in the fall. The Ruby, under bond to Detroit people, sent to the smelter 85 tons of gold-copper ore as a test of bulk values, with results that led to two tunnels being

run into the hill to further prospect the ground. The work was planned by Mr. Wayne Choate, M. E., of Detroit, who paid two visits to the property during the year. This is the only property in the district in which Michigan men are known to be interested. A shaft was sunk 150 feet on the Lake claim, and one on the Blue Bell, both by Chicago companies.

The Athelstan sent out 550 tons of ore, making its aggregate to date 1,750 tons. But little development work was done, its total footage being but 445 feet, and nearly all of that was done in 1899-1900. On the R. Bell a lot of underground prospecting work was done last year, the total to date exceeding 1,000 feet in all. The ore was of excellent grade, but was not continuous nor in sufficient quantity to maintain a regular output. Some 480 tons were shipped to the Granby Smelter before operations were suspended in the fall. After more than a year's suspension, owing to financial difficulties, the Golden Crown resumed work in November. The company was reorganized under the name of the Golden Crown Mines, Limited, and the old Brandon & Golden Crown Mining Company was wound up. The new company left an assessable margin on its stock and the assessments having been freely met it discharged old liabilities and started with working funds. Little was done by the end of the year beyond pumping out and clearing up the workings for vigorous operations this year. Its total footage of work at time work when suspended was 2,443 feet, 461 feet being sinking and raising, and 1,982 feet drifting and cross-cutting. During 1900 this mine shipped 2,241 tons of ore of good grade, but had to pay freight and treatment rates that were much higher than are now obtainable. The adjoining Winnipeg Mine suffered financially from the same cause in 1900.

The Carmi, situated up the west fork of Kettle River, more than 50 miles from a railway station, is the pioneer shipper of a promising section of the Boundary, that is heavily handicapped by lack of transportation facilities. There are reserved claims in that neighborhood upon which ore carrying high silver values and some gold occurs in quantity. Last year a small upright boiler, a 60-horse-power horizontal boiler, a 6 by 8 link-motion hoist, a sinking pump and a machine drill were taken in to the Carmi under many difficulties. Two shafts were sunk on this claim, the deeper 200 feet, and 220 feet of drifting and cross-cutting were done. The ore taken out in development, some 885 tons, was hauled out on sleighs, and notwithstanding the high cost of freighting yielded a fair profit. The Rambler, in the same vicinity, has been waiting for months for sufficient snow to send out two or three car-loads of high-grade ore for a quantitative test, and the Butcher Boy is also ready to make a trial shipment. A 12-horse-power sectional boiler and a 5 by 5 hoist for the Washington and Idaho claims were months on the way before reaching their destination. The only underground work done on this group is a 100-ft. shaft. The Butcher Boy shaft is down nearly 100 feet, and a drift has been run in ore, of which there are two or three car-loads waiting for shipment to the smelter. A horse whim was lately taken into this claim. Other promising claims are the Sally, upon which about 250 feet of tunneling has been run, the Bell and the Bounty. The completion of a good wagon road will give this section an opportunity to demonstrate its mineral value. A charter for a railroad has been granted, but only preliminary surveys have as yet been made.

The North Fork of Kettle River, above Grand Forks, did not make any progress worth mentioning last year. In 1900 the Humming Bird shipped several hundred tons of high-grade ore to the Granby Smelter, and the Golden Eagle sent 120 tons. The Little Bertha and Strawberry each sent out a test car-load. Other well-known claims are the Volcanic, Pathfinder and Seattle. There is a plant, consisting of a 50-horse-power boiler, 6 by 8 hoisting engine, pumps, etc., on the Pathfinder, on which property two shafts, one 135 feet and the other 125 feet, have been sunk, and some 700 feet of cross-cutting and

drifting have been done. There is as well a small power plant on the Golden Eagle.

Up the East Fork of the North Fork there is a promising section known as Franklin camp, which for size of ore bodies, so far as shown by the limited amount of work done and specimen assay values, compares favorably with what was known of the older Boundary camps at a similar early stage. This section, too, is kept back by lack of transportation facilities, but wagon road communication will shortly be extended to it. A deal of newspaper booming was done last year in connection with the reported discovery of coal up the West Fork of the North Fork, but up-to-date results have not shown the sensational statements then made to have been warranted.

A small local company was organized last spring to work Rock Creek, which in the early '60's attracted many placer miners by what is known as the "booming" system of placer mining, but the season closed without success having been attained. Another effort is to be made next season to get down to bed rock by this method.

General Remarks.—The experience of the past year seems to have emphasized very sharply the necessity for working both mines and smelters on a large scale, particularly since the price of copper is so much lower than it was some time since. Among several suggested consolidations was that of the British Columbia Copper Company's Mother Lode the Dominion Copper Company's Brooklyn and Stemwinder group, and the Snowshoe, and for a while it seemed possible that this might be brought about. The great fall in the price of copper interfered with the negotiations, which are now stated to be suspended for a while. There has been much published from time to time about the low grade of the general run of Boundary ores, but the compensations that exist are seldom mentioned. The chief off-sets to the admitted low grade of much of the ore are its occurrence in enormous masses, the consequent cheapness with which it can be mined and its remarkable self-fluxing properties which make it practicable to smelt it at much lower rates than are possible where ores are more or less refractory. As additional factors in building up a great mining and smelting industry in the Boundary, mining costs must be reduced to as low a figure as is possible and freight and fuel charges must also come down. Given these aids to turning the very extensive mineral resources of the district to profitable account, there will be established here an industry that will eventually attain to proportions that will contribute materially to the commercial and industrial prosperity of a large section of the Province of British Columbia.

AMERICAN SULPHATE OF COPPER FOR GREECE.

CONSULAR REPORT.

In confirming his recent telegram to the Department announcing that a United States firm had been awarded the contract to supply 500 tons of sulphate of copper to the Currant Bank of Greece, Consul Jackson, of Patras, January 6, 1902, says that in all seven bids were received, representing American, English, German and Belgian firms. The bid of the successful American company—\$45,015 for the 500 tons c. i. f. Patras—was \$5.84 per ton lower than the nearest competitor. When the results of the bids were made public the following day, negotiations for 300 additional tons were begun by private firms, and, in the opinion of the consul, the United States will capture this year a large percentage of the Greek market for this product—a market worth, at a low estimate, \$450,000.

The consul adds that the success of the American offer was wholly unexpected by the European companies, several of which were of the belief that their prices had been cut so close as to render competition improbable. In fact, the American product was not considered at all, on account of the exacting conditions governing the contract and the high trans-Atlantic freight rates.

THE OSCEOLA, NEVADA, TUNGSTEN DEPOSITS.

By FRED D. SMITH.

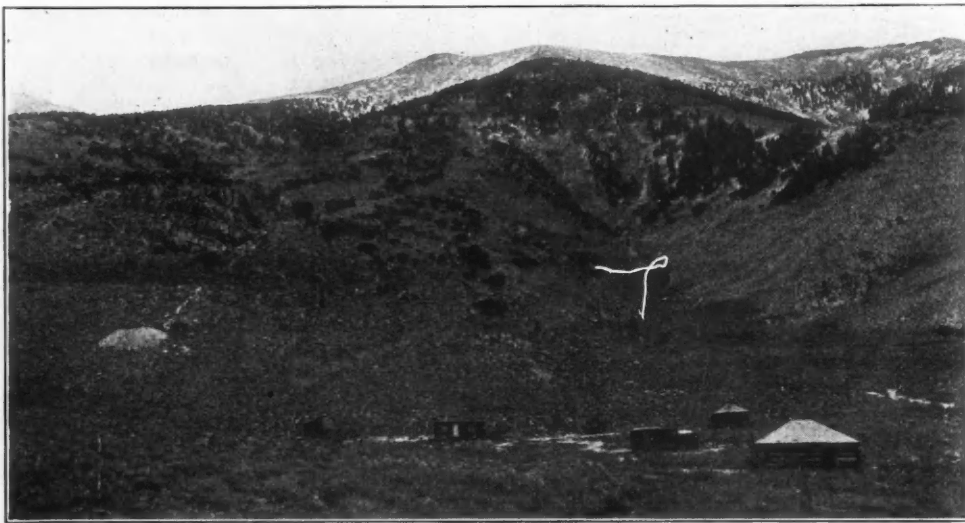
This occurrence has been noted by Mr. F. B. Weeks, of the United States Geological Survey, who visited the locality in the autumn of 1900. His notes on the "Occurrence of Tungsten Ore in Eastern Nevada," which were published in the twenty-first *Annual Report* of the Survey, were reproduced in the *ENGINEERING AND MINING JOURNAL* in the issue of July 6, 1901.

During December, 1901, the writer made a careful examination of this deposit and was greatly impressed by the quantity of this ore on the claims comprising the present group. It is his belief that the occurrence is worthy of a more detailed description. Compared with other visible supplies of tungsten ore in the world, these mines are of a most extraordinary economic importance, as they are capable, apparently, of producing more tungsten mineral than any other mine known, and perhaps than all other mines combined.

History.—The very prominent outcrops of the veins of white quartz in the brownish gray granite were noticed by the earliest prospectors, and the

Geology.—The veins are in the foot hills and lowest slope of the Snake Mountains. (See Fig. 1.) For a distance of several thousand feet up the side of the mountain and for an elevation of about 1,500 feet the formation is granite, which is overlain by Cambrian quartzite. The latter rock forms the main ridge of the mountains to the top of Mount Wheeler or of Davis Peak, which is directly above the deposits in question. The veins, of which there are five prominent ones, all occur in the granite and plainly cut across the bedding of the granite, which is very indistinctly marked. They have been traced to the contact of the two rocks, though none has yet been found in the quartzite. The general strike of the veins is northeast-southwest and the dip to the northwest. Only one is developed, and as the directions are determined from the croppings only, there is necessarily much uncertainty regarding the parallel character, or whether some of the veins will ultimately run together.

In many cases the croppings are very prominent, for instance, on the hübnerite, where the vein can be traced in one continuous line for a distance of 600 feet. Figure 2 shows the vein running from the



TUNGSTEN MINE, OSCEOLA, NEVADA.

black mineral therein examined. The writer is informed that as early as 1885 samples of this mineral were sent to the chemist of a prominent reduction works in California, who reported same to be "specular hematite," thus confirming the prevalent misconception of the mineral.

In 1889 more observing prospectors, refusing to accept the mineral as one of iron, sent samples to Denver for analysis, with the result of learning the true character of the same and of its value as a source of tungstic acid. It is probable that from this analysis the prevalent idea was obtained that the mineral is hübnerite and not wolframite. The writer has never made a complete analysis of it and is not aware of any such from an authoritative source.

Messrs. C. W. Gaby and W. Buntin located on the more prominent veins in 1899 and have since made several small shipments of hand clobbered ore which was taken from the outcroppings of the richest parts of the veins. In the summer of 1900 a small hand-made jig and canvas table were erected and operated by horse power. Later a gasoline engine was used for motive power, but the equipment was not adapted to the concentration of the mineral either from the economic or the metallurgical standpoint.

A shipment of about 10 tons of concentrates, which carried from 65 to 70 per cent WO_3 , was made in 1900. The owners then sold their claims to Mr. J. H. Marriott, of Osceola, Nev., who had previously located the surrounding claims which showed any veins of the mineral. The present owner drove a tunnel for a distance of 208 feet on one of the stronger veins, the workings of which can be seen in Fig. 2. The ore taken from this drift was left on the dump and shows plainly the character of the vein filling.

dump of the tunnel up the mountain side. Talus has covered the veins in many places, but they are discernible for a total distance of 1,800 feet, either as one vein or as parts of several, up the mountain side which has a general slope of about 18° .

The hübnerite vein, as shown in the tunnel, has a strike of $N. 70^\circ E.$ and a dip of $65^\circ N. W.$ The walls are well defined and part easily from the vein being separated on the foot by a layer of clay. The width varies from 18 to 36 inches and averages 26 inches throughout the whole length of the tunnel.

On the surface the vein shows greater width in places, and in some it has narrowed to 6 inches. Large boulders of quartz not properly in place, which from their proximity to the vein show their connection with it, are scattered along the slopes below the vein.

Character of the Ore.—The hübnerite occurs in the white quartz in various sized crystals, many of which are 3 inches long and plainly show the crystalline character. Massive specimens when broken show cleavage planes from 2 to 4 inches long and 1 to 3 inches wide. However, much of the mineral is in fine grains and in irregular bodies. The quartz is found entirely enclosing the hübnerite in some cases while the reverse is also true in that some specimens of apparently solid mineral will be found to enclose the quartz. This plainly shows that the two minerals were deposited simultaneously. In some cases a laminated appearance of the quartz is found with the hübnerite concentrated between the laminæ of quartz, giving a banded appearance to the mineral. This is more prominent where the vein pinches to a width of 6 to 12 inches.

The quartz is very solid with practically no evi-

dences of weathering such as shown by pores or a honeycomb character. No oxidation products as iron oxides, etc., are found. In some few instances a yellowish efflorescence suggesting tungstite, WO_3 , was observed though unidentified.

In one locality a considerable amount of scheelite was found mixed with the hübnerite. Its color varies from a waxy grayish white to a pale yellow and is often overlooked or mistaken for the quartz.

As far as studied, it appears that the mineralization of the vein has taken place across its whole width, though it often occurs in larger quantities on one wall than on the other. This concentration on the walls was found to change from one side of the vein to the other in short distances. It was also found that a concentration of the mineralization into so-called shoots had taken place. These shoots were from 15 to 25 feet in length and were separated by less mineralized portions of the vein of about the same length. At the same time some mineral was found in all of the vein.

These shoots are very prominent on the surface, as each shows an abundance of the hübnerite in massive form owing to the high contrast in the colors of the hübnerite and the gangue. At a depth of 80 feet at the face of the tunnel, it is reported that the mineral was found in as good a proportion as the surface indications would suggest.

Accessory Minerals.—As far as examined the ore is remarkably free from other minerals. Pyrite was found in a few places in small bunches, but the absence of iron stains would indicate a small content of pyrite. None was seen on the croppings. Fluorite in very small quantities was found on the dump from the tunnel workings, though to what extent it occurred in the vein could not be learned. These two minerals, besides the hübnerite, scheelite and quartz, were the only ones found, unless more careful examination discloses the presence of wolframite mixed with the hübnerite.

Practically all of the ore shipped has been either hand sorted and cobbled or concentrated by the crude methods outlined above. These ores carried an average of 68 per cent tungstic acid. One shipment of 2,000 pounds gave 600 pounds of 65 per cent concentrate. The ore was closely cobbled before shipment. Hand concentrated samples have assayed as high as 67½ per cent WO_3 .

From the ore as exposed in the croppings and in the tunnel workings it is the opinion of the writer that the whole vein matter, if carefully concentrated so as to save both the hübnerite and the scheelite, would produce 10 per cent of mineral carrying 70 per cent, WO_3 .

A small sample of the pyrite found on the dump was assayed for gold and silver and found to carry 2½ ounces silver and a trace of gold. Samples of pure hübnerite were found to carry 2 ounces silver and likewise a trace of gold.

The mine appears to be singularly favored, for Nevada mines, in that it is very accessible, being practically in the valley, at the foot of the mountain, and in close proximity to water both for milling purposes and for power. The mountain sides above are still covered with wood for fuel and some of this is large enough for mill and mine timbers. The nearest railroad point is Frisco, Utah, on the Oregon Short Line, a distance of 85 miles, over fairly good desert roads.

QUINCY, MASS., GRANITE SHIPMENTS.—The year 1901 was less active than 1900, and the total shipments show a decrease of over 10 per cent. As distributed, the 1901 movement was 85,664,897 pounds from West Quincy, 62,126,740 pounds from Quincy Adams, and 73,585,620 pounds from the Quarry Railroad, making a total of 221,377,257 pounds, against 246,064,662 pounds in 1900. The decrease was due to the smaller shipments from the Quarry Railroad. The best month was May, which recorded shipments aggregating 29,758,105 pounds, while January holds the low record of 7,737,815 pounds.

COAL AND COKE SHIPMENTS.

Heavy snowstorms have interfered with transportation of fuel from producing centers, causing much inconvenience to consumers. In fact, the shortage of fuel in certain sections of the iron and steel industry has resulted in the banking of a number of blast furnaces. This shortage is, of course, only temporary, but it is annoying at a time when demand for iron and steel is brisk. On the other hand, prices for fuel have strengthened and for certain deliveries sellers are asking a heavy premium. Just at present export trade is necessarily neglected, although at ruling low ocean freights this would seem an opportune time to enter foreign markets.

Anthracite.—The demand is good, owing to cold weather, but shipments from collieries are limited by the small car supply. In January shipments were approximately 4,538,138 tons, which compares with 5,183,392 tons in January, 1901, the record breaking month. The Pennsylvania Railroad moved from January 1 to February 15, a total of 572,598 short tons, against 631,443 tons in the corresponding period last year. This decrease of 58,845 tons was more than made up by the heavier shipments of bituminous coal and coke for the same period. Receipts of anthracite coal at ports on the Great Lakes in 1901 aggregated 3,371,254 tons, or 998,659 tons more than 1900. The increase was principally in the tonnage received at Milwaukee and Chicago. The shipments from Lake ports in 1901 were nearly as large as the receipts, amounting to 3,310,323 tons, against 2,073,500 tons in 1900; showing an increase of 1,236,823 tons, or over 37 per cent. This improvement was chiefly in the Buffalo shipments, which were 2,594,159 tons in 1901, as against 1,422,663 tons in 1900. Lake freight rates from Buffalo in 1901 averaged fractionally above those of 1900, but are much less than 1899, when tonnage moved at fancy rates.

Bituminous.—Collieries report a better supply of the large 50-ton steel hopper cars, while the wooden cars, which are in most demand, move slowly. The shipments originating on the Pennsylvania Railroad from January 1 to February 15 aggregated 2,885,082 short tons, or 106,888 tons more than for the corresponding period last year. During January the Beech Creek District in Pennsylvania sent forward 494,049 short tons. The Huntingdon & Broad Top Mountain Railroad moved from January 1 to February 22 a total of 290,255 tons, which is a decrease of 67,768 tons from last year, due to the smaller shipments from the Cumberland Region. Broad Top showed an increase of 40,732 tons this year. In the full year 1901 the Broad Top shipments were 642,598 tons, while those of Cumberland were 1,749,988 tons, making a total of 2,392,586 tons, showing an increase of 306,522 tons, or 12.8 per cent, as compared with 1900. In the 11 months ending November 30, 1901, the Norfolk & Western Railroad shipped 5,379,036 tons, of which 2,315,129 tons, or 43 per cent, went to tidewater. In the same period in 1900 there were shipped 5,278,304 tons, of which 2,239,385 tons, or proportionately the same percentage as in 1901, went to tidewater. The total increase in 1901 over 1900 was 100,732 tons. Shipments over the Chesapeake & Ohio Railroad from July to November, 1901, the first 5 months of the company's year, were somewhat less than 1900, the decrease being chiefly in the movement of New River coal to tidewater. In the 5 months of 1901, the total shipments were 2,159,724 short tons, against 2,402,514 tons in 1900, a decrease of 242,790 tons. The 1901 movement was 1,567,279 tons New River coal (1,785,219 tons in 1900); 551,842 tons Kanawha (564,812 tons in 1900), and 40,603 tons Kentucky (52,483 tons in 1900). In addition to these shipments there were received from connecting lines 29,980 tons, against 15,465 tons in 1900. In December, 1901, this railroad moved 387,179 short tons, against 393,942 tons in 1900. The shipments of Ohio coal over the 7 railroads reporting to the Traffic Association during the year 1901 aggregated 11,757,625 tons, of which 3,685,850 tons, or 31 per cent, were carried by the

Hocking Valley Railway. The receipts of bituminous coal at the ports on the Great Lakes in the year 1901 were 5,834,510 tons, chiefly at Milwaukee and Superior. As compared with 1900, these receipts show an increase of 1,575,665 tons, or 27 per cent. The shipments on the Great Lakes were similarly heavy in 1901, amounting to 6,170,218 tons, against 4,733,379 tons in 1900, the increase of 1,436,839 tons, or 23.3 per cent, being in a larger movement from Toledo and Ashtabula. The Lake freights from Ohio ports averaged several cents better than 1900, but do not compare favorably with 1899, when rates were generally high.

Coke.—Though production in the Connellsville Region averages over 210,000 tons weekly, shipments are less than 10,000 cars, owing to the interruption of transportation by bad weather. Shipments from the Beech Creek District in January were 13,442 short tons. On the Pennsylvania Railroad the original tonnage from January 1 to February 15 was 1,999,222 short tons, against 966,946 tons last year; showing an increase of 132,276 tons, or 12 per cent. The shipments over the Norfolk & Western road in the 11 months ending November 30, 1901, showed slight improvement over the corresponding period in 1900, being 1,362,150 tons, against 1,351,785 tons. The movement to tidewater was 94,159 tons in 1901, as against 92,956 tons in 1900. Chesapeake & Ohio shipments in the first 5 months of the company's year (July to November, 1901) show a good increase, being 190,675 tons, against 135,982 tons in 1900. Of the 1901 shipments 154,095 tons were in New River coke, and 36,580 tons Kanawha, the increase over 1900 being chiefly in the movement west. There were also received from connecting roads 3,207 tons in 1901, against 4,490 tons in 1900. 1901 over 1900 was 100,732 tons.

MARKETS FOR PHOSPHATES IN SPAIN.

The trade in phosphates keeps steady pace with the manufacture of fertilizers. The article is also largely employed in making dynamite and other explosives.

Up to the present, Algeria has furnished almost the entire supply from its vast deposits near the Tunisian frontier, the phosphates being shipped from the port of Bone, usually in a ground state, as only one or two firms in Spain possess the necessary grinding plant.

Small sailing vessels carry the phosphate to Spain in the two strengths of 58 to 63 per cent and 63 to 70 per cent of tribasic phosphate of lime; and as with a favorable wind these vessels can be depended on to reach a Mediterranean port in three or four days, and can be chartered at freights varying from 6 to 7 francs (\$1.16 to \$1.35) per ton, the advantage of the Algerian over the American phosphate in this respect is at once apparent. Manufacturers are at the same time fully alive to the value of the Florida rock phosphate, but as I understand this is at present shipped in the rock only, consumers of phosphate unprovided with grinding plant are unable to use it—a fact worthy of consideration on the part of shippers from the United States.

Notwithstanding the drawbacks of distance and heavy freights, the Florida article has a certain consumption in Spain, and has given such good results in one or two instances that some manufacturers have decided to use it altogether in future.

Business in phosphates is likely to increase, and it is reported that important works are in course of construction in one of the northwest provinces, which will require a large supply of the article. Our shippers should therefore carefully study the question of freights, and if these can be reduced so as to compete with those from Algeria, America may look forward to a good share of this trade.

COAL IN BELGIUM.—Coal production in Belgium for the year 1901 is reported at 22,073,740 metric tons, against 22,708,632 tons in 1900; showing a decrease of 634,892 tons, or 2.9 per cent.

PROSPECTING FOR PETROLEUM IN MEXICO.

CONSULAR REPORT.

A law has been issued to encourage prospecting for oil in Mexico. Among its provisions are the following:

The Federal Government is authorized to issue concessions for the exploitation of deposits of petroleum or gaseous carburets of hydrogen in vacant or national lands. Permits to explore may be issued either to private parties or to companies, and shall be good for one year. During that period, no one but the person or company will be entitled to prospect in the territory. Prospecting permits will be subject to a tax of 5 cents per hectare, payable in stamps on the document.

The sources or wells discovered must each be capable of producing at least 2,000 liters (528 gallons) of petroleum per day, or, in the same time, 20,000 liters of gaseous hydrocarbons, suitable for fuel. The concessions for exploitation will be good for 10 years. Concessionaires will enjoy the following franchises:

The right to export duty free, the natural refined or prepared products resulting from the exploitation. The right to import duty free on a single occasion machinery to refine petroleum or gaseous hydrocarbons and to prepare products of all kinds having crude petroleum as their base; the necessary piping for this industry and the attachments for said piping; pumps, iron or wooden tanks; iron or wooden barrels; gasometers and material for the buildings destined for the exploitation of the industry; all these importations to be subject to the rules and regulations as enacted by the Department of Finance.

The capital invested in the exploitation of petroleum or gaseous hydrocarbon will be held free for ten years from all federal taxation with the exception of the stamp tax. All the products of the exploitation will be entitled to a similar exemption until they become the property of third parties.

The first persons who, in any State, or in the territories of Tepic or Lower California, discover deposits or wells of petroleum or gaseous hydrocarbons, provided that each well yields at least 2,000 liters every 24 hours, will be privileged in such form that for a diameter centering at the well where the original discovery was made and varying in length in proportion to the capital invested in the discovery and other expenses incidental to the commencement of exploitation, no other person will be entitled to bore prospect wells or to exploit the same products. The length of the diameter within which this privilege is to be enjoyed cannot exceed 3 kilometers (1.8 miles) and shall be fixed in each case by the Department of Fomento, in accordance with the rules of practice that are to be issued. The privilege alluded to in the foregoing section will hold good for a length of time proportionate to the capital invested in the discovery of the deposit or well of petroleum and in the expenses incidental to the commencement of the exploitation. The duration in question shall not exceed 10 years and shall be fixed in each case by the Department of Fomento, in accordance with the regulations mentioned in the foregoing section.

MECHANICAL COAL-CUTTERS AT A FRENCH COLLIERY.

In a communication to the *Societe de l'Industrie Minerale*, M. Baily, of Marles Collieries, describes the results obtained from the use of coal-cutting machines in those mines. In 1894 an electrical equipment of 300 kilowatts capacity was installed, which was increased to 500 kilowatts in 1900. The electricity was at first used to work the pumps, secondary ventilators, winding engines, etc., and it was not until August 1, 1900, that it was applied to coal-cutters. The first trials of coal-cutting machinery were made with a pick machine, which, however, did not give encouraging results. It was first put to work a seam about 2¾ feet thick, but was afterwards transferred to the headings in the Grande Veine, which rises from 3½ to 6½ feet in thickness, has a solid roof, and is of but moderate inclination. Thus all the conditions for successful working by machine were present, and the great

inconvenience of heavy timbering was entirely eliminated, the machine being used to drive a heading over 12 feet wide in the solid, where the frame could be brought up close to the wall. The results obtained were satisfactory, exceeding by 15 to 20 per cent those obtained in similar headings where the work was done by hand. Difficulty, however, was experienced in working the pick machine by electricity, and on September 20, 1900, it was abandoned in favor of a Morgan-Gardner chain machine, which has worked satisfactorily ever since. The machine was very similar to one exhibited at the Paris Exhibition, being 12 feet long, 4 feet 9 inches broad, 2 feet 6 inches high and 2,645 pounds in weight. It was also put to drive headings in the Grande Veine. The machine makes a regular cut of 4½ inches high and 3 feet 4 inches long on a thickness of 6 feet. To get the seam it is necessary to make four successive grooves in the face of the heading, each cutting about 2½ square yards of coal. The time occupied in getting this amount of coal is 4¼ minutes, and a force of 30 ampères under a voltage of 480 volts is required to start the machine, from 10 to 14 ampères to keep it in work, according to the nature of the cut, and 6 ampères to return it on the carriage. The machine is attended by two men, who work two headings, while three additional men are employed in clearing, loading, timbering, etc. Unfortunately, says M. Baily, the use of the machine is restricted to headings, the rooms being worked by hand, owing to the close timbering, and even in the headings manual labor has often to be substituted.

The application of chain machines in these mines is limited by one or other of the following circumstances:—insufficient thickness of seam, an inclination exceeding 8°, instability of the roof or of the coal itself, and the presence of noxious gases. When all favorable conditions are found existing together the output by hand can be doubled, but if one or other of them is wanting the production approaches that of the miner, and as the chain machine could only be used in headings, it was decided to use in the more closely-timbered workings a Sullivan machine. The speed obtained with the latter was remarkable, giving an advance of nearly a foot a minute with a cut of 4 feet 4 inches width. This machine, however, was found considerably more cumbersome than was expected, requiring an opening of at least 2½ feet and a free space of 4¾ feet between the cut and the last range of timber. This last condition prohibited its use. It has now been replaced by a Diamond coal-cutter, which has not been at work long enough to give any basis of results. The free space required between the face and the timber by the latter is only 3 feet. The essential conditions will be a solid roof and a regularity of seam sufficient to provide a working face large enough to keep the three men at the machine well employed.

GOLD MINES NEAR PORT ARTHUR, CHINA.

CONSULAR REPORT.

The report of M. C. Bogdanovitch, a Russian Government mining engineer, who has spent three years in examining the coast of the Okhotsk Sea—especially in the southern part of the peninsula of Liao-Tung—has just been published in the twentieth volume of the "Elements of the Geology of Russia." Mr. Bogdanovitch found gold in the mass of rock at Liao-Te-Chan, in the vicinity of Port Arthur, near the Bay of Siao-Pin-Dao, near the lake of Hons-Tsa-Pao-Tis, near the temple of Tcheou-Tsia-Town, in the basin of Lema-San-He, and a gold mine with veins near the village of Tundsia-Pei-Ho, as well as other mines of less importance. He is of the opinion that there are veins of gold in the sides of Golden Mountains, near Port Arthur, but has formed no definite opinion as to the existence of gold near the Bay of Siao-Pin-Dao. The mines near Lake Hons-Tsa-Pao-Tsi seem to be poor.

Between the temple of Tonhon-Din-Miao and the village of Tian-Tsi-Town, Mr. Bogdanovitch found

that gold sands had been worked in a primitive way by the natives and the washing of 500 poods (18,056 pounds) of sand in his presence yielded 0.11 ounce of gold per 100 poods (3,611 pounds) of sand. The analysis of the samples proved that the nuggets contained 952 parts of gold and 36 of silver; the nuggets found in the region of Lema-San-He contained a smaller quantity of fine ore.

Mr. Bogdanovitch thinks that the veins near the village of Tundsia-Town-Pei-Ho should receive a more thorough investigation. The chemical analysis made in the laboratory of the Minister of Finance at St. Petersburg of various samples of ore from this mine shows a yield of 0.111 ounce of fine gold per 100 poods (3,611 pounds) of ore, which is sufficient to make the working of this mine profitable; but additional reports are expected.

Among the rivers that cross the eastern watershed of Liao-Te-Chan, the most important is the Po-Tsian-Tsi, but the gold district found along the river does not seem to be sufficiently rich to pay for working. Between the mouth of the river and the temple of Tchin-Tchei-Tsi, nuggets have been found weighing 1,321 ounces.

These nuggets, the engineer thinks, are due to the continuous action of the sea water on the rock, and the working of these mines presents no technical difficulties, though the coast is open and for that reason exposed to the action of the waves.

AMERICAN EXPORT ORDERS.

So many and so widely distributed are the foreign orders received by American manufacturers that special mention should be made of the more important purchases. It is also gratifying to note that many of these orders have come from British corporations, who consider American-made machinery and supplies cheap and serviceable.

An interesting order was booked recently for drilling machines to test the placer ground on the Gold Coast, West Africa, where English companies are actively working gold mines. A similar order came from British India, where prospecting will be carried on in the Chanda District, in the Central Provinces. Another large order is for milling machines to be installed on the property of the De Beers Diamond Mines, in Kimberley, South Africa. The Mount Lyell Copper Company, in Tasmania, has also been a prominent purchaser of American machinery. In the Caucasus a complete American turbine water wheel outfit will be installed, and an elaborate oil-filtering equipment has been ordered for Smyrna, Turkey. In addition to these orders considerable electrical apparatus will be shipped to the English market, and other machinery and supplies to leading cities in Continental Europe, Central and South America, Mexico and Canada. These orders have been taken in severe competition with foreign manufacturers, and bring credit to our exports, among whom we are glad to see so many prominent advertisers.

THE GERMAN CEMENT TRADE.—The correspondent of the London *Economist* says: "The cement companies in Upper Silesia have begun to issue their annual reports for the year 1901, and they show far less satisfactory results than for 1900. The Oppeln Company (formerly Grundmann) pays 3 per cent, against 7 per cent; the Oberschlesische (Schottländer), 3 per cent, against 8 per cent; and the Groschwitz Company, 6½ per cent, against 13 per cent. Bad as these results are, they are much better than those of factories in Central and Northwestern Germany, many of which will have to pass their dividends altogether. The conditions of production are more favorable in the Silesian District than these latter. There is a slight improvement in the cement trade just now, which is connected with an improvement in the building trade. The reports of the cement companies complain of the loss of trade in the United States, but they dwell upon the prospects of finding new markets in South Africa after the war is over, which are declared to be very favorable."

ELECTRICITY IN MINING.

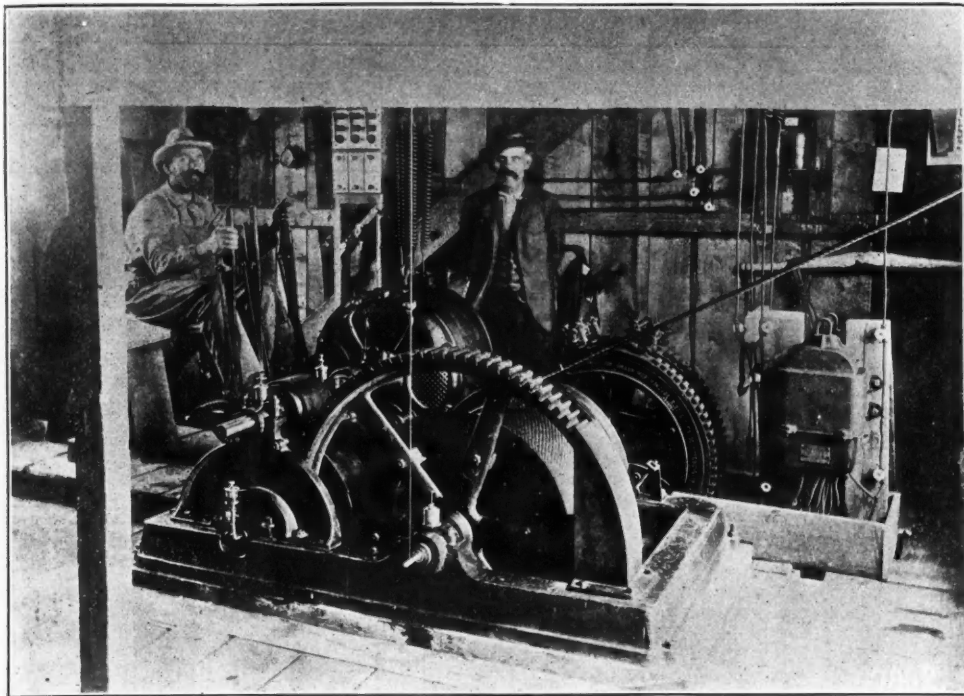
By GEORGE H. GIBSON, PITTSBURG.

The operations of mining may be classified under the headings of excavation, haulage and hoisting, with the auxiliary operations of pumping, ventilating and lighting. All these are processes involving the use of tools and the application of energy. In the beginning the source of this energy was human muscle, supplemented at a later date by animal power. The primitive miner of Peru, Mexico and

Furthermore, the exhaust from the apparatus is disagreeable and, if of any considerable volume, soon renders the mine uninhabitable. Even though the exhaust may be taken care of by suitable condensation apparatus, the heat and leakage from steam pipes are apt to raise the temperature of the mine to a point where it becomes unbearable. There is also the objection to the use of steam that steam piping is difficult to lay and the general system lacks flexibility, durability and efficiency.

The most recent agent which has been brought to the aid of the miner is electricity. As a means of power transmission it is unique in possessing all the advantages and possibilities of other methods and escaping their disadvantages. It is adaptable for all classes of work, since it is used for hoisting, hauling, drilling and excavating in general, ventilating and pumping, as well as the additional use of lighting, which is possible with none of the other methods. Its flexibility is at once apparent. Electric wires may be run anywhere and under any conditions to be found in mining work. They are easily and quickly laid, occupy small space, and may be in a moment tapped at any place at which it is desired to operate machinery.

Electrically driven machinery is extensively used in practically every operation in mining. Electrically driven hoists are in extensive use, especially in the gold, silver, and copper mines of the West. Electrically driven pumps are used both in the West and in the coal mines of the East. Accompanying this article is an illustration showing a sinking pump driven by a direct-connected electric motor. Electric locomotives are quite widely used for mine haulage in coal and metal mines everywhere. By their use the cost of haulage has as a rule been cut in half, or in many instances from about 7 to 3½ cents per ton. Ventilating fans, as well as pumps, are driven by motors and require no attention further than a bi-weekly or monthly oiling. Electric drills for rock drilling are coming into use. They are usually of the percussion type and consists of a hammer or bar actuated by a suitable mechanism driven by an electric motor. In coal drilling the electric drill does the work of six or seven men. In coal mining probably the most general and profitable application of electric power is to the coal cutting machine. The ordinary method of undercutting by means of the pick in the hands of a miner is most difficult, laborious and costly, as well as wasteful of coal. The



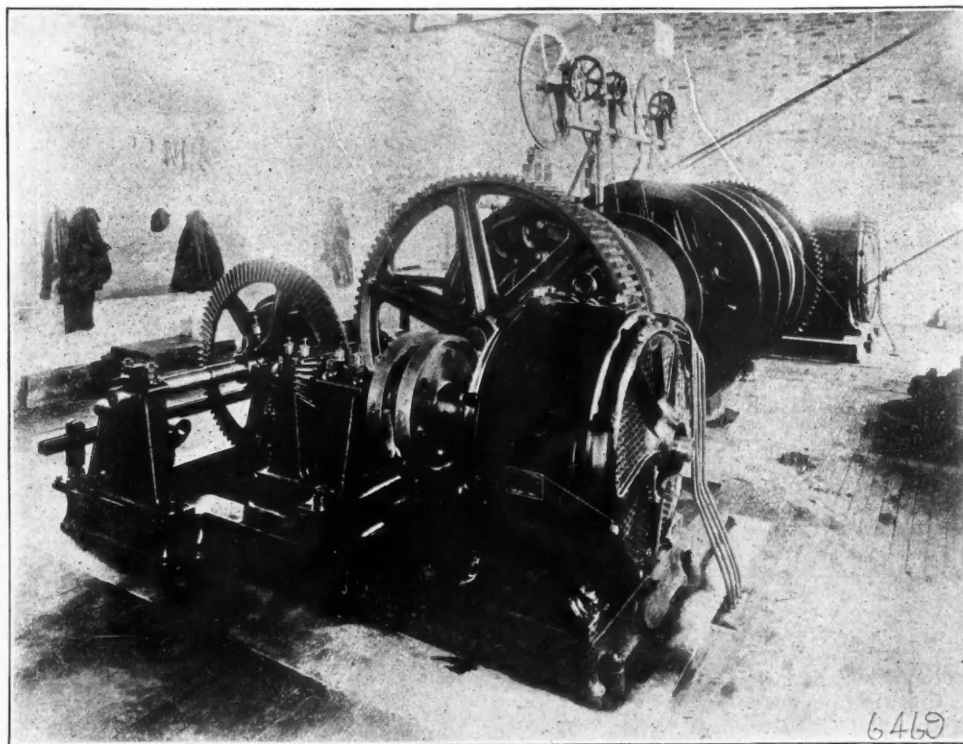
ELECTRIC MOTOR OPERATING HOIST.

Lake Superior excavated his ore by means of stone, wood or bone implements and carried it upon his back to the mouth of the mine with the aid, perhaps, of rude ladders and ropes. The Lake Superior miners appear to have employed another agency in mining, as they are said to have used fire to break up and loosen the rocks surrounding the outcroppings of native copper in that region. As they followed the veins deeper, however, this method must have become impracticable and these prehistoric miners were compelled to revert to the use of primitive stone hammers and wooden picks. In the earliest mines, water, if present, was gotten rid of by natural drainage, and no provision was made for ventilation. Animals have been used in mining almost exclusively for hoisting and haulage.

Fire, as above noted, was one of the earliest of natural agents brought to the aid of the miner. In modern times he has found further applications of fire which have revolutionized his habits and methods of work. The first commercial application of the steam engine was in pumping and hoisting in the coal mines of England. Since then the use of steam generated power, or in some cases power generated by water-falls, has extended to every kind of mining in every region of the earth.

The conditions under which mining operations are carried on make it necessary that the power used be generated outside of the mine. This implies some means of transmitting the power in order that the energy produced may reach its point of application at the face of the workings, or at the pumps or hoists. In early practice this was accomplished almost entirely by means of mechanical devices. Ropes were used for hoisting and hauling and the early Cornish pumping engines were provided with long piston rods extending from the steam cylinder at the head of the shaft to a pump cylinder far below.

At various times it has been attempted to use steam for power transmission, but steam lines, when of any considerable length, are subject to a large amount of condensation, which gives rise to serious trouble in the pumping or other machinery operated.



TYPE C. WESTINGHOUSE MOTOR, DRIVING HOIST.

Compressed air has been quite extensively used as a substitute for steam. It is adapted for use in the same class of apparatus and it escapes some of the objections which may be used against steam. It may be carried any distance without condensation, and the exhaust rather improves, than otherwise, the conditions existing in the mine. However, the use of compressed air has against it all the other objections placed against steam, and it has the added disadvantage of requiring expensive apparatus in the shape of compressors, re-heaters, etc.

use of coal cutting machines has resulted in a reduction of the cost and has increased the output of the mines where they have been adopted. Machines similar to these are used for making vertical cuts through coal veins.

Connected with, though not a part, of metal mining is refining and reduction work. In such work electricity has found a wide application, both for operating machinery by means of motors, for lighting and for electrolytic processes.

It will be well to illustrate and enforce our state-

ments by citing a number of recent and important installations of electric mining machinery:

The Cripple Creek District is probably, in this respect, the most up-to-date of any in the world. It has been said that it is "the only district in the world where a miner can go to his work in an electric car, descend the mine in an electric hoist, keep his mine dry with an electric pump, do his work by an electric light, run drills operated by electric motor-driven air-compressors (in some cases now being substituted by direct electric drills), and fire his shots by electricity from a switchboard far removed from the point of explosion."

The Cripple Creek District contains within an area of 6 square miles 500 gold mines, the produc-

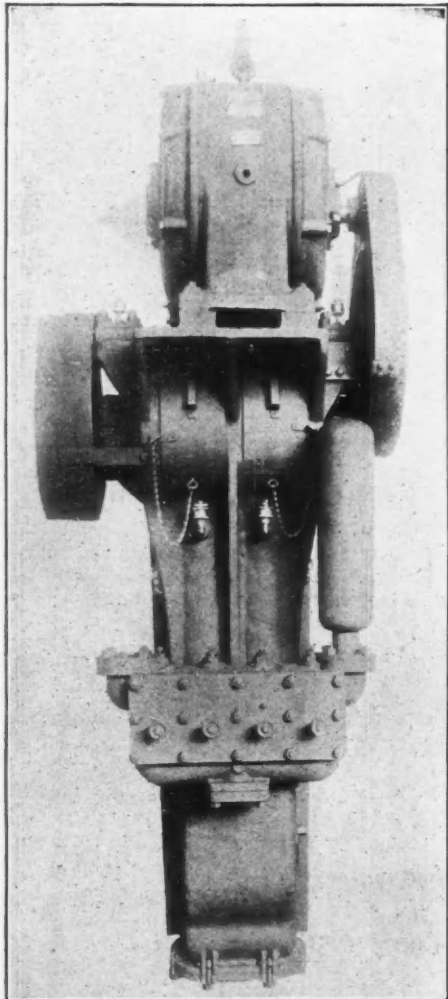
La Bella Mill, Water and Power Company, which has a 3,000-horsepower plant at Goldfield in the district. This is a steam plant, the coal being brought there by rail.

The power distributed by both companies is quite largely applied by Westinghouse, Type "C," induction motors. The Colorado Ore Reduction Company has a 150-horsepower Westinghouse motor operating crushing machinery, as well as a number of smaller motors. The Lilly Gold Mining Com-

pany uses a 100-horsepower motor for operating its machinery. The Moon Anchor Gold Mining Co. has a 100-horsepower, Type C, motor for pumping at a depth of 600 feet. The Trade Dollar Mining Company, of Silver City, Idaho, has recently put into operation a large water-power plant at Swan Falls on the Snake River, from which power is transmitted to the company's mine 27 miles distant. The power-house contains three Westinghouse belt-driven generators

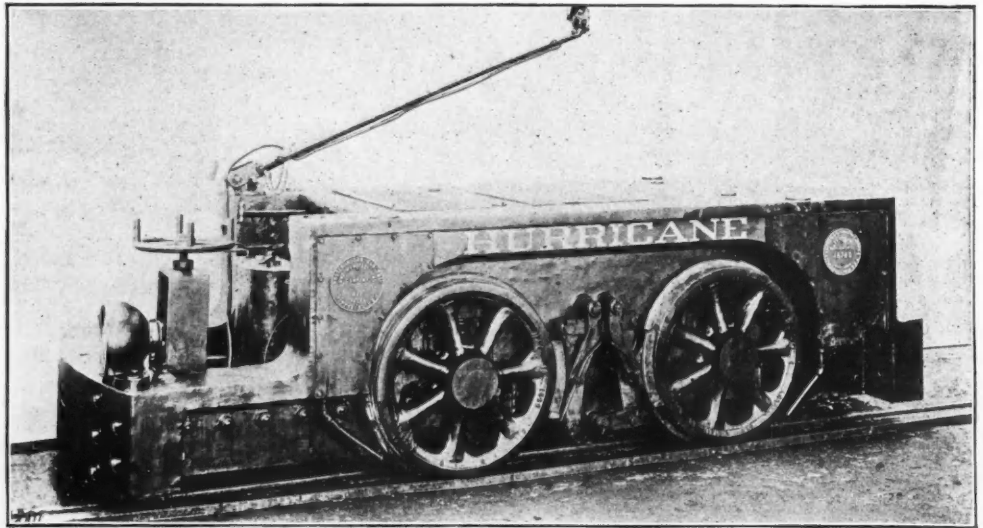
possible to economically handle material yielding only \$.50 to \$2 per ton. The water is confined in reservoirs high above the point at which it is desired to use it, and in order to fill these reservoirs it is usually necessary to install pumping apparatus.

The Crown Mountain Gold Mining Company has built a reservoir of 750,000 gallons capacity on a mountain side near the Chestatee River, in Georgia. Electricity having been selected as the power for the plant, a Westinghouse 300-horsepower, 2-phase



WESTINGHOUSE MOTOR OPERATING KNOWLES SINKING PUMP.

tion of which in 1900 amounted to \$22,500,000. The district is traversed by a street railway operated by power generated at Lake Moraine, 9 miles distant. In the early days of Cripple Creek the shafts were usually sunk by steam machinery, which was very expensive, both on account of high cost of fuel and the inefficient types of apparatus used. In July, 1888, electric machinery was first introduced in the district, and it was soon found to be more profitable for the individual mine owners and lessees to rent motors and power from one of the two electric power companies which were soon established. One of these, the Colorado Electric Power Company, has more than 70 consumers using an aggregate of more than 1,500 horse power. This power is used for driving crushing machinery, hoists, air compressors, pumps, etc. The power plant is located at Canyon City, and is equipped with three Westinghouse generators having a total capacity of 2,250 horsepower. The current is transmitted 27 miles to Cripple Creek, at a pressure of 20,000 volts. The transmission in the district is made by 3-phase current at 500 volts to induction motors, which are found most valuable in this service, as they are very simple in construction and require little or no attention. The other company furnishing power is the

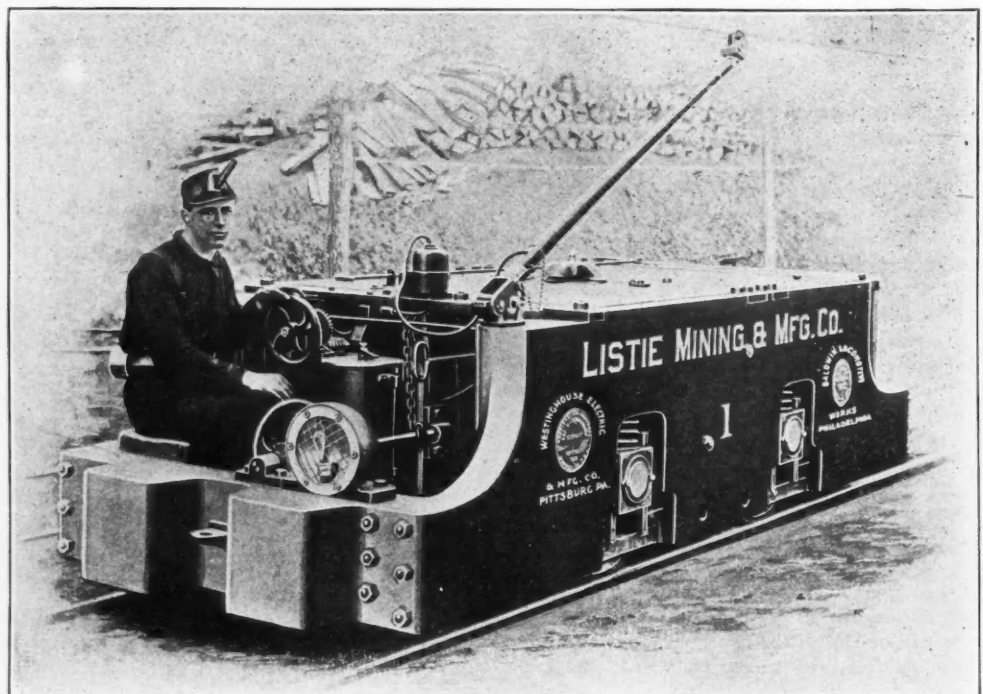


ELECTRIC MINE LOCOMOTIVE.

induction motor was installed to operate the pump supplying the reservoir. The power comes from a central power plant, located on the Chestatee River 12 miles away, and which contains a Westinghouse 500-kw. generator direct connected to a Victor turbine. In the mill a 125-horsepower motor is used for operating an air compressor and a 100-horsepower motor for operating crushers, while other machinery is driven by motors of from 10 to 20 horsepower.

operated from a jack-shaft, which is driven by four vertical turbines. The alternators are of 300-kw. each and deliver 3-phase current at 500 volts which is stepped up to 22,000 volts for transmission. Hydraulic methods are much used in gold mining in the Georgia mountains. The gold is scattered in small quantities along the mountain sides and cannot be economically recovered by the use of pick and shovel and the old methods of mining. However, by the use of water jets it has been found

The largest cyanide gold reduction plant in the world is the Golden Gate Mill of the De La Mar's Mercur Mines Company, which owns a number of mines in the Cape Floyd mining district in Utah, including the famous Mercur Mine, the Golden Gate Mine and the Brick Yard group. The electric power in this mill is supplied by the Telluride Power Transmission Company from the plant at Provo, Utah, 30 miles distant. The transmission is at 35,000 volts. The motors used in this mill were



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furnished by the Westinghouse Electric and Manufacturing Company, of Pittsburg, Pa.

Another large mill is that of the Union Gold Extraction Company, of Florence, Colorado. This mill works on ore from the Cripple Creek district, which is received in cars of 20 to 30 tons capacity. After the ore is delivered from the cars it is handled entirely by electrically driven machinery and conveyors. The power plant consists of a 500-horsepower Corliss engine, direct-connected to a 550-volt Westinghouse direct-current generator, from which the power is distributed to all departments of the work.

When we turn to coal mining we find a great total saving by the use of electric-motor-driven ma-

pany at Thomas, West Virginia, operates two mines, which are supplied with power by a 150-kw. alternator and a 175-kw. direct-current generator. The alternating current is used for operating three 10 horse power motors for driving small pumps, one 5 horse power motor, one 10 horse power, two 20 horse power motors for operating elevators, also one 5 horse power induction motor for a car lift and three chain coal cutters.

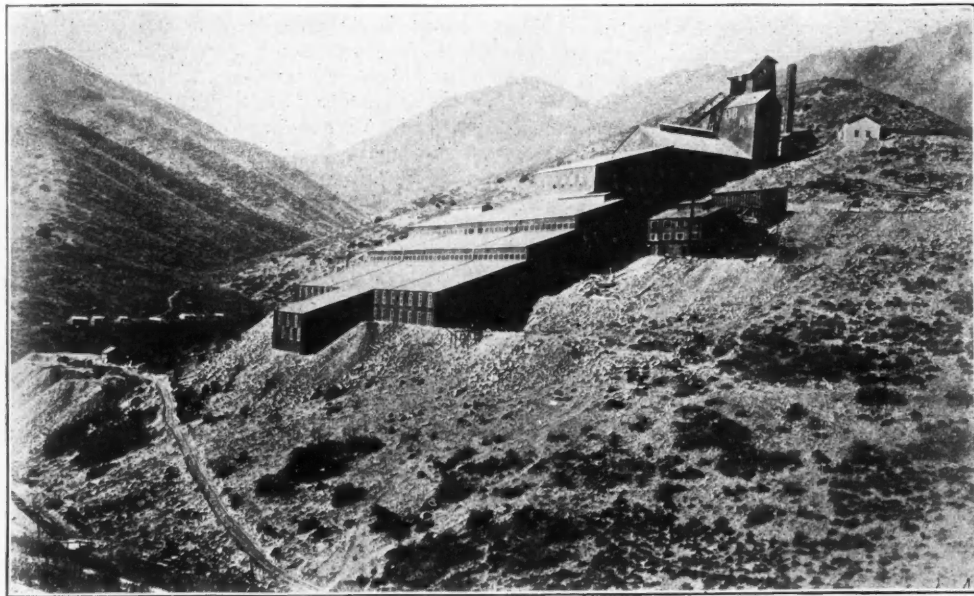
The Westinghouse Electric and Manufacturing Company has recently completed the installation of an electric plant for Osborne, Saeger & Co., at North Buena Vista, Pa., for operating coal mines. The coal is in seams from 5 to 10 feet in thickness and the output of the mine is about 200 tons

550 revolutions per minute, together with switchboards for the same. Two mining locomotives are in use, one being equipped with two Westinghouse, No. 65, 220-volt mining motors and the other with two No. 75 motors.

There are many coal mines in which electric machinery is used with great saving in Pennsylvania, Ohio, Illinois, Kentucky, Alabama, and other States, but it is hardly necessary to give further examples of electric installations in coal mines, since they are all very similar.

From the numerous examples of the use of electric power in both coal and metal mining which have been cited above, it will be seen that while only a start comparatively has been made, the introduction of electric machinery is proceeding very rapidly. Indeed, the extent to which electricity is adopted corresponds very closely to the extent to which mine owners and managers become familiar with this new means at their disposal. A very close analogy is found in the case of the introduction of electric power distribution in factories, which progressed very slowly until a sufficient number of factories had been equipped to make the advantages of electric power equipment everywhere manifest. Now no one hesitates about equipping a new factory for electric power distribution, and in hundreds of old factories the existing equipments of belts, shafts, pulleys and other devices are being ruthlessly scrapped to make room for electric motors. The advantages of electric power over other means of transmission are even more decided in the field of mining than in manufacturing, and as the educational period is fairly passed we may now expect a rapid increase in the use of electrical machinery in all branches of the mining industry.

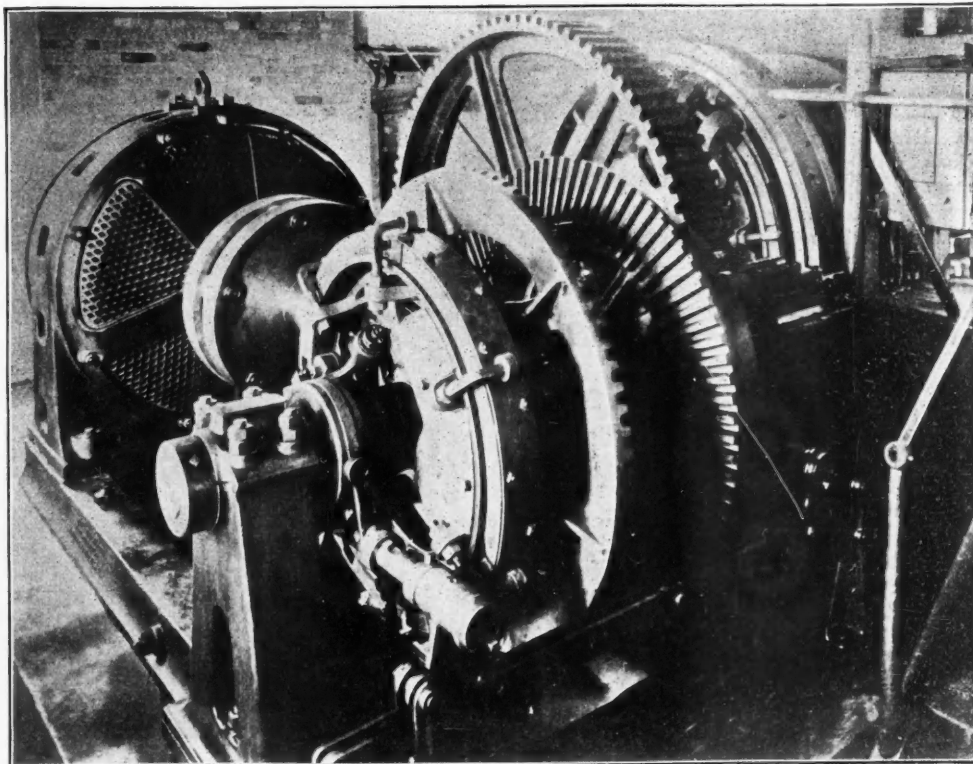
RUSSIAN COAL RATES.—A conference was recently held at the Ministry of Finance in St. Petersburg to consider whether the British coal now imported at the Russian Baltic ports could be re-



DE LA MAR MINE, MERCUR DISTRICT, UTAH.

chinery. The coal mined in the United States in 1900 was 270,000,000 tons, valued at over \$300,000,000, four-fifths of the coal being bituminous. About 53,000,000 tons of this bituminous coal was undercut or mined by machinery, and since it is estimated that the saving in cost was 10 cents per ton the total saving amounts to \$5,300,000. In addition to this, electric power is very extensively used in coal mines for hauling, hoisting, ventilating, pumping and lighting.

The Keeling Mine, near Pittsburg, Pa., has recently adopted electric locomotives. At this mine over 200,000 tons of coal are handled yearly. The electric railway from the mine to the river passes through three hills by tunnels and over short ravines. A rope haulage plant was formerly employed, but it is now standing idle and two electric locomotives, weighing about 26,000 lbs. each, are being used. The gauge of the track is 39 inches. Each locomotive makes one trip an hour with a train of 20 cars, covering a distance of 3 1-2 miles. Each car with its load weighs two tons and the rails are 40 pounds to the yard. The voltage employed is from 250 to 300 volts, the current being furnished by two Westinghouse generators of 250-kw. each. The Cumberland & Elk Lick Coal Company and the Merchants' Coal Company have installed an electric plant for hauling, pumping and coal cutting. The Southwest Virginia Improvement Company has several electric locomotives. The Berwind-White Coal Mining Company operates 6 mines equipped with electric installation with a total output of 5,000 tons per day, which is eventually to be increased to 10 mines with 10,000 tons per day. The haulage from the mines is done entirely by electricity. The electric service is divided into direct current for hauling and polyphase current for other purposes. The polyphase motors are found to be especially adapted for general power work on account of their simplicity and great durability and also on account of the fact that they are entirely sparkless. The Davis Coal and Coke Com-



ELECTRIC HOIST OPERATING PUMP.

pany daily. The electric plant consists of one generator of 100-kw., direct-connected, from which the current is distributed by bare copper wires throughout the mines. Five coal cutters are in daily use.

Another plant recently installed is that of the Loyalhanna Coal and Coke Company, of Loyalhanna, Pa. This company has put in one 100-kw. engine type Westinghouse alternator running at 250 volts, and one 100-kw. direct-current belted Westinghouse generator running at 250 volts and

placed by coal from the Donetz Basin in South Russia. Heretofore British coal has been delivered much cheaper, as it comes by water. The present rate by rail from the mines in the Donetz Basin, Baltic ports, is about 44 kopeks per pood, which is equivalent to about \$4.50 per ton, and has effectually prohibited such shipments. The Ministry of Finance, in consultation with the Ministry of Communications, will take under discussion the question of decreasing freight rates.

ARTIFICIAL GRAPHITE.

By FRANCIS A. J. FITZGERALD.

In 1891 Mr. E. G. Acheson discovered carbide of silicon, now well known as an abrasive under the name of carborundum. The furnaces used in making carborundum contained a central core of granular carbon which was heated electrically and thus converted the surrounding mixture of sand and coke into silicon carbide. In most furnaces the carbide next the core was raised to such a high temperature that the silicon was vaporized and the carbon left behind as graphite. In a lecture at the Franklin Institute Mr. Acheson said:

"The part near the core consists of pure carbon, those parts more distant from the axis of the core are more or less mixed with the carborundum crystals. * * * The free carbon has all the properties of graphite, it blackens the fingers, etc."*

Numerous experiments were undertaken later to determine the best methods for the commercial production of graphite, and eventually Acheson took out a patent for the manufacture of graphite. In this patent Acheson's method is described as follows:

"I have also discovered that in order to produce pure graphite from carbonaceous materials there is an indirect conversion, and that the act of formation of the graphite is more in the nature of an act of dissociation of the carbon from its combination with other materials than a conversion of the ordinary carbon into graphite, and that as a preliminary step the carbon has to be combined chemically with some other material. Thus I have found that if the carbonaceous material or carbon used in the process contains a considerable proportion of mineral matter or if it is mixed with a certain proportion of oxide or oxides of iron and subjected to the treatment as hereinafter set forth, the yield of graphite is enormously increased and the product is more satisfactory."†

Acheson also found that the carbide forming materials need not be present in the proportion necessary to convert all the carbon into carbide, but that a much smaller amount was sufficient.‡

The furnaces used in the Acheson process for making graphite and graphite electrodes commercially are similar in outward appearance and magnitude to those used in Acheson's process for making silicon carbide. They are built of brick in the form of a long, narrow trough lined with some suitable refractory material. In making graphite electrodes the latter are manufactured of petroleum coke and pitch like an ordinary carbon, such as is used in arc lights, but a certain amount of some carbide-forming material such as silica or iron oxide, is introduced. The electrodes are baked in the usual way, and are then ready for graphitization. To perform this operation they are placed in a furnace and heated to a temperature well above that of the volatilization of such bodies as iron, aluminum and silicon. That the temperature used in the Acheson furnaces is well above this point may easily be demonstrated, as the bodies above named are condensed in the form of their oxides outside the furnace.

In manufacturing graphite for other purposes, such as crucibles, paint, stove polish, etc., anthracite coal is usually employed. Having found a process for making graphite Acheson next set to work to find a natural carbonaceous substance which would yield a graphite suitable for commercial purposes. He experimented with a great many materials, and finally discovered that anthracite coal gave the most satisfactory results. The furnace is filled with anthracite coal through the center of which runs a core composed of a carbon rod which connects the terminals of the furnace electrically. When cold, anthracite coal is a very poor conductor of electricity, hence the necessity for the core which acts as a conductor and heats the surrounding anthracite when the furnace is started. Finally, the whole mass is raised to a very high temperature and converted into graphite. On cooling, the latter is removed from

the furnace and ground up to such degrees as are desirable for the various purposes for which it is intended.

The physical changes produced by the Acheson process for manufacturing graphite electrodes is illustrated by the following table:

Amorphous carbon electrodes:	
Density	1.90
Electrical resistance per cu. in.	0.00124 ohm
Graphite electrodes:	
Density	2.19
Electrical resistance per cu. in.	0.000320 ohm

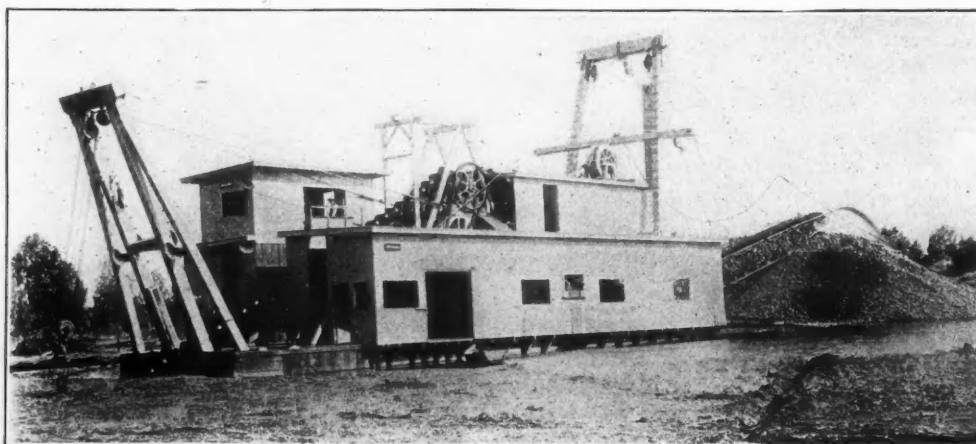
The high temperature to which the electrodes are raised in the electric furnace volatilizes nearly all of the contained impurities, leaving an ash content of from 1 to 5 parts in 1,000. The electrodes show marked resistance to disintegration in the electrolysis of sodium chloride solutions, having from 2 to 3 times the life of the most resistant form of amorphous carbon, retort carbon and from 3 to 7 times the life of artificial carbon anodes.*

Tests made on the graphite produced from anthracite show that it is free from amorphous carbon. The average product of the furnaces contain approximately 5 per cent of ash, and is therefore far purer

finished electrodes is given as 1 part in 1,000. The size of the electrodes is limited generally by the difficulties of manufacture. In rectangular shapes the cross section is limited to about 28 square inches, and the length to 36 inches. The width of a carbon is usually limited to 8 inches. In round carbons the length is limited to 36 inches, and the diameter is 5 inches. These limits can be increased slightly when large amounts are ordered. Some striking results have been obtained in tests made in Germany with Acheson graphite electrodes in the electrolysis of sodium chloride solutions.

THE BRITISH COAL EXPORT TAX.

A meeting of the Representative Committee of the Coal Exporters of the United Kingdom was held at London on January 17. The recent correspondence between the secretary of the committee and the Chancellor of the Exchequer, as well as the Chancellor's letter to Mr. W. K. Plummer, M.P., for Newcastle, were read and discussed. With reference thereto the following resolution was unanimously passed:—"That the Chancellor of the Exchequer be thanked for his courtesy and consideration in



BUCYRUS BUCKET DREDGE ELECTRICALLY OPERATED. (See page 308.)

than the average natural graphite. When necessary, purer graphites are produced; this being done by heating to a high temperature for a sufficiently long time to volatilize and drive off all impurities. Anthracite treated in this way produced a graphite containing only 0.31 per cent of ash, although the original coal carried about 15 per cent ash. This small residual ash is undoubtedly due to the condensation of the vapors existing in the furnace when the current is cut off. Mr. Acheson has considered a plan by which these may be washed out during the operation of the furnace by the use of an inert gas such as nitrogen; but commercial requirements have not so far necessitated putting this into practice.

It is a remarkable fact that in spite of the large amount of work that has been performed by various experimenters on the conversion of amorphous carbon into graphite, half a century elapsed before a process was developed that is now becoming of greater importance every year. Over 50 years ago with a battery of 600 Bunsen cells Despretz attacked this problem; but it was only a few years ago that a method was discovered by which, in the first year of the new century, and with the electric current produced by the Niagara Falls, nearly 2,000,000 pounds of graphite were manufactured from amorphous carbon.

Acheson graphite electrodes, made of artificial graphite, are recommended for electrolytic and electro-metallurgical processes, and the advantages claimed for them are long life, low porosity, high conductivity and great economy. The electrodes are made by treating in the electric furnace amorphous carbon articles made up in the shape desired. The product is stated to be entirely free from amorphous carbon, and the percentage of impurity in the

informing the trade of his intentions prior to the introduction of the Budget, and thus relieving the members of the coal trade of a great strain in the conduct of their business."

On January 21 the committee proceeded to the Treasury and were received by the Chancellor of the Exchequer. The following points submitted to him by the secretary on the 18th were dealt with seriatim. On the first point, that the Board of Customs should be empowered to exempt from duty arrears existing on April 19, 1901, and subsequently delivered, the Chancellor of the Exchequer stated that he would be prepared to consider cases of great difficulty not necessarily amounting to *force majeure*. On the point of the exemption of shipments in 1902 under contracts made prior to April 19, 1901, he said that any such cases must be stated in writing and would only be considered if they involved ruin. The second point was that extension of period of delivery consequent upon strikes or stoppages should be recognized, and this having been agreed to by the Board of Customs that day, provided it did not extend to shipments beyond December 31, 1901, was not gone into; but on the next point, that interest should be allowed on duty paid on exempted contracts until refunded, the Chancellor stated that the rebate was a bounty, and that interest could not be paid on a bounty. Several other questions relating to the interpretation of the law were also discussed.

NEW BRITISH BLAST FURNACES.—The number of blast furnaces reported in course of erection, or being rebuilt, in Great Britain on December 31, was 70. Of this number 11 were in Scotland, 10 in the South Staffordshire District, 8 in the Cleveland District, 8 in the West Cumberland Mematite District, 7 in South Wales, and 6 in Derbyshire.

*Journal of the Franklin Institute, June, 1899.

†United States Patent 568,323, September 29, 1896.

‡Journal of the Franklin Institute, June, 1899.

*Foerster, Zeitschrift fuer Angewandte Chemie, June 25, 1901.

ANACONDA COPPER MINING COMPANY'S NEW REDUCTION WORKS.

The Anaconda Copper Mining Company's new reduction works at Anaconda, which are about completed and ready to reduce to metal the ores from Butte, are without any doubt the largest, the most complete and the most modern reduction works of their kind in the world. Throughout they have suitable and improved machinery, together with a great many labor-saving devices. This magnificent plant as it now stands is the result of many years' hard study and experimenting by Mr. Frank Klepetko, general manager of the company. His ideas have been worked out by his assistants and the designing engineers into a plant that will be notable in the metallurgical history of the world.

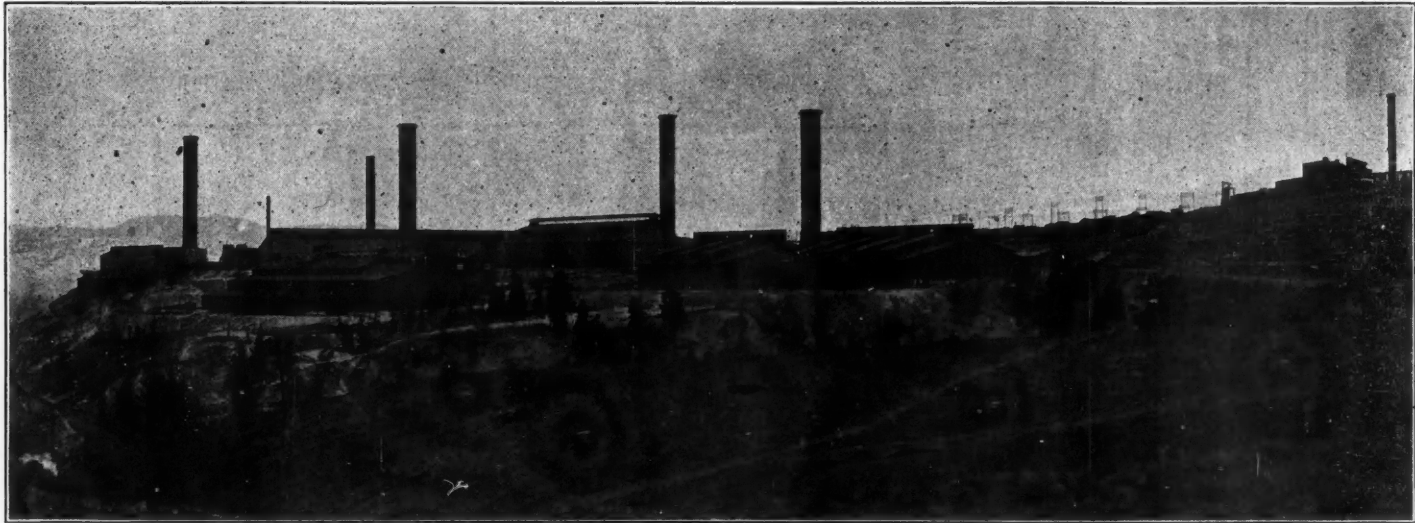
This great work has been accomplished in the short time of 19 months, which is about the time since the ground was first broken for this great undertaking. The credit for the rapid progress as well as the successful completion of this work is due to Mr. C. H. Repath, chief engineer of construction. Through his complete organization, his selection of competent assistants and his faithful work he has been able to keep the work moving at a rapid

Concentrator with Ore-Bins and Storage Bins.—The crude ore as it comes from the mines in Butte is hauled a distance of about 35 miles before it reaches the top of the ore-bins, where it is delivered in big steel bottom-dump cars. The ore-bins are heavy structures 70 feet high, 24 feet wide and 650 feet long, divided into two sets of bins, the upper and lower set. Each set of bins is provided with double standard-gauge tracks for handling the ores from and to the bins. The upper set of bins is made up into 8 bins for receiving the crude second class ores that will be passed through the concentrator direct, and 6 bins that will receive the ores for the sampling mill. The lower set of bins is divided into 16 bins for coarse concentrates and 8 bins for ores that have passed through the sampling mill. A space of 140 feet in the center of the bins has been designed specially for receiving the coal for the boiler house, which is located right in front of the bins.

The concentrator, which was designed and erected under the personal supervision of Mr. W. J. Evans, consulting engineer for the company, is an enormous building covering about 7 acres of ground. This structure is a combination of steel and wood. The concentrator building is divided into two parts, each part being 255 feet wide and 335 feet deep,

This department is fitted with 36 double-compartment Evans jigs arranged in three double rows, each row being provided with four Evans hydraulic classifiers, each classifier making 3 sizes of materials and supplying feed for 3 sieves. In these jigs the first fine separation takes place, the concentrate being separated from the middlings and collected into a main launder, which conveys the concentrate direct to the concentrate storage bins.

The middlings from the jig department are by means of launders converted and conveyed to 2 sets of 40 by 15 rolls in the middling department. This department is fitted with 2 sets of 40 by 15 rolls, as mentioned above, where the materials are crushed to $2\frac{1}{2}$ cubic inches. From the rolls the crushed materials are delivered into a belt elevator and elevated to 4 sets of trommels; the undersize from these trommels is delivered and distributed into 4 Evans hydraulic classifiers, which supply feed to 18 double-compartment Evans jigs arranged in one triple row. Here the same operation takes place as in the jig department. The concentrates, after the separation has taken place, are collected and mixed with the concentrates from the jig department and delivered into the storage bins. The middlings from this department are collected in launders and conveyed to an elevator in the re-grinding



GENERAL VIEW OF THE NEW REDUCTION PLANT, ANACONDA COPPER COMPANY.

speed, and through his direct supervision in conjunction with that of Mr. R. G. Collins, his able chief assistant in the field, all the plans have been fully carried out.

The designing of this great plant was begun in the first part of April, 1900, under the direct supervision of Mr. A. G. Gullberg, in charge of a force of 15 to 20 of the best engineers and draftsmen that could be secured at that time. The engineering staff has been hard at work from the beginning in designing and preparing all the plans; and as the machinery all through the plant is of special design, much work was thrown on the engineering department, and some delay was caused in the delivering of the machinery.

The site chosen for the plant is on a hill side, covering about 300 acres, with sufficient slope of the ground to conveniently transfer the material from one department to the other by compressed air locomotives and tram cars on pretty nearly level tracks. The whole plant consists of 9 separate departments or buildings, as follows:

1. Concentrator department with ore bins and concentrate storage bins.
2. Concentrator power house, with boiler house.
3. Sampling mill department.
4. Roaster department.
5. Reverberatory department.
6. Blast furnace.
7. Converter department.
8. Smelter power house, with boiler house.
9. Briquetting department.

with a space of 136 feet between the two parts where the power house is located. Each part is divided into 4 sections, making 8 sections in the whole mill. Each section is independent, and may be worked as a separate mill. Each section has a capacity of 600 tons of ore per 24 hours, consequently the capacity of the whole mill is 4,800 tons per 24 hours. Each section is divided into 5 departments, or operations, as follows: Crusher department, jig department, middling department, re-grinding department and tables or slime department.

The crusher department is fitted with one 24 by 12-in. Blake crusher, which receives the ore from the ore bin, where the rock is crushed to about 3-in. size, and passed to two sets of trommels for sizing. The oversize from these trommels are spouted into two 15 by 5 crushers, where the materials are reduced to about $1\frac{1}{2}$ -in. size. The undersize from the trommels and the materials from the crushers are delivered into two belt elevators, which elevate all the materials up to the main sizing or trommel floor, where it enters into a series of trommels for the coarse sizing. The oversize from these trommels is delivered to a series of coarse jigs of the Hartz type, where coarse concentrate is made, cleaned from waste and delivered into the coarse concentrate bins, and from these bins the materials are trammed to the blast furnace department.

The gangue from coarse jigs is spouted into two sets of 40 by 15 inch rolls, where the size is further reduced, and it is then elevated and rejigged.

All fine material or undersize from the crusher department is automatically delivered to the jig de-

partment. This department is fitted with four 5-ft. Huntington mills and 18 double-compartment Evans jigs with 4 classifiers. The middlings from the middling department are elevated and distributed into two V-shaped tanks, and from these tanks the Huntington mill receives its feed. In the Huntington mill the materials are ground fine enough to pass through a $1\frac{1}{4}$ -inch screen, and from the mills the material that passes through the screens is spouted into 4 hydraulic classifiers, one for each mill. These classifiers supply the feed for the finishing jigs. Here the same operation takes place as in the jig and middling department. The concentrates are collected and elevated into the main concentrates launder for further transportation. The tailings are by means of launders conveyed to the main tailing launder for further transportation to the tailing dump.

The last department is the table, or slime department, which is fitted up with 35 Wilfley tables, and where all the fines or slimes from the whole section are collected and settled in a number of V-shaped tanks. From these tanks the feed is drawn off through the plugs in the bottom of the tanks and delivered to the tables. The concentrates from the tables are handled and collected by means of shaking launders, in order to eliminate the water; these launders deliver the concentrates to the concentrate storage bins, which are located at the lower end of the mill. The tailings from the tables are led off to the main tailing launder and conveyed to the tailing dump.

The concentrate storage bins which receive the

concentrates from all the sections of the mill are of wood, forming a structure 72 feet wide and 635 feet long divided into 3 rows with 24 separate bins in each row, each bin being provided with a number of gates in the bottom in order to be able to draw off the concentrates into special tram cars that run right under the bins.

Concentrator Power House.—The concentrator power house is located between the two halves of the concentrator buildings, and occupies a space 136 feet wide and 150 feet long. The building is a steel structure with brick walls provided with three 15-ton traveling cranes with a span of 44 feet, running the whole length of the building. The machinery in this power house consists of 2 triple-expansion Nordberg engines, each having a maximum capacity of 3,600 horse-power and ordinary running capacity of 2,000 horse-power. These engines are located, one on each side of the power house, and transmit their power by means of 36 2-in. manila ropes to the main line shaft, which runs the concentrator as well as the electrical machinery. In the center of the power

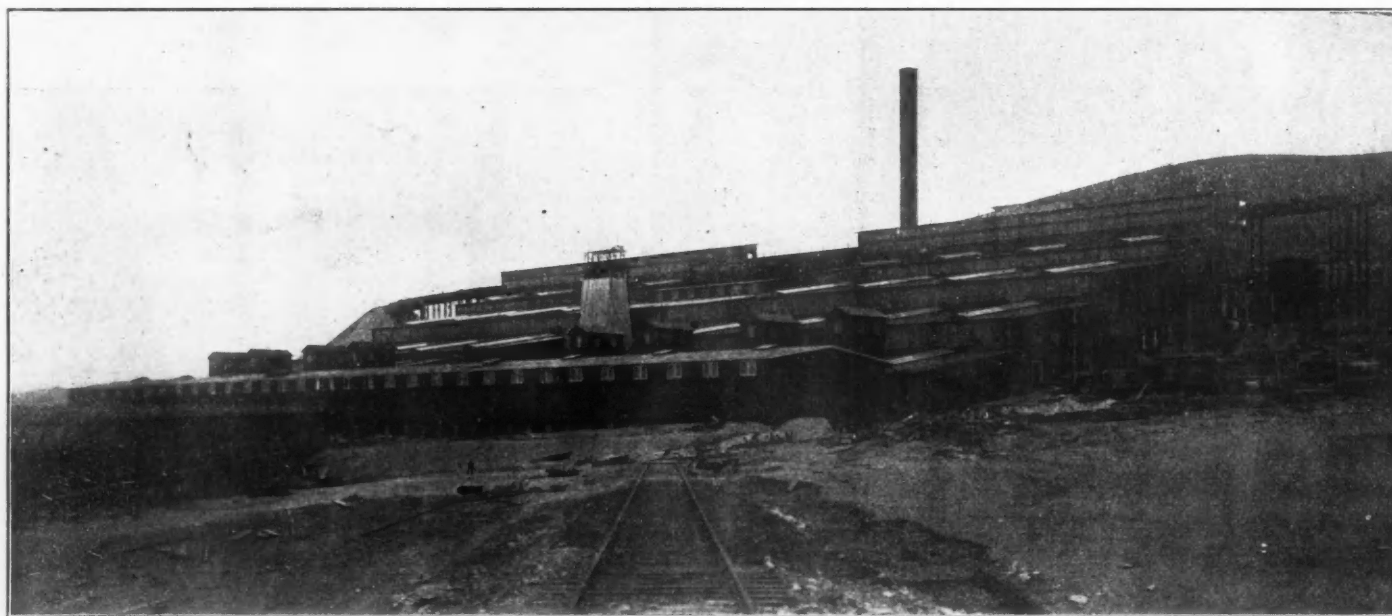
house is a Fraser & Chalmers triple-expansion engine of 1,400 horse-power. This is an auxiliary engine intended for driving part of the electrical machinery in case of a breakdown of one of the Nordberg engines. The power from this engine is also transmitted to the main line shaft by a double leather belt 68 inches wide, the receiving pulley being mounted on a counter-shaft provided with a 84-in. friction clutch. The electrical machinery consists of 2 700-kw. two-phase belted Westinghouse generators, one 500-kw. railway generator, several 100-kw. railway generators and 3 125-light arc machines. All these machines are driven from pulleys mounted on countershafts and provided with friction clutches; the smaller machines are driven from friction clutch pulleys. In this power house all the electric power is generated for the city as well as for the reduction plant. The condensing plant consists of 2 elevated Westinghouse central condensers, each one of ample capacity to take care of all the exhaust steam from the whole plant. The condenser receives its condensing water direct from the main flume, furnishing the water for the concentrator and consequently the system works out very simply and inexpensively. The exhaust steam from the auxiliary pumps—feed pumps, fire pumps and vacuum pumps—is used for heating the concentrator building and also for heating the boiler feed water. For heating the building the Webster heating system was adopted, and has proved very successful; and for heating the feed water 2 open Cochrane heaters are used. The steam for this power house is

furnished by 5 batteries of Stirling water-tube boilers; each battery consists of two 300 horse-power units carrying a pressure of 150 pounds per square inch.

Sampling Department.—The sampling mill is located on the upper side of the ore bins, and is a wood and brick structure 42 feet wide, 60 feet long, and 5 stories high, divided into 2 sections, each section being a separate and complete mill with a capacity of 600 tons of ore per 24 hours. The ores to be sampled are stored in the upper part of the ore bins and transferred to the sample mill by means of electric cars. The ores are fed into a 24 by 12-in. Blake crusher, reduced to about 3-in. size and elevated to a Brunton sampling machine which cuts out a 20 per cent sample, the discard being taken to another elevator and elevated back to the main ore bin. The 20 per cent sample is passed to a 15 by 5 crusher, reduced in size and cut by a No. 2 Brunton sampler, where 20 per cent is taken out again. The new sample is further taken to 2 sets of rolls, and between each crushing operation it passes through a Brunton sampler, where 20 per

The bottom or floor of the chamber consists of steel hoppers where the dust will be collected and drawn off into cars at any time without interfering with the running of the plant. The dust chamber is connected with a self-sustaining brick-lined steel stack 40 feet at the base, 24 feet diameter and 230 feet high above the ground.

Reverberatory Department.—The reverberatory building is a steel structure 184 feet wide, 518 feet long, with a space of 120 feet in the center, where the stack is located, and 20 feet high from the floor line to the charging tracks above the furnaces. In this building are located 14 reverberatory furnaces, each 24 feet wide and 54 feet long, placed in 2 rows, one row on each side of the building with the fire-boxes towards the center of the building, leaving a clear space in the center where the sluices for the ashes and slag as well as the water pipes are located. Each furnace is provided with 5 calcine charging hoppers and one coal hopper. These hoppers are fed from bottom-dump tram cars which run right over the furnaces, and from these hoppers the materials are automatic-



CONCENTRATOR BUILDING, NEW PLANT, ANACONDA COPPER COMPANY.

ally fed into the furnaces. The smelting capacity of these furnaces will average about 120 tons in 24 hours, and the matte is topped off at intervals into special 20-ton ladle cars, which deliver the matte to the converter department for further refining. The slag is skimmed off into big smelting boxes, where it overflows into a stream of water, is granulated and carried off in big sluices to the slag dump.

The smoke and fumes from these furnaces are taken care of by 2 underground flues, one at each side of the building; these flues connect with the big steel stack in the center. This stack is of the same design and size as the stack described in connection with the roaster department.

Blast Furnace Department.—The blast furnace building is a 3-story steel structure, 82 feet wide and 200 feet long, the first floor being the matte track floor. The second is the main operating floor and the third the charging floor. This department is provided with 5 big furnaces 56 inches wide, 180 inches long and about 40 feet high, each having a smelting capacity of 400 tons in 24 hours. The crucible is constructed of heavy cast-iron plates bolted together very strongly, provided with special water-jacket breast and spout. The water jackets, which are hung from heavy beams and connect to the crucible are 12 in number, placed 2 in height, each one 7 feet 6 inches high. The lower jackets are provided with 32 tuyeres 5 inches in diameter.

The charging floor is about 26 feet above the operating floor and provided with a track on each side of the furnaces, the charges being made up at the

cent is taken out each time, leaving the final sample 3.2 pounds per ton of sampled ores.

Roaster Department.—The roaster department, which is located about 800 feet from the concentrator bins, is a steel structure 98 feet wide, 320 feet long and 50 feet high from the floor line to the calcining floor. There are 48 improved MacDougal furnaces in this building; each furnace is about 28 feet high from the floor line to the top, and divided into 6 roasting hearths with a working platform at every other hearth. On top of the furnace is located a big hopper, which received the concentrates from special bottom-dumping tram cars. The hopper is connected to the furnace by means of a special feed arrangement that regulates and supplies the furnace with a constant feed, which can be changed to suit the different ores. Each of these furnaces has a roasting capacity of 40 tons per 24 hours, and the work being done automatically, no fuel being used except when the furnaces are first heated up, after the first is started the ore will supply its own fuel in the form of sulphur. After the ores have passed through the furnace they are automatically discharged into 2 storage hoppers at the bottom of the furnace. In these hoppers the calcines are kept hot till the time they are transferred and dumped into the reverberatory furnaces.

The smoke and fumes from this furnace are carried off through big sheet iron overhead flues. These flues are connected with a big dust chamber 40 feet wide, 300 feet long and 40 feet high, this dust chamber being covered with expanded metal and concrete.

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The smoke and fumes from these furnaces are taken care of by 2 underground flues, one at each side of the building; these flues connect with the big steel stack in the center. This stack is of the same design and size as the stack described in connection with the roaster department.

Blast Furnace Department.—The blast furnace building is a 3-story steel structure, 82 feet wide and 200 feet long, the first floor being the matte track floor. The second is the main operating floor and the third the charging floor. This department is provided with 5 big furnaces 56 inches wide, 180 inches long and about 40 feet high, each having a smelting capacity of 400 tons in 24 hours. The crucible is constructed of heavy cast-iron plates bolted together very strongly, provided with special water-jacket breast and spout. The water jackets, which are hung from heavy beams and connect to the crucible are 12 in number, placed 2 in height, each one 7 feet 6 inches high. The lower jackets are provided with 32 tuyeres 5 inches in diameter.

The charging floor is about 26 feet above the operating floor and provided with a track on each side of the furnaces, the charges being made up at the

storage bins in side-dumping charging cars, which can be dumped from either side, and which are brought in to the furnaces by compressed air locomotive. When a furnace is ready to be charged, the doors, which extend the whole length of the furnaces, are opened by air pistons, and the charging car which is connected to a special air lift dumps the charge into the furnace under perfect control. This way of charging will undoubtedly be of great advantage in many ways, and at the same time is inexpensive compared with other methods. In front of each furnace is located a 16-ft. settler, which receives a continual flow of matte and slag from the furnace. In this settler the matte is separated from the slag and tapped off from the bottom of the settler into the 20-ton ladle cars, in which it is transferred to the converter department. The slag has a continuous flow from the settler into the stream of water where it is granulated and carried off by a sluice to the slag dump.

The smoke and fumes from each furnace are carried off through an overhead steel flue which connects to a dust chamber of the same design and size as that used in the roaster department, the dust chamber being connected to a big stack also the same as at the roaster department.

In connection with this department are the huge storage or stock bins. There are 3 in a row, each one being 30 feet wide, 30 feet high and 500 feet long, and on top provided with double tracks where the materials are brought in tram loads and dumped into the bins. On each side of the bins tracks are also provided in connection with a great number of track scales; on these scales the charges are being made up in the charging cars, weighed and transferred to the furnaces by compressed air locomotives. All the chutes used in these bins are operated by compressed air, and through this arrangement the cars are loaded quietly and easily.

Converting Department.—The converter building is a steel structure 137 feet wide, 416 feet long and fitted with two 60-ton electric traveling cranes with 60-ft. span, one 40-ton electric traveling crane 22-ft. span and one 20-ton electric traveling crane 40-ft. span. The two 60-ton cranes are for handling the converters and hot metal ladles; the 40-ton crane is located about 20 feet above the main cranes, and will be used exclusively for handling repair parts for the main cranes. It also proved to be of great advantage during the erection of the main cranes. The 20-ton crane is placed in the casting department, and will handle all materials in that part of the building. The converter department consists of 2 storage furnaces of the reverberatory type for receiving matte from the reverberatory and blast furnace departments; 8 converter stands with converters; 3 casting furnaces with special casting machines for casting anodes and pig copper; two slag casting machines; the clay mill and converter lining department.

The storage furnaces are arranged in such a way that smelting can be done in them if desired. Directly over the furnaces is the charging floor, with double-track system, where the 20-ton ladle cars are brought with matte from the reverberatory and blast furnace department. If one of the converters should be in commission when the ladle cars are brought in and not be able to receive a direct charge from the ladle the metal is poured into one of the furnaces, and whenever a charge is needed the metal is tapped from the furnace into a ladle and the converter is charged from one of the main cranes. In most cases the converters are supposed to be charged direct from the ladle cars by means of special swinging cranes and spouts which are turned into the mouth of the converter when charged. The big converters used in this department are of the barrel type 8 feet in diameter and 13 feet long, fitted with 18 1/4-in. tuyeres and special ball closing valves. The converters, when in the stands, are operated by very powerful hydraulic tilting arrangements; out of the stands they are handled by the main cranes. When a converter charge is blown and the slag skimmed off, the matte is poured into a ladle, this ladle being picked up by the crane and the metal poured into

one of the casting furnaces. The casting furnaces are of the refining furnace type, each furnace holding about 75 tons of metal. The metal from these furnaces is drawn off from the front and tapped direct into anode or pig moulds, as the case may be; the moulds are mounted on traveling carriages, which are moved by hydraulic mechanism of a very ingenious design. The anodes or pigs are automatically taken through a water cooling tank and loaded on to railroad cars ready for shipment. The slag skimmed off from the converters is transferred to a slag casting machine—which is a novelty—and cast into small bricks, which are automatically delivered into steel bins and ready for the blast furnaces.

The clay and lining department is located in one end of the building, and consists of crushing and grinding machinery for grinding the materials used for converter lining to a fine pulp. After they are properly mixed the material is shoveled into the converter and the lining tamped in by a special tamping machine at a very rapid rate. The smoke and fumes from the converters are carried off in big overhead steel flues, which are connected with a dust chamber and steel stack of the same design and size as described above.

Smelter Power-House.—The power for all the smelting departments is furnished from one central power-house located conveniently to be reached from the different departments. The building is a steel and brick structure 80 feet wide and 500 feet long, provided with a 15-ton electric traveling crane running the whole length of the building. The machinery in this building consists of one Nordberg triple-expansion engine and a compressor with a capacity of 20,000 cubic feet of free air per minute. This engine furnishes the air for the converter plant at a pressure of 13 pounds per square inch. Four Nordberg compound engines are directly connected to No. 10 Connersville blowers, each blower having a capacity of 30,000 cubic feet of free air per minute. These blowers furnish the air for the blast furnaces at a pressure of 30 ounces per square inch. There is besides one Nordberg compound engine having a capacity of 400 horse-power; also 3 air compressors of small sizes, which furnish the air for the locomotives as well as all the air lifts.

The steam for this power-house is furnished by 6 batteries of Stirling water-tube boilers of the same capacity as those used at the converter power-house and covering the same steam pressure. The launders and feed-water heaters as well as all auxiliaries are a duplicate of the machines used in the concentrate power-house.

Briquetting Department.—This department is more or less considered as an experimenting plant, where the sluices and flue dust will be made into small briquettes for blast furnace product. The plant is fitted with two briquetting machines having a capacity of 100 tons per 10 hours, also with dryers and conveyers, all of special designs, which handle the briquettes automatically from the machines to the storage bins direct. This plant will prove very interesting when in full operation.

Conclusion.—It might be of interest to mention that in the construction of this mammoth plant there has been used about 20,000 tons of structural steel and cast iron, 25,000,000 feet of lumber, 1,000 cars of brick and 50,000 yards of masonry, while about 300,000 yards of excavation were required.

CHLORATE OF POTASH AS AN EXPLOSIVE.—At a recent meeting of the London section of the Society of Chemical Industry, Dr. Dupré contributed a paper in which he detailed some experiments which go to show that chlorate of potash is explosive by itself; that is to say, when a bead of chlorate is suddenly heated to a high temperature by passing an electric current through a loop of platinum wire in which the bead is held an explosion results. The chairman, Mr. Otto Hehner, said that nobody could get away from the fact that chlorate of potash would explode, and the sooner the manufacturers recognized it the better for them.

A BRIQUETTE PLANT IN NEW MEXICO.

BY OUR SPECIAL CORRESPONDENT.

About 50 men are employed in the construction work and the placing of machinery for the new briquette plant at Gallup, N. M., for the Colorado Fuel and Iron Company. The briquette plant has been experimented with in a small way for some time, but the managers confess they do not thoroughly understand how to secure the best results, and as a consequence they are sparing neither time nor money to make this plant perfect. They term this an experimental plant, and in the event they succeed putting it on a paying basis they expect to place in that vicinity a plant which will cost \$50,000. When the present structure is complete and the machinery adjusted they will have expended over \$40,000, and to keep this sized plant in operation it will require about 100 men working an 8-hour day in the mine and 25 men in the building.

The object of the company is to utilize the stock coal that is screened at the mine, and should the amount of slack be sufficient for the constant operation of the plant, large coal can be used to profitable advantage. It has been claimed the by-products—carbon, gas, ammonia, and a small amount of benzine—will more than pay the cost of the operation of the plant, and the briquettes, which are 3-in. cubes, will be in great demand when once on the market. The engineers of the Santa Fé Pacific are running surveys for a new spur from the main line to the works. About 400 tons of slack will be reduced to briquettes each day during the experimental campaign.

TREATMENT OF BLACK SANDS IN NEW ZEALAND.—The Department of Mines of New Zealand gives notice that a bonus of £2,000 will be paid to any person who before January 1st, 1904, shall invent such appliances as will successfully save gold from black sands in New Zealand. The bonus will be paid on compliance with the following conditions:

1. The invention shall, in its main features, differ from all machinery and appliances at present in use for the saving of gold, whether coarse or fine.

2. It shall be readily transportable from place to place, and shall be capable of utilizing local water for all its requirements.

3. The invention must be capable of treating not less than 30 cubic yards an hour of black sand or any coarser material up to a diameter of 4 inches; and it must be capable of treating such material profitably where there is not more than a value, in gold, of 3 pence per cubic yard; not less than 80 per cent of the gold contained in the material to be recovered by the machine.

4. No bonus to be paid until the invention has been continuously worked for not less than six months, and it shall, during that period, have treated not less than 100,000 cubic yards of material, working three shifts a day.

5. The bonus will be paid on the certificate of an officer that not less than 20 persons other than the applicant for the bonus are successfully working the invention.

6. Any person who receives the bonus shall not be allowed to take out patent rights in New Zealand for his invention.

Applications should be addressed to Hon. James McGowan, Minister of Mines, at Wellington, New Zealand.

MOVING MACHINERY IN A WILDERNESS.

—The London *Engineer* says that the Societe Miniere et Commerciale de Satadougout, French West Africa, had to send across Senegal a complete dredging and excavating plant, weighing nearly 100 tons, for the gold bearing placers on the banks of the river Faleme. The twelve wagons containing it were run on 600 meters of rail that were successively taken up from behind and laid down in front, in which manner nearly 200 kilometers were traversed in two or three months, under the direction of engineer Moufflet, notwithstanding great difficulties of all kinds.

THE MINING REVIVAL AT TOMBSTONE.

SPECIAL CORRESPONDENCE.

The ENGINEERING AND MINING JOURNAL has frequently referred during the past year to the fact that a revival of the well known mines of Tombstone, Ariz., was contemplated or begun. The present project is one which is worth the attention of your readers both from its magnitude and the intelligent manner in which it has been conceived. Already the first step is completed, the sinking of a shaft to water level, and machinery for the surface and for pumping is arriving at the mines.

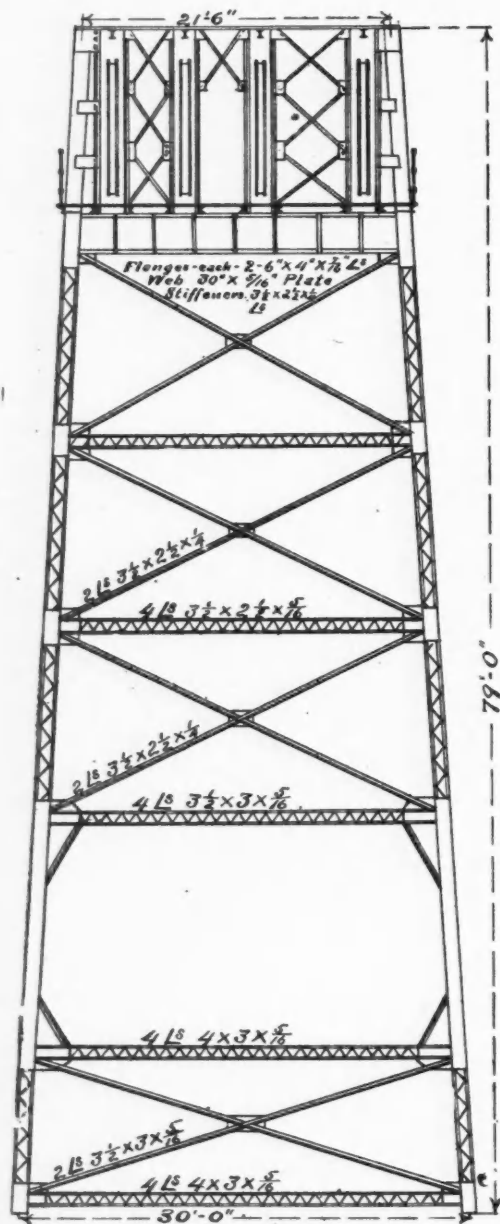
It is generally known that mining in this district began to fall off very seriously after a few months

as much as the two old ones. Another great advantage is in the use of California and Texas oil, which is abundant now, for fuel.

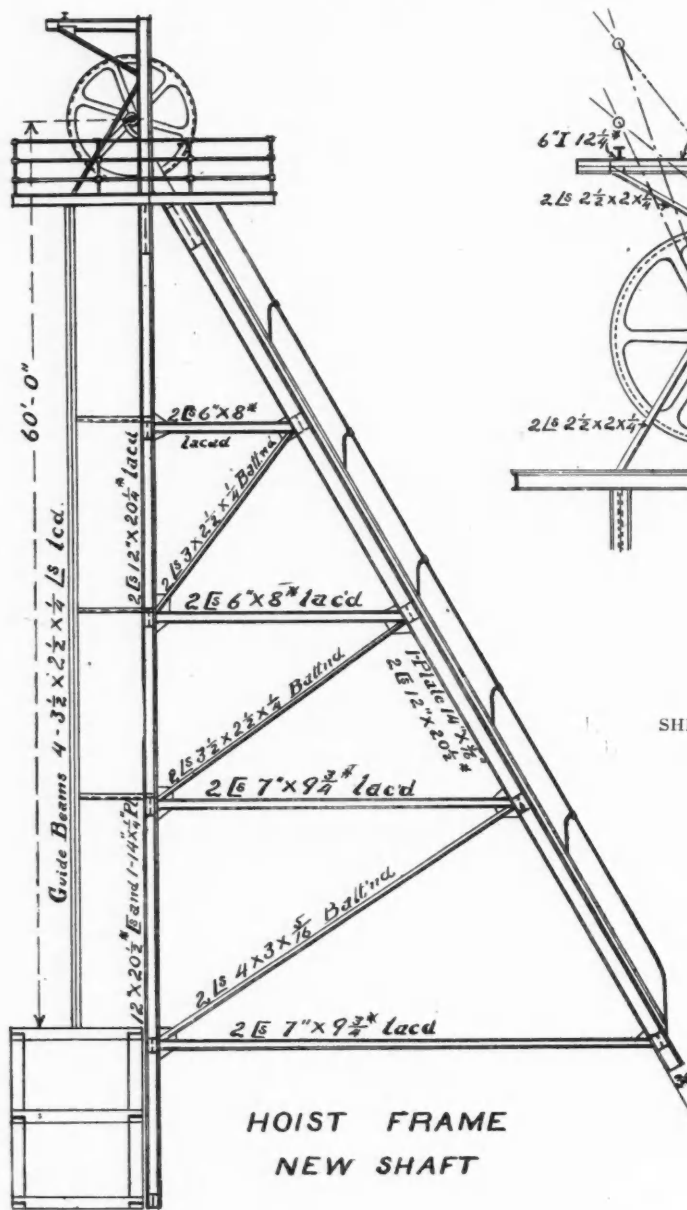
All these details have been studied with the greatest care, and the plans are as follows: Two Prescott direct-acting, triple-expansion pumps, made by the Prescott Steam Pump Company of Milwaukee, will be placed at the water level, and will receive water from four sinking pumps, each of 800 gallons per minute capacity, which will follow the water down. A fifth sinker will be in reserve, and, of course, one of the main pumps is a reserve. This large reserve capacity is provided partly to meet contingencies while sinking and partly to have a

head gear, made by the American Bridge Company of New York, which has made work of this kind a specialty. The head-frame is illustrated in the figures, and is designed with all the advantage of experience. The uprights are made of channel beams joined by plates, the stiffeners of channel beams laced and the braces of angle irons. From the shaft to the center of sheaves the height is 60 feet, the spread of the sheave columns 30 feet, and of the back frame 3 feet. The width of the latter is 28 feet 8 inches. Sheaves are 8 feet in diameter.

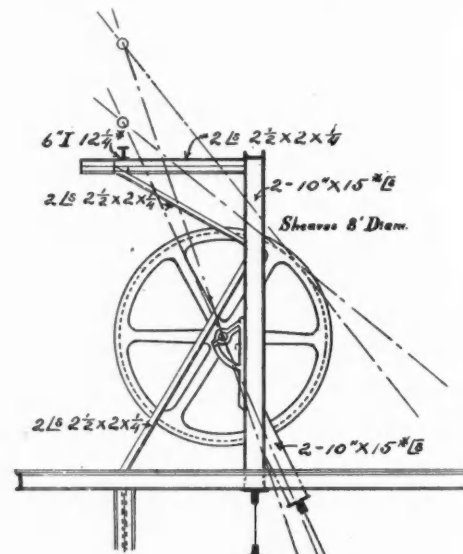
For handling pump material a double-cylinder engine 16 by 24 inches, geared to a capacity of 60,000 pounds, will be used. The hoist engine, a double



HEADGEAR, TOMBSTONE MINES.



HOIST FRAME
NEW SHAFT



SHEAVES FOR HEADGEAR,
TOMBSTONE MINES.

of pumping, and was further reduced by two fires which destroyed the pump and shaft houses of two out of the three most productive mines.

The old pumps were of the Cornish pattern, and were exceedingly costly, both to build and run, but they discharged 1,100 gallons a minute, which some readers may think ought to have been enough to dry up a desert, and it was effective. The mines were carried down 100 feet below water level, and important discoveries of ore are made, but the work was very costly. Tombstone was dependent for fuel on scanty forests 18 and 20 miles away, and hauling was the only way of bringing the fuel in.

In the 15 years which have elapsed the art of pumping has made great strides, and it is possible to install and operate pumps now for much less than at that time. In fact the new pumps, which will throw 1,750 gallons a minute, will not cost a third

pump ready for the 1,000-ft. level. When that depth is reached two 800-gallon-per-minute pumps in addition will be installed there to throw direct to the surface so that there will be a double line.

The pumps are duplex, and have two each of steam cylinders 39, 23 and 15 inches in diameter. Water plungers are 13 inches, and the stroke is 24 inches. Pumps of this size are 33 feet 7 3/8 inches long, 9 feet 8 inches wide and more than 6 feet high. Others of the same make proportioned for a 1,000-ft. lift are already ordered. The shaft in which they will be set is 569 feet deep to water level, and as the plan shows it has 2 hoist compartments 4 by 7 feet in the clear and 2 pump compartments 5 feet 9 inches by 7 feet. This shaft is heavily timbered, and was completed in less than five months from the start.

Over it will be built a steel shaft house and steel

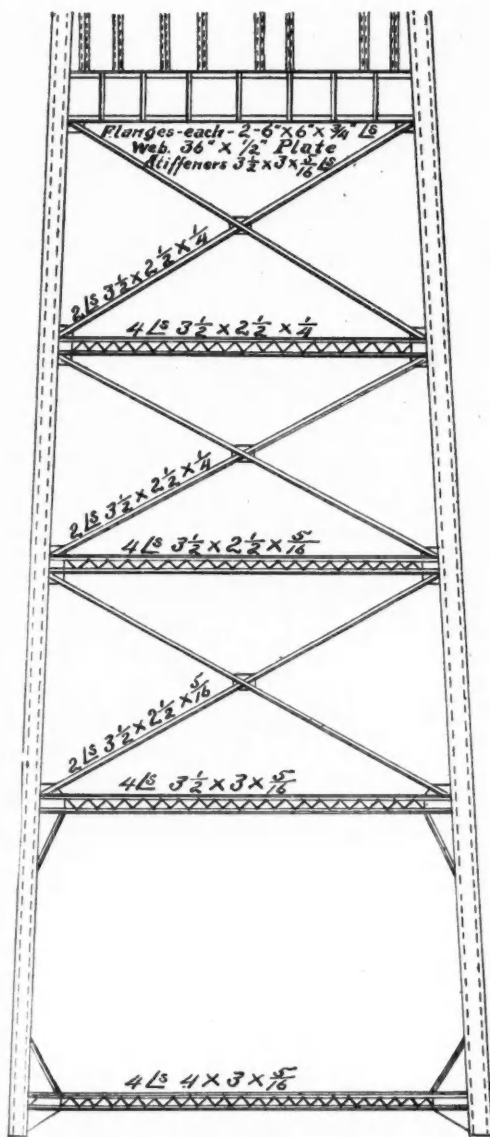
cylinder 16 by 60 inches, with reels for flat rope, is already on hand.

Though the lift is moderate this is a fine and powerful plant especially designed to meet sudden rushes of water which former experience shows may be expected. The first object is to throw out water, for the men who have the management of this enterprise, and who are veterans in Tombstone work, have no doubt that once out it will not return. Tombstone, though its pumping days were few, has had the usual experience of mines in the arid region. Though the pumping stopped 16 years ago the water has never returned quite to its old level.

Their experience gives them confidence in the mines, but it was hopeless to attempt an undertaking in which the benefits would accrue to parties who did not share their cost, and no move was made until the control of all the noted mines had been

obtained. Now the Tombstone Consolidated Mines Company has the Contention, Grand Central, Head Center, Tranquillity, Goodenough, Toughnut, West Side, Lucky Cuss, Emerald and nearly 60 other mines, and any one familiar with the district will recognize in those given the names of the most noted producers of old days.

Tombstone is not a camp where a mine can be found by digging anywhere, as I have heard it strongly asserted in other camps. There is a definite law of deposition here, and the mines named above cover the most noted lines of ore deposition. In fact out of the \$25,000,000 which this camp produced the Tombstone Consolidated Mines Company has the properties which yielded \$24,000,000.



HEADGEAR, TOMBSTONE MINES.

The mines occupy a series of sedimentary rocks about 2,800 feet thick, and consist of flat deposits in limestone and of vertical veins that cut through the strata and have been found all ore bearing down to the depth of 650 feet, where the water level is found. The pumping operations of 1884 permitted a further depth of 100 feet to be reached, and at 75 feet a drift was run in a good ore body especially rich in gold. Improvement in the proportion of this metal was noticed in other mines also above the water level.

All the formations to be passed through have been opened at various points on their outcrop, and in most of them important mines were developed. The prospects of the camp are, therefore, good for a successful future, and the projectors of the enterprise who bring to their task the invaluable teachings of experience in these very formations are confident that Tombstone will take its place again among

the prominent mining districts. They have suffered from delays in filling contracts for machinery which for the last year have annoyed every enterprise of the kind, but now they have passed that stage. Their machinery is arriving, and work will proceed steadily.

Though Tombstone is only 10 miles from the railroad, it is very necessary to have rail communication to the camp for operations of this sort, and if it is not obtained from the Southern Pacific or the new El Paso & Southwestern road building by Phelps, Dodge & Company, they will provide it as an adjunct to their own enterprise.

Skill, confidence, vigor and abundant means are strong factors of success, and when applied to a carefully studied formation which has been so productive as Tombstone, they give reason for anticipating a brilliant outcome. The best ore-carrying strata have not been reached in the vertical veins, being under water there, and the new operations will be watched with eagerness by those who know the camp to see what the situation will bring forth.

NEW YORK EXPORTS IN JANUARY.

January exports of mineral products and their manufactures were with few exceptions less than those for December and January, 1901. This decrease is partly accounted for by the heavier home consumption, especially of iron and steel, which is taking much of the production that was formerly exported.

On the other hand, it is gratifying to note that American goods are growing in favor in European countries that formerly supplied us with similar manufactures.

In the table herewith, which shows a total value of \$9,896,996, the foreign trade in iron and steel and machinery alone represented \$3,458,416, or 35 per cent., which went chiefly to British markets.

Compared with December the exports of iron and steel manufactures show quite a decrease, excepting in steel hoops and bands. The movement in wire alone fell off 5,905,777 pounds, or over 32 per cent.

cross quite a good business has been done, principally with England.

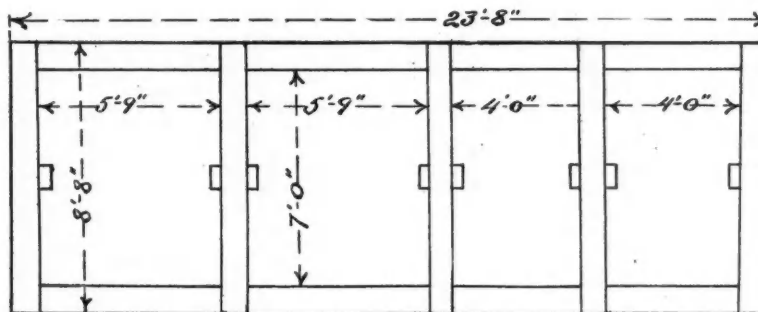
Nickel, although it shows an increase of 69,465 pounds over December exports, is 141,860 pounds less than January, 1901. Belgium and Italy were the largest recipients, though some quantities were also sent to Holland and England.

NEW YORK EXPORTS IN JANUARY.

Articles.	Quantity.	Value.
Acids	.....	\$14,907
Ashes, Pot and Pearl, lbs.	98,616	4,494
Asbestos	.....	11,366
Aluminum	.....	2,175
Cement, bbls.	13,469	18,647
Bricks, fire and building	.....	4,952
Coal, Anthracite, tons	1,355	6,613
Coal, Bituminous, tons	3,909	12,366
Coke, tons	.....	161
Copper, ore, tons	2,268	231,231
Copper, ingots, etc., lbs.	16,218,091	1,971,228
Copper manufactures	.....	47,644
Copper sulphate, lbs.	1,564,294	62,460
Explosives	.....	78,313
Iron, pig, tons	755	14,600
Iron, scrap, tons	.....	392
Iron and steel bars, rods, lbs.	1,171,894	34,663
Iron and steel sheets, lbs.	341,993	10,081
Iron hoops, bands, lbs.	516,240	11,126
Iron and steel wire, lbs.	12,268,593	265,227
Iron and steel manufactures	.....	332,725
Iron, structural, lbs.	1,334	93,230
Iron and steel nails, etc., lbs.	3,764,746	77,574
Steel rails, tons	1,325	34,456
Tin plates, lbs.	9,836	846
Machinery, electrical	.....	274,998
Machinery, metal working	.....	284,812
Machinery, not specified	.....	935,575
Electrical appliances	.....	376,980
Pumps	.....	181,375
Engines	.....	129,481
Boilers	.....	91,899
Pipes and fittings	.....	308,376
Lead, pigs, etc., lbs.	4,602	340
Lead manufactures	.....	8,092
Mineral oils, gals.	48,899,845	3,484,947
Nickel, lbs.	397,283	108,365
Lime, acetate, lbs.	3,368,285	51,047
Phosphate rock, tons	1,000	11,130
Marble, manufactured	.....	39,832
Roofing slate	.....	30,643
Paints	.....	74,231
Salt, lbs.	48,239	520
Zinc ore, tons	2,058	60,000
Zinc, pigs, lbs.	671,149	29,938
Zinc mfrs.	.....	671
Zinc oxide, lbs.	570,291	28,065
Zinc dross, not specified	.....	21,235
Tin manufactures	.....	22,467
Total value	.....	\$9,896,996

Coal exports were less than December, but somewhat larger than January, 1901, yet the trade is still limited.

Mineral oil shows a decrease of 8,327,709 gallons as compared with December. Exports this year were chiefly to Holland, France and England.



PLAN OF SHAFT, TOMBSTONE MINES.

The exports of fine copper were 3,545,234 pounds greater than for December, but they show a falling off of 635,112 pounds as compared with January, 1901. The value in January, 1902, on the other hand is \$1,065,079 less than in December, owing to the cut in the price of the metal.

Of the countries receiving fine copper this year, England leads with 9,965,621 pounds, followed by Holland with 3,476,462 pounds, France with 842,377 pounds, and Russia 751,557 pounds.

Copper ore exports in January were 511 tons larger than December, and 1,981 tons better than January, 1901. In 1902 these exports were to England. Copper sulphate shipments show an increase of 1,358,137 pounds over December, but as compared with January, 1901, they show a considerable falling off, owing chiefly to the small exports to Italy. Greece was the largest recipient this year, importing 746,755 pounds, or nearly one-half of the total for January.

Spelter and zinc ore exports were larger than last year. The former went chiefly to England, while the zinc ore was destined to Holland. In zinc

Exports of asbestos are widely distributed, quantities going to South Africa, Belgium, England and the West Indies.

OUVAROVITE.—An interesting discovery of richly colored ouvarovite is reported near Carrville, Trinity County, California. It occurs in small dodecahedral crystals, from 1 to 3 mm. in diameter, of the richest deep green coating seams or cavities in chromic iron. These were at first mistaken for emeralds, and announced as such, causing considerable excitement for a time, but their form and association are conclusive as to their being chrome garnet. So far, the crystals obtained are small, but as an addition to the gem-stones of the United States, and as mineralogical specimens they have great interest.

The beautiful new variety of garnets from Cowee Valley, North Carolina, called rhodolite, intermediate in composition between almandine and pyrope, continue to be mined as one of the most interesting of American garnets.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

LIABILITY WHEN MINOR IS EMPLOYED IN MINE.—Between the ages of 7 and 14 years a child is *prima facie* incapable of exercising judgment and discretion, and therefore incapable of being guilty of contributory negligence; but in an action to recover for the alleged negligent killing of a child between the ages of 7 and 14, evidence of capacity may be received, contributory negligence imputed, and such negligence shown in defense of the action; but the mere fact that a boy of 14 was shown to be "bright, smart and industrious," without more, is insufficient to overcome the presumption of the want of judgment and discretion which his age *prima facie* implied.—*Tutwiler Coal, Coke and Iron Company v. Enslin* (30 *Southern Reporter*, 600); Supreme Court of Alabama.

DUTY ON FURNACE SAND.—An article known as furnace sand, which is produced by grinding silica stone or sandstone and is used in making the bed of a furnace, to protect it from injury by heat, is free of duty under the provision in paragraph 671, tariff act of 1897, for "sand, crude or manufactured, not otherwise provided for." The expression "sand manufactured" embraces not only sand which is partially manufactured, but also sand produced by a process of manufacture.—*Appeal of Dana & Co., from Collector of Customs at Boston; Board of General Appraisers.*

LIABILITY OF COAL MINING COMPANY IN PENNSYLVANIA.—Where a miner in Pennsylvania, acquainted with perils of crossing a mine's haulage way in which cars were run, was injured by a car while necessarily crossing such way, the fact that he had previously notified his mining foreman, made by the law of Pennsylvania and the decisions of its courts, his fellow servant, of the defects which contributed to his injury, and knew that such defects had not been remedied by such foreman, precluded him from recovering for such injury on the ground that his employer had neglected to furnish a safe place in which to work.—*Berwind-White Coal Mining Company v. Szotak* (72 *New York Supplement Reporter*, 647); City Court of New York.

WHEN MINE BOSS DELEGATES HIS DUTIES.—Where a mine boss who has control of a mine, with power to hire and discharge employes, instead of performing his duties in and about the operation of such mine himself, enjoins the performance of such duties on a miner in his employ in such mine, such miner as to the performance of such duties, is not the fellow servant of other miners, but as to them, stands in the same relation as the mine boss, and the latter is chargeable with whatever notice such miner has or ought to have while so performing the duties of such boss. The company is chargeable with whatever such mine boss, or his substitute, knows or ought to know in the operation of such mine.—*Wellston Coal Company v. Smith* (61 *North-eastern Reporter*, 143); Supreme Court of Ohio.

SUFFICIENCY OF COMPLAINT BUT ERRONEOUS INSTRUCTIONS.—A complaint by a coal miner for injuries done by the breaking of a pulley, which stated that the pulley was wholly insufficient in both size and strength; that the defects were so located and concealed that the miner could not discover them, and that he had no knowledge of same; but that the company did know of such defective dimensions and strength, sufficiently describes the defects to maintain the action for damages resulting from the breaking of such pulley whereby such miner was injured. It was, however, error for the court to instruct the jury that if the pulley was insufficient, as alleged, and the company knew it, or could have known it by the exercise of ordinary prudence, the miner could recover; since the instruction authorized

a recovery without requiring proof that the miner had no knowledge of the defect.—*Indian Bituminous Coal Company v. Buffey* (62 *Northeastern Reporter*, 279); Appellate Court of Indiana.

EFFECT OF ENTRY OF MINING CLAIM.—After entry of a mining claim in the land office, a re-location of the premises cannot be made by another so long as that entry stands; and such a re-locator acquires no rights, of possession, or otherwise, which will sustain a suit by him in the courts to compel a conveyance to him of the legal title. If the patent is not issued at once, it is because the magnitude of the business in the land department causes the delay. But such delay in the mere administration of affairs does not diminish the rights flowing from the purchase, or cast any additional burdens on the purchaser, or expose him to the assaults of third parties. With one voice the courts hold that when the right to a patent exists the full equitable title has passed to the purchaser, with all the benefits, immunities, and burdens of ownership, and that no third party can acquire from the Government interests against him.—*Neilson v. Champaigne Mining & Milling Company*. (111 *Federal Reporter*, 655); United States Circuit Court, District of Colorado.

IMPLIED DELEGATION OF AUTHORITY BY DIRECTORS OF IRON COMPANY.—The president of an iron works corporation entered into a contract for the purchase of ore for the works in accordance with the usual course of the business of the company, and in the same manner that other similar contracts had been made. He signed the contract for the company, and also for a firm, of which he was a member, as agent for the seller. The firm was the owner of \$50,000 of the stock of the company, which was one-fifth of its entire capital stock, and was also its creditor for \$45,000. The firm's commission on the sale was \$1,500. The contract was executed in December, and the ore was deliverable monthly during 12 months beginning in May following. There were monthly meetings of the directors afterwards, and there was evidence tending to show that the contract was reported to and discussed by the board, and that the individual directors had knowledge of it previously; but such evidence was contradicted. There was also evidence of the existence of a de facto executive committee, of which the president was a member, which authorized the contract, and also made others of a similar character at the same time and prior thereto, all of which had been recognized and treated as valid. No formal action was taken by the board of directors on the contract in question until the following December, after a part of the ore had been delivered and paid for, when the board passed a resolution repudiating the same. It was held that the fact that the president acted in a dual capacity did not, under such circumstances, render it void, but only voidable, unless there was proof that his conduct was unfair, oppressive or fraudulent toward the company; that the question whether the contract was authorized by the board or ratified, either by consenting to same or by failing to disaffirm within a reasonable time were for the determination of the jury. While a corporation cannot incur an obligation without the authority or consent of its board of directors, such authority may be delegated to the executive officers with respect to certain classes of transactions, as well as to a particular transaction, and a corporation may be bound by a consent implied from a course of conduct permitted and recognized by its directors. A voidable contract of this kind may be ratified either by express resolution or by action of the board as an organized body, taken with full knowledge of the facts which treats it as in force; and a failure of the board, having such knowledge, to disaffirm it within a reasonable time, will amount to a ratification.—*Salem Iron Company v. Lake Superior Consolidated Iron Mines* (112 *Federal Reporter*, 239); United States Circuit Court of Appeals.

ABSTRACTS OF OFFICIAL REPORTS.

Mass Consolidated Mining Company, Michigan.

This company's report covers the year ending December 31, 1901. The financial statement shows cash on hand January 1, \$97,984; receipts from copper sold, assessments, etc., \$576,500; total, \$674,484. The payments were: Underground expenses, \$211,277; stamp mill expenses, \$24,302; new buildings, equipment and machinery, \$308,435; smelting and marketing copper, \$26,012; general expenses, etc., \$7,576; total, \$577,603. This left a balance of \$96,881 at the close of the year.

The mining work done during the year included 491 feet shaft sinking, 1,422 feet cross-cutting and 5,103 feet drifting.

In their report the directors say: "During the past year construction and development work on your property has been pushed to the utmost, with the idea of making the mine enter the list of producing properties at the earliest possible moment. The stamp mill has been completed and one stamp placed in operation with a second head now being placed on the foundations. A large dock has been constructed and a sufficient depth of water obtained to permit the largest vessels alongside. This will greatly cheapen the cost of freight on coal and mineral, which will make a large saving to the company. At the mine the surface work has been completed and everything is working in a satisfactory manner. We have rock house facilities to handle the output of the three shafts we are working. We have ample boiler capacity, improved machinery properly housed and have used every endeavor to equip the mine with the most improved facilities for economical mining.

"The underground work has been pushed, but much more must be done before the mine can give the best results. The first stamp was placed in operation about August 1, and while a great deal of rock has been run through the mill which in active mining would not ordinarily have been treated, the percentage of mineral in the lodes is proving satisfactory. The most important reasons for running so much of the poorer copper-bearing rock was for the purpose of ascertaining, as far as possible the silver values contained in the rock, and our experiments have been satisfactory and we expect to make the silver a very valuable by-product, thus reducing materially the cost of making copper. Notwithstanding the fact that the one stamp has not been run to its full capacity and that a large amount of poor rock has been run through the mill (which would not otherwise have gone through), we have produced nearly 1,000,000 pounds of copper."

American Iron and Steel Manufacturing Company.

This company owns extensive rolling mills and other manufacturing property in Reading and Lebanon, Pa. The report is for the year ending December 31, 1901. The balance sheet at the close of the year is as follows:

Preferred stock.....	\$3,000,000
Common stock.....	1,700,000
Accounts payable.....	600,323
Undivided profits.....	184,318
Total liabilities.....	\$5,484,641
Plant and equipment.....	\$3,597,847
Goods, material, etc., on hand.....	1,269,840
Accounts receivable.....	512,785
Cash on hand.....	104,169
Total assets.....	\$5,484,641

Dividends paid were \$150,000, or 5 per cent, on the preferred stock; and \$187,000, or 11 per cent, on the common stock; making a total of \$337,000. President J. H. Sternbergh's report says:

"During the calendar year 1901, this company manufactured 117,661 net tons of bar iron and steel. Of this quantity we sold 36,469 net tons merchant bar iron, and of the remainder we manufactured and sold 62,106 net tons of miscellaneous finished goods, bolts, nuts, rivets, etc. Our total sales of all products for the year amount to \$4,754,560.

"We have sold the real estate and buildings of our North Reading works and shall move most of the

machinery to Lebanon and concentrate more of our work at this point. We are glad to state that we are realizing many of the advantages anticipated when our constituent companies consolidated in August, 1899. Referring to our financial statement on the preceding page, we beg to explain that ordinary repairs and renewals of buildings and machinery are charged monthly to operating expenses, and new construction to plant and equipment. The company's credit is first class. We pay for all of our purchases promptly, and discount our bills whenever possible.

"We are obliged to practically rebuild much of our Central Works, including the erection of a new nut shop, 201 by 184 feet; a new bolt shop, 201 by 150 feet; an additional warehouse, 300 by 70 feet; an electrical power and pumping plant, 95 by 60 feet; a water tower 20 feet diameter, 70 feet high; a pattern storage warehouse, 107 by 50 feet; a new bolt threading shop, 200 by 74 feet; a galvanizing shop, 106 by 40 feet; a new scrap iron shed, 230 by 80 feet; and other buildings, besides the complete re-arrangement of railroad tracks through the grounds for the more economical handling of materials, and the substitution of modern steam boilers and furnaces for the less efficient types heretofore used, and, in general, the repairing of nearly all the engines and bolt and nut machinery at the Lebanon works. Much of this work has already been done, and when all of the above improvements are completed we shall be able to execute our orders much more satisfactorily and economically."

Trimountain Mining Company, Michigan.

The report of this company for the year ending December 31, 1901, shows receipts as follows: Balance from previous year, \$262,376; assessment No. 1, balance, \$241,676; interest, loans, etc., \$74,018; total, \$578,070. Payments reported were: Mining expenses, \$234,984; new construction and equipment, \$250,936; supplies, etc., \$40,375; general expenses, taxes, etc., \$42,465; total, \$568,760, leaving a cash balance of \$9,310 at the close of the year.

President Fay says for the directors: "During the past year work at both the mine and the mill has been carried on practically as indicated in the last annual report, and substantial and encouraging progress has been made in all departments. At the mine itself work below ground has been pushed continuously by shafts, drifts, and cross-cuts, a total of over 13,000 feet now being opened—and this is being continued at the rate of about 1,000 feet a month. The quality of the rock encountered more than meets our expectations, and it is worthy of note that the longest level north of No. 3 shaft is fully as rich as any in the mine. As the three shafts now opened cover less than one-half of the outcrop of the lode, we still have ample room for expansion in this direction. By our present arrangement with the Arcadian mill we have the advantage of sending rock from the shafts and drifts direct to a mill instead of dumping on the surface to be rehandled later. Stopes are also being cut out, thus preparing the mine to furnish the necessary rock to our own mill when it starts.

"At the mill, Mr. Uren, the assistant superintendent, has devoted his whole time and attention, as planned, to the work of construction and equipment. There was some unexpected delay in the completion of the railroad to the location and in obtaining structural steel, etc., when needed, but the work has progressed favorably withal, and no reason is now apparent why the plant at this point should not be in commission the coming Summer. Hoisting and other machinery, which has been sufficient for the development work, must soon give place to more powerful equipment, in order to keep pace with the rapid growth of the mine and the larger demands to be made on it in the near future by the completion of the mill. The initial expense for this will be heavy, but the work being done both at the mill and the mine, above ground and below, is of the most modern, permanent and substantial character, and we believe a generous outlay in the beginning will prove a wise investment in the economies of production thus made possible.

"In regard to the future of the property, although we have as yet no returns from the smelter, the directors had hoped to lay before the stockholders at this meeting figures based on the results of the five weeks' mill run, in which there have been stamped about 14,000 tons of rock, taken from drifts and stopes in all parts of the mine. These returns, however, have been so unexpected and remarkable that we deem it good and conservative policy not to make them public at this time. . . . This, we understand, is an extraordinary statement for a management to make to its stockholders, but is based on the extraordinary conditions which have developed since stamping began. Therefore we think that until we have stamped a much larger quantity of rock, stockholders should be satisfied with our statement that the test has been conservatively and fairly made, and although the mill returns have far exceeded all our former estimates, we are led to believe these remarkable returns will continue."

National Lead Company.

The report of this company, which owns a number of plants making white lead, covers the year ending December 31, 1901. The balance sheet at the close of the year and of the previous year was as follows:

—Assets—			
	1900.	1901.	Changes.
Plant investment	\$23,479,631	\$23,471,009	D. \$8,622
Other investments	1,230,521	1,227,424	D. 3,097
Stock on hand	5,682,718	5,213,707	D. 469,011
Treasury stock	190,600	190,600	D.
Cash in bank	724,226	274,434	D. 449,792
Notes receivable	181,386	170,494	D. 10,892
Accounts receivable	1,576,875	1,603,149	I. 26,274
Total	\$33,065,957	\$32,150,818	D. \$915,138
—Liabilities—			
	1900.	1901.	Changes.
Capital stock	\$30,000,000	\$30,000,000	. . . . .
Surplus	1,208,948	1,277,808	I. \$68,860
Mortgages	12,603	12,603	. . . . .
Notes payable	1,835,000	800,000	D. 1,035,000
Accounts payable	9,406	60,407	I. 51,001
Total	\$33,065,957	\$32,150,818	D. \$915,138

The total capital stock is \$15,000,000 common and \$15,000,000 preferred. Of this \$14,905,400 common and \$14,904,000 preferred are outstanding, \$94,600 common and \$96,000 preferred being held by the company and included as treasury stock in the statement above.

The net earnings for 1901 were \$1,112,140, from which there were paid dividends amounting to \$1,043,280, or 7 per cent on the outstanding preferred stock. The balance of \$68,860, added to \$1,208,948, brought forward from 1900, made the total surplus \$1,277,808 at the close of 1901. This surplus constitutes the working capital. No dividends were paid on the common stock.

President L. A. Cole's report says: "It will be noted from the comparative statement that both assets and liabilities have been reduced, and that notes payable now amount to but \$800,000, as against \$1,835,000 when last reported. The net earnings would have been larger had we not written off a considerable sum from the cost of raw materials, reducing them to current market values.

"Aggregate business increased in both tonnage and profit over the preceding year, and while competition continues active, it is as stated in the last report and shown in the results, not destructive of profit to economically administered concerns. In pursuance of our policy to maintain the physical condition of properties at a high standard, operating expenses were charged with \$208,169, of which \$89,706 was for new work and \$118,463 for current repairs.

"With the year just closed a decade of corporate life is completed, the company having commenced its active business January 1, 1892. A brief review shows the net earnings for 10 years were \$13,340,239, of which \$11,774,286 was paid out in dividends, \$288,145 was charged off for depreciation in 1896, and the remainder of \$1,277,088 remains in the form of surplus account. The tonnage of manufactured products in 1901 exceeded that of 1892 by 23.4 per cent. During the same period \$1,553,645 was expended in the maintenance and repair of properties, all of which was charged to operating expenses. The

cost of manufacture and administration has been sensibly reduced and the standard of quality improved. Numbers of new processes for making white lead have been patented and presented for our consideration, and while each has been exhaustively examined, it is our judgment that no method has yet been proposed or perfected the product of which is comparable in quality to that made by the old Dutch process, which we continue to use. The growth of the company has been substantial, new properties have been bought and all are in better condition than when acquired, useful and profitable lines of manufacture have been added, its trade has been conserved, protected and extended, and competition has been met as it developed."

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.

State of Illinois. Eleventh Biennial Report of the Bureau of Labor Statistics. David Ross, Secretary. Springfield, Ill.; State Printers. Pages, 292.

Annual Report of the Comptroller of the Currency of the United States. Volume II. Washington; Government Printing Office. Pages, 1,448.

Pumps: Their Construction and Management. By Philip R. Björöling. London, England; P. S. King & Son. Pages, 64; with 91 illustrations. Price (in New York), \$1.25.

Statistical Abstract of the United States. 1901. Twenty-fourth Number. Prepared by the Bureau of Statistics under the direction of the Secretary of the Treasury. Washington; Government Printing Office. Pages, 488.

Ohio Society of Surveyors and Civil Engineers. Report of Proceedings of Twenty-second Annual Convention. Frederick J. Cellarius, Secretary. Dayton, O.; published by the Society. Pages, 164; illustrated. Price, 50 cents.

NEW PUBLICATIONS.

Die Bewetterung des Berwerke. By Robert Wabner. Leipzig, Germany; Arthur Felix. Pages, 264; with Atlas of 40 plates. Price (in New York), \$5.50.

This work, while it has a few characteristic German faults, is on the whole worthy of special notice. It is a practical work, concisely written and, while thorough, does not deal much in ancient history nor in the higher mathematics. Hence it will prove of interest to all persons concerned in coal mining who wish to get a good idea of the latest German practice. In this connection we would point out that while American mining methods have much to commend them in cheapness and efficiency, yet the matter of safety too frequently is disregarded. This is well shown by statistics on accidents in American and European mines that have been published in the ENGINEERING AND MINING JOURNAL and the matter has been brought sharply before the public lately by several distressing accidents. In general, shafts and gangways at German collieries are much more durably built than in this country and the ventilating devices are more efficient. Many of the German collieries mine coal at great depths, the coal seams are frequently much disturbed and the mines workings are hot and gassy, hence thorough ventilation is a prime necessity. Again, the German Government is much stricter in its mining law regulations than are the various State governments with us, and the matter of dust explosions, for instance, is looked after sharply.

The present work gives a summary of the various gases met in mine workings and their detection, treats of ventilation by furnaces and describes various patterns of mine fans and the influence of temperature and weather conditions on mine ventilation. It also gives an excellent summary of the various means of getting air currents through mine workings by stoppings, brattices, etc., and the various safeguards to be

observed in laying out and keeping in order airways. There are also descriptions of safety lamps and brief notices of respiratory apparatus, helmets, etc., for rescuing lives or fighting mine fires in the presence of gas and smoke.

As noted above, the book avoids a common fault of many German works in that the author does not attempt to write his subject to the dregs. Unfortunately, the publisher has seen fit to place practically all cuts in a separate volume, instead of in the text. This is a common fault of German books, and to American readers at least a very annoying one. It compels the reader to stop continually and try to use two volumes at once. However, the plates are well executed and of more than ordinary value. Of particular merit are those showing various patterns of fans and other ventilating devices; in fact, the work gives us the best brief summary of present mine fan construction, with regard to Continental practice, that we have seen, and we take pleasure in commending the book to all persons interested.

New York. Nineteenth Report of the State Geologist. Reprinted from the *Fifty-third Annual Report of the New York State Museum.* Frederick J. H. Merrill, Director. Albany; published by the University of the State of New York. Pages, 160; illustrated. Price, 40 cents.

The present report, which covers the year 1899, although not published until 1901, is an extract from the *Fifty-third Annual Report of the New York State Museum*, under which the Geological Survey forms a department. The introductory section, which describes the work done by the State Geologist, is quite brief. The field work now going on is chiefly in the Adirondack region. It is the only part of the State in which there is much room for general exploration. In economic geology the principal work has been on the clay industries of the State and on the slate industries of the region bordering on the Vermont border. In pure geology the year was chiefly devoted to the status of the crystalline rocks in Westchester and Putnam counties and in the upper part of New York City. In addition to this general report there are several special reports of much interest. The first of these is on the Upper Cambrian Formations of Warren, Saratoga, Fulton and Montgomery counties, by Prof. J. F. Kemp. Others are on the Local Geology of Clinton County, by H. P. Cushing; Crystalline Rocks Near the St. Lawrence River, by C. H. Smyth, Jr.; Oil and Gas in Southwestern New York, by Irving P. Bishop; the Roofing Slate of Washington County, by J. N. Nevius, and the Emery Mines of Westchester County, also by J. N. Nevius. The report is illustrated by several maps and geological diagrams and by a number of half-tone reproductions of photographs.

Cast Iron; a Record of Original Research. By William J. Keep. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 240. Illustrated.

The author of this volume, as is well known, has spent a great deal of time in researches into the relations between the qualities of iron and its chemical composition. He has from time to time given some of the results obtained by him in papers contributed to the American Institute of Mining Engineers, the Iron and Steel Institute of Great Britain and other societies. He now presents the first complete report of his investigations in response to many requests from those who were more or less familiar with his work. We may add that Mr. Keep also served as a member of the testing committee of the American Society of Mechanical Engineers and contributed largely to the valuable reports made by that committee. The results of the researches conducted on the lines above indicated have been to some extent unexpected. Thus, the discovery of the fact that the shrinkage of cast iron varies inversely as the silicon in the iron is compara-

tively recent and other effects of the chemical composition were also unknown or only suspected.

The present volume describes very thoroughly the methods adopted by the author and others who have worked in co-operation with him, the results of these experiments and the general conclusions drawn from them.

The importance of chemical analysis of iron is also very fully shown and the relation between the chemical and physical tests is pointed out. The volume will be very interesting to engineers in general who have to employ cast iron to a large extent and also to foundrymen, who will learn from it many valuable lessons as to the proper proportioning of foundry mixtures, which are now too often the result simply of guesswork.

Dunbar's Western Mining Directory, 1901-1902. Denver and San Francisco; the Western Mining Directory Company. Pages, 320. Price, \$10.

This directory purports to give a list of the principal operating mines, smelters and reduction plants in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington and Wyoming in the United States; in British Columbia and in the Republic of Mexico. The facts given with regard to each mine are extremely brief, including, as a rule, the name of the company, the name of the superintendent or manager in charge of operation, and in some cases a brief note as to the equipment and the number of men employed. The arrangement is not by any means the most convenient that could be devised, the mines in each State being put under the heading of the district or post-office. This makes it difficult for any one to find a mine unless he already knows its exact location. As the majority of people who use such a directory are more familiar with the name of the company than with its post-office, it involves a great deal of unnecessary and annoying labor. With regard to accuracy, it is difficult to give an opinion of such a book without some months' use, but a brief glance over it shows several defects, thus arousing the suspicion that more may be found upon more careful examination. Thus, in Utah, we fail to find the name of the Utah Consolidated Gold Mines, although the Highland Boy, a property which that company operates, is given; in this case, a stockholder or any one else who was familiar only with the name of the company would be unable to find it at all.

We are aware that the preparation of a mining directory involves an immense amount of labor, but we certainly think that in a book for which so high a price is asked more information, and more nearly complete information, might be expected.

CORRESPONDENCE

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested. Letters should be addressed to the MANAGING EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Manganese Supplies of Brazil.

SIR: Referring to your reply in your issue of February 8, to a correspondent on the world's supply of manganese, I note that you ignore the large and almost untouched Brazilian deposits, allowing it to be assumed that your correspondent is correct in assuming that "there are practically no reserves . . . in the mines . . . of Brazil."

The Gandarella, Miguel Burnier and Lafayette deposits, near Ouro Preto, in the State of Minas Geraes, alone contain far upwards of 192,000,000 tons. A deposit on the Paraguayan frontier contains 210,000,000 tons, and yet another in Matto Grosso 180,000,000 tons. These last two deposits were examined by one of the most eminent engineers of the Ouro Preto School of Mines, Dr. Publio Ribeiro, whose figures I quote.

These two deposits alone are capable of supplying the world for some centuries to come with an ore

containing 50 per cent of manganese, traces only of sulphur and phosphorus and a small percentage of silica.

I beg that you will give this letter publicity in the same column as your first answer.

ALCIDES MEDRADO,

Brazilian Mining Commissioner to U. S. A.
New York, Feb. 17, 1902.

[We publish our correspondent's figures as received, but think that they should be revised, unless due allowance has been made for the usually irregular nature of manganese ore deposits.—EDITOR E. & M. J.]

Soldering Aluminum.

SIR: Referring to the paragraph on this point in your issue of January 11, I would point out that as far as my limited experience goes, this method of soldering aluminum by having a layer of molten solder on it and scratching the metal through is very tedious and uncertain, while the following method, while much slower than tinning copper or sheet iron, is still easy. It is possible with precautions to solder a strip about 10 inches long, all along one edge ready for joining to another strip or another metal, in about one minute. The precautions are:

1. Absolute freedom from grit in any shape or form.

2. Absence of wood fumes, as those given off when edge of a strip is soldered on a board. A tile should be used to support the work, and this should be warm.

3. A flawlessly tinned copper bit. As the work rapidly dirties the bit, frequent retinning on a bit of tin plate is necessary for the bit.

4. Spirits may be used to keep the tinning of the bit clean.

5. Flux. Use lard oil or any other animal oil. Hydrocarbon cylinder oil will do, but not as well. It should be noted that Norval has patented the use of mixtures of stearic and oleic acids for this work, and he claims that this covers the use of oils, except hydrocarbons. He says that the joints made with hydrocarbons separate after a time on their own account. This does not, however, happen in a year, as I have a sample that old.

An ordinary tinman's copper soldering bit and ordinary solder (lead and tin) are used, and the work is done exactly like tinning copper with the above precautions and limitations. Once tinned the strip can be soldered as readily as tin plate.

J. S. V. BICKFORD.

Camborne, Cornwall, February 2, 1902.

A Theory of Underground Solution and Precipitation.

Areas of depression and naturally those covered by water, and, as stratification proceeds and depression continues, moisture is carried downward with the deposits. The amount of moisture so carried down would vary according to the nature of the deposits even when drained sands and gravel contain 5 per cent moisture to 95 per cent of the dried material. Clay under the same conditions may contain 22 per cent moisture to 78 per cent of dry material. These deposits, being saturated, would contain more. With successive settling the deposits approach a more heated zone. Water vapor cannot rise to the surface because of the overlying strata. It becomes more and more heated far above the boiling point of water at atmospheric pressure. As settlement proceeds, cracks and fissures arise in the adjoining country rock, towards which the water naturally oozes or flows. At the high temperature named, the water has great power of solution, and takes up from the country, with which it has been so intimately in contact, much soluble mineral, which at ordinary temperatures it would not touch. With so large a proportionate quantity of water thus placed at disposal,

there could be no question of a sufficiency to provide solution. Ample time, during the whole period of subsidence, would be given for these operations to take place.

When elevation begins the waters with the dissolved minerals also rise. As the upper strata begin to rise above the general grand level denudation occurs. Finally the lower strata with the mineral bearing waters begin to approach the surface. At this time cracks and fissures again appear which on the anticlines widen as they approach the surface. To the fissures these waters flow, the fissures being areas of lower pressure. With this gradual rise, pressure is relieved and the temperatures go down. As a result the deposition of the minerals from the mineral bearing waters takes place, and principally in the fissures now called veins. These processes also have ample time for execution, and crystallization can proceed with the necessary deliberation. The strata reaching the surface have, by this time, formed new fissures, through which the vapors of the hot water can escape to the surface, leaving the rocks comparatively dry. In other cases as of wet mines they are either wet from surface water, or from water not entirely free to escape.

Those theories of the movement of underground waters, as compared to this just stated, ascribe to mineral solution and deposition far feebler actions. The waters are not so highly heated, and the percolation by gravity alone, in presence of obstructions, seems very inefficient.

L. S. AUSTIN.

Marysville, B. C., Feb. 13, 1902.

A New Method of Treating Auriferous Gravels.

Sir: As demonstrated by the writer in working the gravels of the upper Vermilion River of Ontario, Canada, the gold occurring in particles too fine to sluice, the gravel is first tested to find how fine a sieve can be used that will allow the coarsest particles of fine gold to pass through. In the ground I have been working I find all values will pass through a 40-in. screen and that the gravels are reduced 14 into 1, the "one" carrying all the values that are obtainable without crushing. The gravel is raised if dry with steam shovel, if wet by dredge and screened in the ordinary way.

The fine pulp, or the one-fourteenth, is pumped into tanks of special filtering construction which are situated at a central treating station located on shore. From these tanks the pulp is drawn in a fairly dry state and charged into an amalgamating barrel in which is a large heavy copper covered roller lying loose in the bottom of the barrel; as the barrel revolves the roller revolves also, rolling the ore under itself, and thus subjecting the pulp to amalgamation under pressure, care being taken that only enough mercury be added to take up the amount of gold in the pulp.

As the ore is fed into the barrels which, by the way, are so constructed as to allow of a continuous feed and discharge, it is further moistened by a charge of cyanide solution which not only assists in amalgamating the coarser particles of gold, but at once attacks the finer portions of gold, and owing to the agitation and splash which takes place inside the barrel the cyanide is greatly assisted in its work by the absorption of the necessary amount of oxygen.

As the pulp leaves the amalgamating barrel it is received in a launder and conveyed to concentrating tables, where all the black sand and any rusty gold that may have escaped from the barrel is separated from the main portion of the pulp. The black sand is conveyed to separate tanks where it undergoes a further cyanide treatment, by which means all the values are extracted. The pulp is conveyed to receiving tanks constructed on the same principle as the first receiving tank. Here the cyanide solution is filtered off, and if it is rich enough in gold it is passed through the precipitation or collecting boxes which may be of any approved construction or method. The one I have adopted, in fact invented, produces the gold upon thin copper films which are

suspended in the solution and on which the gold is made to precipitate itself by an electric method, but without the aid of an anode or negative pole of a battery. By this method I have collected a deposit of over 30 per cent in two hours, and have proved that deposition continues as long as there remains any gold in the solution. Any silver in the solution is also deposited with the gold. Weak solutions both in gold and cyanide have proved equally successful. By this method the troublesome zinc shaving is done away with, and hence the loss arising from the treatment of the residues is avoided. The films can be allowed to remain in the solution until such time as it is deemed advisable to clean up, when it is simply necessary to unlock and raise the cover of the tank, lift out the suspended films, replacing them with others. The sheets removed, which will contain from one to ten times their own weight in gold, can be either melted into a brick or passed into the bank or mint in the same condition as they are lifted from the solution, the small amount of the copper in the films amounting to only a small percentage of the whole.

From the number of tests I have made on a somewhat extensive scale I am fully convinced that much of the values found to exist by assays, in gravels, tailings and similar products, really occur in piece films on the sands or particles of ores caused by abrasion through contact with the coarser particles of gold.

R. H. ALEN.

Toronto, Ont., January 27, 1902.

(We shall be pleased to receive from any of our readers some discussion upon the method of saving fine gold which is suggested in the letter above given.—EDITOR, E. & M. J.)

Discrepancies in Cyaniding.

Sir: The query signed "Subscriber" in a recent number of the ENGINEERING AND MINING JOURNAL in which is stated the results of certain cyanide operations, and an explanation asked of the great discrepancy he encountered between the estimated results of a season's run, and the actual product of the final clean up, attracted my attention. Now, of course, as no symptoms were given, it is impossible to give a diagnosis of his particular case, but this complaint can serve as a text on which much could be written by cyanide operators, were they so minded, and frank enough to publicly record a failure or two, as well as the universal success, that, as far as public utterances are concerned, one would judge was being met with. It is in the careful records of patient investigation and detection of the causes of the troubles that invariably arise in the practice of this metallurgical process that the value of future literature on the subject will consist. I am free to admit, therefore, that in my own case, "unexpected discrepancies" have hit me many a hard blow, and the effort to make results check has cost me many a crucible and many a ton of coal.

Now, in the first place how did "Subscriber" estimate his results? We will say perhaps, by the usual one of determining the value of samples taken from loaded vats before and after treatment, determining tonnage, allowance for moisture, etc. This procedure theoretically will give the amount of gold extracted, but it will not give you, by any means, the amount you have to put through the zinc boxes, because, although it is possible to get a fairly accurate sample of the stock and even moisture by means of the usual tryer—even this depends upon the character of sands in the vat—it is not possible to attain the same accuracy in sampling the tailings. Percolation is not by any means uniform, nor do the solutions extract evenly in all parts of the vat. I will venture to say that out of, say a dozen cores, taken from different parts of the vats, no two will run in value alike, and it is most instructive to assay the different solutions, drained from these separate cores. Although, of course, the sample of tailings

for assay may be thoroughly mixed and washed free of entangled gold-bearing solution before assay, still it is not safe to depend on such sample for purposes of estimation.

Then again, it is not possible even to estimate the amount or total value of solution left in the residues. The final solution running from the vats may show a value as low as 25 cents per ton at the end of treatment; still if a section from any portion of the vat be taken with a spade, from top to bottom, and transferred to a test tub, thoroughly drained, and solution tested, no one could predict its value, and, as I said before, if a dozen such sections were taken no two would run alike. Therefore, either way you take it, if the final tailing sample be dried down without washing, before assay, the evaporated solution will leave behind values that are not an average, and if the sample be washed clear and clean, the entangled solution left in the vats is an unknown quantity, both as to tonnage and value.

There is one more important point in this connection that I will call attention to, and that is the condition and value of the two or three inches of material just above the filter cloth, which is usually left in the vat from one charge to another. I have gotten values out of this that made my hair stand on end. Now apart from a possible mechanical concentration that might take place, especially if the sands carry much iron or coarse gold, there is also a probability, if not a certainty, of some precipitation, especially from the weak solutions passing through at the beginning and end of the operations, which solutions, although weak in cyanide, may be strong in value.

This discussion on sampling may seem trivial, but it may be one of the causes of error in "Subscriber's" estimate. If space permitted I would like to argue at some length as to the advantages—and with me it is a necessity—of having intermediate tanks between the treatment vats and the zinc boxes, and also of a proper and easily manipulated system of distribution of solution. I speak of this because at this point, where the solution drops from the main launders into these intermediate tanks, it is possible to attain almost absolute accuracy in estimation. In my own practice I place here a solution register, which automatically records the tonnage, and a continuous sampler, which takes an average sample of a 12 or 24 hours' run. The value of this per ton, and the number of tons run, accurately known, will of course give you the amount of gold put into solution, which is what you want to know. With the stock sample from the vats, you have the data from which the per cent of extraction can be seen at a glance, and with a continuous sample from the outgoing solutions from the zinc boxes, you have the data for rate of precipitation. With these few samples taken regularly and at the same time, every day, one can have an accurate and systematic method of tally which if the clean up is properly conducted will return bullion accordingly. A daily record of work done in each department of a cyanide plant is, to my mind, of too great importance to be neglected and "eternal sampling is the price of good work" in this business.

The presence of organic matter in the solutions mentioned by "Subscriber" is a disagreeable complication to deal with. Its effect in the zinc boxes is very marked and certainly detrimental. The excessive evolution of hydrogen, with consequent frothing, and floating of the zincs is due to its influence, I think, without doubt. This action suggests polarization, although I would not attempt to give any reason therefor. I am satisfied, however, that there is danger of re-solution of values when this action takes place. Once in my own experience when it was very marked, and weights had to be placed on the zincs to hold them down, the in-going solution was running \$2 per ton, and the out-going ran \$12. Nor was this due to suspended particles of precipitate in the sample, as investigation proved. This alarming state of affairs was corrected by rearranging and thoroughly distributing the zinc in the boxes and by placing fresh zinc in the upper compartments.

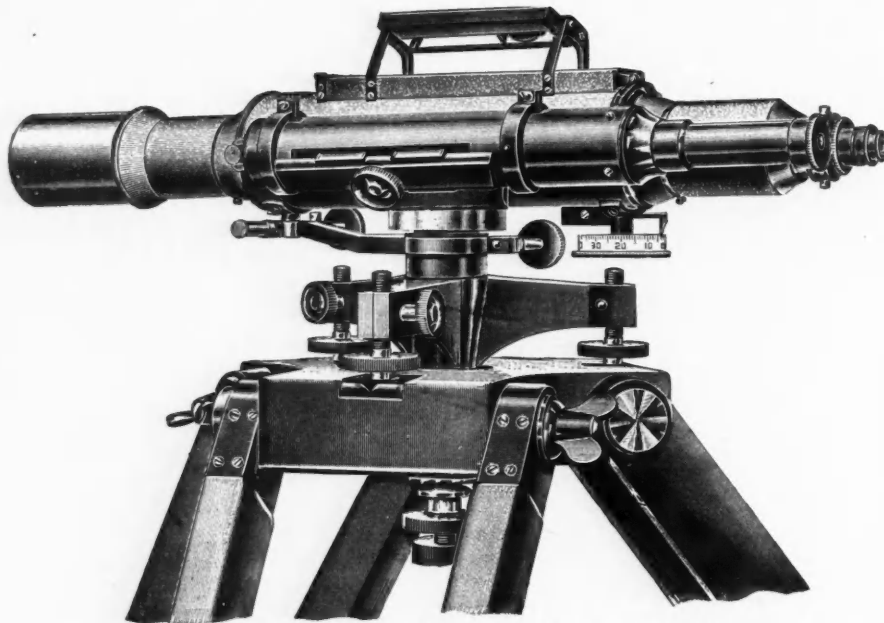
I will state in conclusion that it is my opinion that gold is an intelligent metal, that it has an unconquerable repugnance to humanity and the light of day. Attacked by fire it escapes up the chimney, wooed by mercury and it slips off down the drain pipe, argued and reasoned with by solvents, and its contempt and obstinacy are disgusting. Even when finally captured, and minted into the bright coin of the realm, it takes unto itself wings and flies away.

H. S. BADGER.

Caribou Mines, N. S., Feb. 19, 1902.

QUESTIONS AND ANSWERS

(Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to our readers besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert.



PRECISION LEVEL FOR UNITED STATES COAST SURVEY.

or 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. Preferences will, of course, always be given to questions submitted by subscribers. Books referred to in this column can be obtained from the Book Department of the ENGINEERING AND MINING JOURNAL.

Sadtler Zinc Retorts.—Can you tell me where the Sadtler retorts for treating zinc ores are made? Where can they be purchased?—N. J. S.

Answer.—The manufacture of Sadtler retorts is a simple matter and it is contemplated that the user will make them at his own works. Zinc retorts of any kind do not stand transportation well; it is expensive on account of handling, packing, freight, and breakage. The Sadtler patents are controlled by the Midland Smelting Company, of Denver, Colo., which is, for the purpose of demonstration, operating a smeltery at Bruce, Kan. If anyone wants a quota of retorts for experiment we have no doubt they could obtain them from the latter place.

Treatment of Auriferous Magnetite.—What is the result of calcining magnetite? Is an auriferous magnetite amendable to amalgamation without roasting and what is the best method of treatment?—J. H. R.

Answer.—Generally speaking, calcining a magnetite would probably not help amalgamation. The best way of getting out the gold depends on a variety of conditions such as the total values in the ore, the manner of occurrence of the gold, etc. If the gold is bright and not too fine it will amalgamate readily. The gold associated with magnetite, as in black sands, etc., however, is frequently extremely fine and its recovery is not a simple matter. The question is then one of values.

"Thermite" for Welding.—Can you refer us to any recent use of this process in this country?—H. P. J.

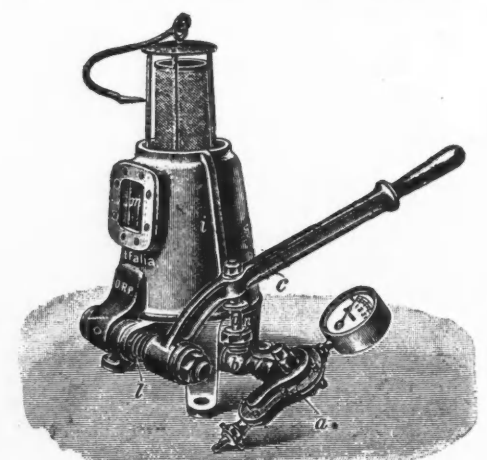
Answer.—With regard to this question, which was published and answered in this column in our issue of February 15 last, a correspondent writes us as follows: "In the 'Questions and Answers' column of your issue of February 15, H. P. J. requests information regarding the use of thermite for welding. The compound I refer to was given several severe tests at the United States Government Arsenal at Watertown, Mass., several years ago. The writer has record of the tests which were very successful."

Unfortunately H. P. J.'s address has been mislaid; if he will forward it to us, we shall be pleased to put him in communication with this correspondent.

Miner and Chemist.—A miner who is 36 years old, capable, and having held several good positions, wishes to change his vocation and study chemistry

with a view of becoming a chemist. Kindly state your opinion of his chances of success in the new vocation. I think that the subject is almost too old.—W. J.

Answer.—It is impossible to give an answer to such a question in any individual case. Too much



APPARATUS FOR TESTING MINERS' LAMPS.

depends upon the personal equation—that is, the personal character, ability and predilections of the party concerned—for an outsider to tender advice. A great deal depends also upon his position, and the special opportunities for the future which he may have in view. The decision must be made by himself, and from his own knowledge of the conditions. Generally speaking, a man who has reached the age of 36 years and is doing well—as he seems to be in the case you mention—should consider matters very carefully before he makes a change. As to the study of chemistry, if he can carry it on at the same time he is doing his present work,

it will be a distinct benefit to him in every way. If he decides to continue mining, a knowledge of chemistry will certainly be an advantage to him.

A NEW PRECISION LEVEL.

The accompanying illustration shows a new precision level designed for and used by the United States Coast and Geodetic Survey. Some work of very remarkable accuracy has been done with this instrument.

Nearly the entire instrument is made of nickel-steel, which has a very small co-efficient of expansion; which is also true of the Invar-steel, a special steel which is used in making parts of the level. The consequence is that when once adjusted, the level remains practically in adjustment and changes of temperature do not affect its accuracy. Those who have used it say that work can be done very expeditiously and accurately, and at the same time it is very convenient in practice. While the target is sighted the observer can read the bubble from the eye end of the telescope, without changing his position. Although this instrument has been in use only a short time comparatively, its merits have been fully recognized by those who have employed it in their work.

The credit of giving the theoretical requirements for such a level is due to Assistant Hayford of the Survey; and for putting them into practical shape to Chief Mechanician Fischer. The actual construction has been undertaken by Fauth & Company, of Washington.

DETECTING LEAKAGE IN MINERS' LAMPS.

The apparatus shown in the accompanying illustrations, for which we are indebted to *Gluckauf*, has been introduced by the Westfalia Armaturen Manufaktur Company of Gelsenkirchen, Germany, for testing leakages of air into the lower portion of safety lamps. The lamp is placed in the apparatus so that, on closing the port *i* by means of the lever *c*, the lower part of the lamp is enclosed in a tightly-closed chamber, the side joints being rendered tight by rubber packing *k*, and the top joint, round the ring *h* of the lamp, by a divided rubber ring *f*. When the apparatus is closed (Fig. 2) the spring *l* allows the lever *c* to be moved still further, whereby the admission valve *b* is opened, and air under pressure is admitted to the closed chamber through the aperture *e* in the bottom (Fig. 1). If the lower part of the lamp be staunch no escape of air can take place from

the chamber, whereas any flickering or extinction of the lamp flame—observed through the window *m*—indicates a more or less serious leakage of air into the lamp. The compressed air is reduced to the desired pressure by reducing valve *a*. The experiments made with this apparatus in the experimental gallery of the Berggewerkschaft show that, in the case of benzine lamps with defective packing, the flame is extinguished when the pressure gauge marks a pressure of 0.12 atmosphere (1.8 pounds) in the chamber, though lamps properly packed with an asbestos ring will stand this pressure satisfactorily. In the case of oil lamps, the more sluggish nature

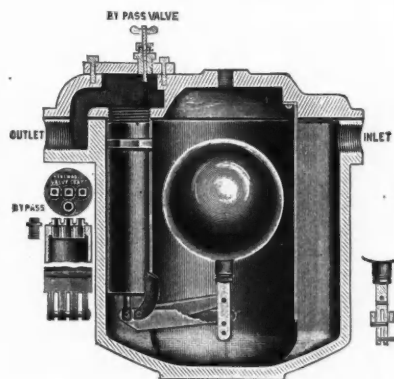
of the flame necessitates a pressure of 0.28 atmosphere (4 pounds). Of course, the character of the lamp wick and fuel influences the working of the apparatus, and therefore the above figures may not hold good in every case. The apparatus possesses the advantage that the lamp is not exposed to free currents of air, but is enclosed in the chamber during the test, and is exposed to a uniform pressure on all sides, whereby an existing leakage is detected. The apparatus can also be supplied in a form wherein the grating *d* is replaced by an arrangement at the top, for hanging the lamp in the chamber by means of the middle ring; the rubber rings *f* can be changed so as to fit lamps of any size.

THE WRIGHT EMERGENCY STEAM TRAP.

The accompanying illustration shows a steam trap made by the Wright Manufacturing Company, of Detroit, Mich., which will, it is claimed, discharge large volumes of water quickly in emergencies and not waste steam under ordinary conditions. The principle involved is simple.

Three steam-tight outlet valves are employed instead of one. These valves are placed at the top of the trap as far removed from the inevitable dirt, grit and sediment as possible. The water enters, filling the trap to the center of the float and forming a seal of from 4 to 6 inches of water over the lower end of the outlet pipe, thus preventing the escape and waste of steam. When thus filled sufficiently to raise the float, one valve is opened slightly if there is but little water coming in, but widely in event of a sudden inflow of water.

newable valves are so placed that they may be cleaned, repaired or renewed without even taking the cap off the trap, and the entire mechanism is accessible without disturbing the piping. The inlet and



THE WRIGHT EMERGENCY STEAM TRAP.

outlet are both on the same line and the trap may be let into the floor if necessary, thus in many cases securing an incline for the pipe.

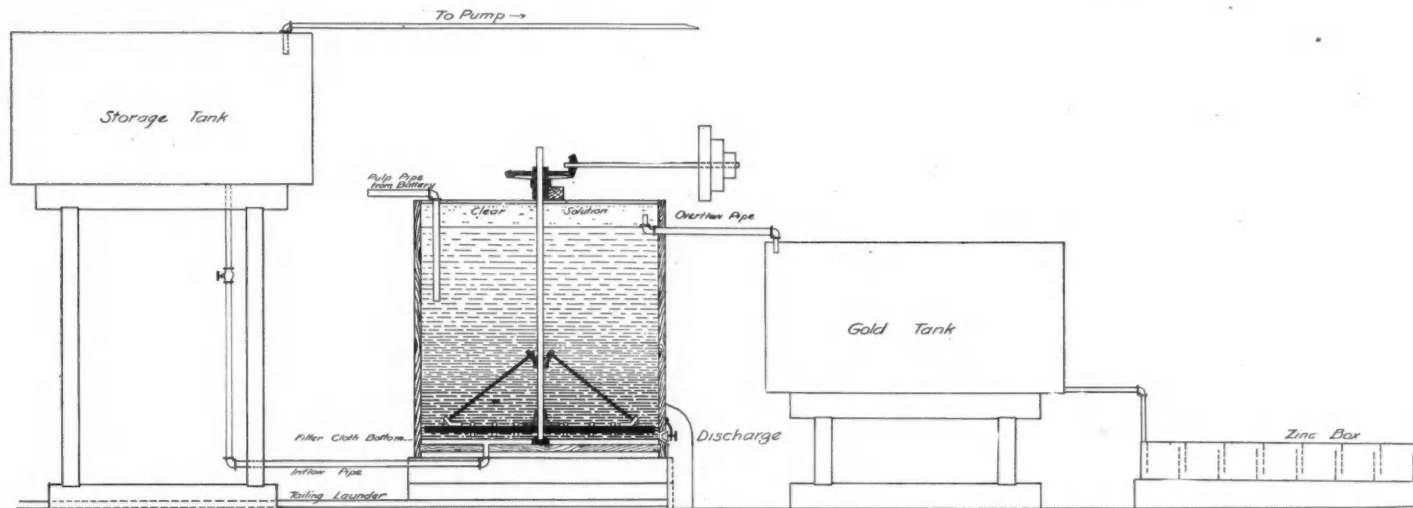
THE GODBE AGITATION METHOD OF LEACHING.

This is a new method, recently patented by Mr. Ernest Godbe, of Salt Lake, Utah, for leaching fine or slimy ores by agitation and the separation of the solution from the ore.

mass of slime into the clear solution zone at the top, from whence it overflows perfectly clear and ready for precipitation.

During the period of dissolving the gold the speed of the stirrer is increased so that the entire charge is in thorough agitation, and at this stage compressed air can be blown in to hasten the dissolution of the gold if the ore requires it. After the dissolution has taken place the gold-bearing solution is washed out by displacement with weak precipitated solution until all the gold has been washed out of the charge, and in turn the weak precipitated cyanide solution is displaced with water when a plug is drawn and the charge allowed to run out into the tailings dam. Each displacement operation washes out about 80 per cent of the solution contained, so that it generally takes three displacements, two of solution and one of water, to recover practically all the gold-bearing solution from the charge. These displacements, however, take place very rapidly, two hours only being required for each one. The proportion of solution to ore varies according to the specific gravity of the slime, being from 1.2 to as high as 5 parts of solution to one of ore.

When used in connection with plate amalgamation, no settling is required as the water is withdrawn by displacement with the cyanide solution. One important feature is that by using a large quantity of solution, which can be done—the upward percolation taking place so rapidly—a very much weaker solution can be used and still bring the proper or necessary amount of cyanide of potassium in contact with the metals to be dissolved, thereby reducing the loss of cyanide to a minimum both as to the loss of the latter in attacking basis as well as in the ordinary



GODBE LEACHING PLANT.

One of the valves is equal to the task of taking care of the water under ordinary conditions, but in event of the water coming into the trap faster than one valve can discharge it, the water rises in the trap, carrying the float with it and opening the second valve sufficiently to discharge the surplus water, or wide open if necessary, and so with the third valve if the volume of water coming into the trap is sufficient to tax the capacity of the three valves, which is very rarely the case. The discharge from each of these valves being continuous is very great—much greater than is possible with an intermittent trap. The action of this trap in emergencies is instantaneous. There are many uses for these traps where the emergency feature renders it invaluable.

Attached to the steam separator, it will, in event of an emergency, such as may never arise, or may arise at any moment, save the engine from a disastrous and expensive wreck. Attached to a steam jacket it will not only keep it free from condensation, but will instantly take care of the cold water with which they are flooded for some purposes, thus saving steam and increasing the capacity of the press. It will do this and not waste steam. All the details have been carefully worked out. The re-

In the case of most ores, especially tellurides and sulphides, the finer they are pulverized the higher is the extraction by the cyanide solution, but it is well known that very fine or talcy ores cannot be successfully leached by percolation, and this is the class of material, the Godbe process is more particularly designed to treat. It consists of a combination of agitation and upward percolation, simultaneously, in the same vat. The pulp is stirred with a cyanide solution, containing lime, in a circular vat, the diameter of which is not greater than the depth, and while being so stirred, a stream of solution is introduced in the bottom, from below a false filter bottom, and rises up through the agitated and suspended ore, and overflows at the top perfectly clear and free from slime. To do this the miller or stirrer is placed close to the bottom of the vat and does not revolve fast enough to throw the slime up to the surface of the charge, but just sufficient to keep the entire mass well up in suspension and flowing around in the tank, and at the same time always leave a few inches of perfectly clear solution at the top. The solution in its upward course comes into intimate contact with every particle of slime, as the latter is constantly changing its position in the tank and rises above the

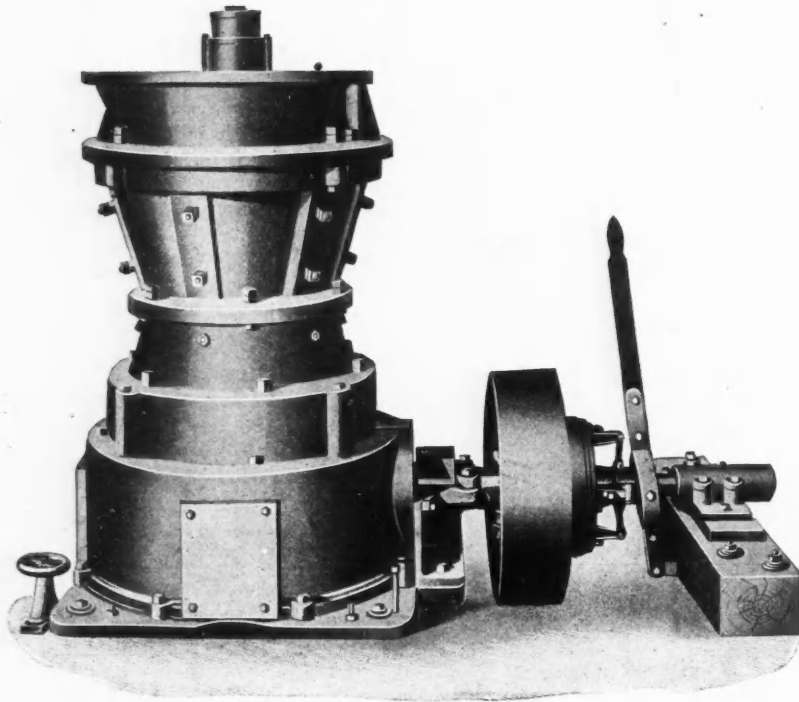
losses of solution. A warm solution greatly assists the operation mechanically, and, presumably, chemically.

ELECTRIC RAILWAYS FOR INDUSTRIAL PURPOSES.

These have long been recognized as a great help for the different industries, as for instance, in and around manufacturing plants, in mines, for contractors' purposes, and for all general uses for which a railroad could be used to advantage. Electric power is in most cases easily to be had as there is hardly a business enterprise without an electric equipment and the surplus electric power can be used with little or no additional expense, instead of animal or steam power. Among those that have given such railroads special attention, and have realized very good results in equipping this kind of roads as well as running them economically, is the well known firm of Arthur Koppel, New York. This firm has built many electric roads for industrial purposes and has also developed portable electric railroads, thus making such roads available for people who have to use them at different places, and at each place for a comparatively short time.

The Arthur Koppel portable electric railway can be laid down and completely equipped within just as short a time as portable railways generally can be. All the parts composing this equipment are light and easily handled. Every detail is worked out so that there is no difficulty, and even specially constructed and patented cars for stringing the trolley wire enter into the equipment. These electric railways have been built in many different countries and for many different purposes, as for instance roads bringing raw material into the plant, carrying the different materials around, and finally taking the finished product to the station, for mines, for contractors, for plantations, and even for passenger traffic.

In order to give interested parties, who are not well acquainted with the type of railroads, an opportunity to study their working and their equipment, the above named firm has put in its offices at 66 Broad street, New York, an exact model of such



STURTEVANT ROTARY FINE CRUSHER.

an electric railroad of one-tenth actual size. This road is equipped with track, overhead system, electric locomotive and many different types of cars, including coal, flat, plantation, contractors, etc., as well as passenger cars. The model shows every detail of the original, materials, construction, working, etc.

BUCYRUS DREDGE IN GOLD MINING.—In THE ENGINEERING AND MINING JOURNAL of February 1 was published a description of a dredging machine equipped with a Robins conveyor belt. By an inadvertence, the name of the manufacturer of the dredge was accidentally omitted. This dredge, which is being operated in the placer region of Oroville, Cal., was designed and manufactured by the Bucyrus Company, of South Milwaukee, Wis.

ROTARY FINE CRUSHER.

Crushers are believed to do the work at lower cost than the best grinders or pulverizers and experience amply confirms these figures. It is therefore of much importance to reduce materials as fine as possible in the crusher and save the wear and tear of machines working at a much greater cost.

The Sturtevant Mill Company, Boston, Mass., has long seen the importance of doing as much work as possible in the breakers, and has made a special study of these fine reduction machines. Its well known roll jaw crushers reduce all hard materials,

at once, without screens, to one-quarter inch; and its rotary crushers handle all rocks of moderate hardness, such as limestones, gypsum, phosphate, talc, coal, etc., in fact nearly any substance below quartz in hardness; easily reducing them to the size of wheat. This is extraordinary work, large blocks quickly breaking to these small sizes without screens, and leaving an output in the best possible condition for economical reduction in mills and pulverizers.

Rotary crushers are comparatively inexpensive. they have large capacity, easily crushing from 8 to 12 inch pieces at the rate of from 6 to 15 tons per hour. The Sturtevant rotary fine crushers are intended to supply rock emery grinding mills, and every kind of pulverizer, with material upon which they can do their best work. Whatever machine is used for finishing, fine crushing is of capital importance, and absolutely essential if good economy is to be obtained.

There is no better investment for any plant than a fine rock crusher; whatever work it will do is done

with unexampled economy. A roll jaw crusher for hard rock reduces to $\frac{1}{4}$ -inch and finer, and a Sturtevant rotary crusher breaks down all rocks of moderate hardness to wheat sizes. They are massive, efficient and durable, need no foundation, and run easily on any strong mill floor.

QUICK SPEED SELF-HARDENING STEEL.

Wm. Jessop & Sons, Limited, Sheffield, England, have introduced an entirely new type of this steel, for which are claimed uniformity and easy manipulation with the best working results in shop practice.

Instructions for working are particularly simple, and no elaborate process of hardening is required. The tool to be forged is heated uniformly, to a bright red, forged to shape and allowed to cool. To harden, place the nose of the tool in the fire, and heat to a good white heat. Allow to cool away from the hearth, and thoroughly remove, by grinding, the thick scale which results from this high temperature. After the tool has been ground four or five times, to get the best possible results, it is found advisable to reharden, without, however, dressing the tool in any way.

This steel has been thoroughly tested on cast iron, and on steel forgings of all kinds. The following is a typical test: A marine shaft 12 inches diameter, carbon 0.30 per cent, was put in the lathe. A 1 1-2-in. square tool was used, with a cut of 3-8 inch, reducing shaft 3-4 inch in diameter; sliding feed, 4 to the inch; cutting speed, 30 feet, as the belting

and the lathe would not do more. The tool ran 24 hours before grinding. The weight of cuttings per hours was 80 lbs.

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.

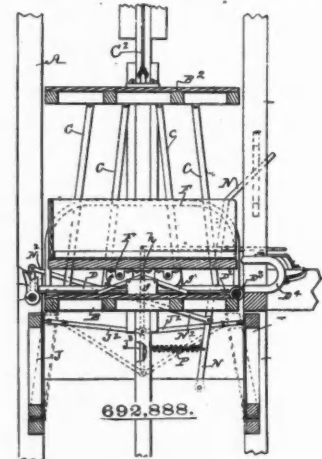
Week Ending February 11, 1892.

692,816. KNIFE FOR CUTTING ROPES USED IN BORING ARTESIAN OR OIL WELLS.—George F. Bell, Sistersville, W. Va. An implement comprising a knife-head, a knife pivotally suspended therefrom and adapted to engage and co-act with a rope-socket, said knife having a guide on one side thereof to engage the main rope, the center of gravity of said knife being below the pivot and between the said pivot and the main rope, whereby the knife by gravity tends to swing from the rope, to maintain its cutting edge out of engagement with the main rope during the descent of the implement.

692,885. GAS-DETECTING ATTACHMENT FOR MINERS' SAFETY-LAMPS.—Matthew D. Mackie, Scranton, Pa. A gas-detector for miners' safety-lamps comprised in a sheath extending through the bowl of the lamp, a sliding rod passed therethrough and surmounted by a hook to which is suspended a substance sensitive to burning gases, the said substance being suspended directly over the flame of the lamp, and shifted toward and from the said flame.

692,886. GRINDING OR CRUSHING HEAD.—Volney W. Mason, Jr., New York, N. Y. A grinding or crushing head, comprising a core having sockets, segments adapted to be placed thereon having ears or projections which enter said sockets, and bolts passing longitudinally through the core which traverses said sockets and pass through said ears or projections and thereby secure the segments to the core.

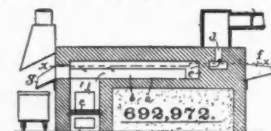
692,888. CAR-DUMP FOR ELEVATORS IN MINES.—John Moses, Youngstown, Iowa. A cage in a shaft for elevating minerals, detents pivotally connected with the top and central portion of the floor of the cage, track-rails pivotally connected with one edge portion of the floor, a car on the track-rails, an iron fixed to the bottom



and central portion of the car to engage said detents, a rock-shaft journaled to the frame in the shaft, props fixed to the rock-shaft for supporting the track-rails in an inclined position, an arm on the rock-shaft, a coil-spring fixed to said arm and to a lever, a lever fulcrumed to the frame for operating the rock-shaft and props and means for raising and lowering the cage.

692,892. EXCAVATOR.—Walter S. McKinney, Chicago, Ill. The combination of a guide-beam, pivotally supported between its ends, a bucket-handle sliding therein, and power devices attached to said guide-beam on opposite sides of the pivot thereof for rotating said guide-beam.

692,972. FURNACE FOR REFINING LEAD AND ZINC FUME.—Frank L. Bartlett, Canon City, Colo. A furnace for refining fume having a flat hearth, a feed-opening at



one end and a discharge-opening at the other end, a fire-box on each side of the discharge-opening below the level of the hearth, vertical flues leading from the fire-boxes to the hearth and bridge-walls extending diagonally from the front to the side walls, separating the fire-boxes from the hearth.

692,973. **HYDRAULIC DREDGE.**—Linden W. Bates, Chicago, Ill. In combination with the discharge-pipe of a dredge, a baffle-plate adapted to receive the impact or pressure of the outflowing current from said pipe, said baffle-plate having two diverting faces and being greater in depth at its extremities than at the point of junction of said faces.

692,979. **PROCESS OF PURIFYING WATER.**—Clemens O. Brueckner, Fort Wayne, Ind. A process which consists in subjecting the water successively to soda-ash, lime and phosphate of soda in the proportions of 15 grains of soda-ash, 23 grains of lime and 7 grains of phosphate of soda to 5 gallons of water.

693,008. **METHOD OF MANUFACTURING GAS.**—Louis G. Harris, East Orange, N. J. The method consists in preparing a mixture of mineral oil, a quantity of water greatly in excess of the mineral oil, and an alkaline ingredient, distilling the mixture, and superheating the resulting gas and vapor.

693,019. **COMBINED SCREEN AND CHUTE.**—Grant Holmes, Danville, Ill., assignor to Robert Holmes & Bros., Danville, Ill. The combination of a chute, a hopper for the upper end of the chute, a door in the bottom of the hopper swung between its ends on a transverse pivot, and a screen extending below the chute lengthwise thereof and comprising the imperforate bottom having closable openings at intervals and graded screens above the imperforate bottom.

693,025. **SEPARATOR.**—Robert W. Jessup, San Francisco, Cal., assignor by direct and mesne assignments, to Spiral Belt Separator Company, San Francisco, a corporation of California. A separator, comprising a traveling, substantially horizontally disposed, flat screen, an imperforate bottom therefor, lying in contact therewith, and traveling, for a time, with said screen, means for feeding the material to the screen at a point where screen and bottom are together, and means for causing divergence of said screen and bottom.

693,026. **SEPARATOR.**—Robert W. Jessup, San Francisco, Cal., assignor to Spiral Belt Separator Company, San Francisco, a corporation of California. In a separator, the combination of an endless, traveling, non-reciprocating, channeled screen, a table lying under and in contact with the screen at the place of feed of the material thereto, and thence extending, in such contact, for a portion of the functionally operative part of the screen, whereby the longer particles entering the channels with the shorter particles are caused to lie down therein, bridging the openings of the screen, and are, thereby, carried by the screen, after the table is passed and the shorter particles have dropped through the screen, and an apron lying flat and directly upon the top surface of the screen beyond the place of feed, whereby the long particles are held in a recumbent position in said channels, to insure their being carried by the screen to their discharge.

693,031. **ROLLING-MILL.**—Julian Kennedy, Pittsburg, Pa. A rolling-mill having housings, each having an upper part in the form of a cross-head, bearings for the upper roll supported on said cross-heads, bolts connecting the upper cross-head portions with the lower parts of the housings and forming the sole support for the upper roll, and adjusting mechanism for simultaneously adjusting the upper cross-heads and the roll carried thereby positively toward and from the lower roll.

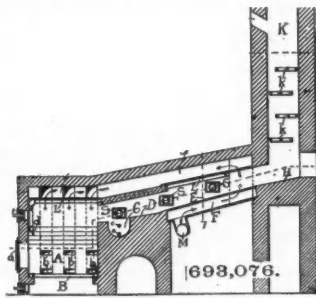
693,035. **PROCESS FOR THE ELECTROLYTIC MANUFACTURE OF CHLORATES AND PERCHLORATES.**—Pierre L. E. Lederlin, Chedde, France. A process of electrolytically producing substances the yield of which is increased by the addition of chromic acid in suitable form to the solution to be electrolyzed, said process consisting in adding chromic acid in suitable form to a solution capable of yielding the desired substance, passing an electric current from an anode to a cathode through the liquid thus formed, and constantly maintaining the greater part of the chromic acid in the electrolyte in the state of bichromate during passage of the current.

693,053. **MACHINERY FOR PRODUCING SEAMLESS METALLIC TUBES.**—Frederick J. McIntosh and William Thornburgh, Detroit, Mich., assignors to the Seamless Steel Tube Company, Detroit, Mich., a corporation of Michigan. In a machine for making seamless tubes from metallic billets, the combination of a stationary bed, a lower supporting-base oscillatory upon said bed, an upper supporting-frame oscillatory upon said base and rotatable rolling bodies carried by said base and frame, respectively, the axis of said bodies being horizontally adjustable by the oscillation of said base and of said frame.

693,062. **MANUFACTURE OF PIG IRON.**—John A. Potter, Camden, N. J. A method of reducing iron ore, consisting in forming a molten bath of pig-iron upon one portion of a continuous hearth, adding iron ore and basic material to the hearth, carrying them into and under the liquid bath, tapping off a portion of the bath, and continuing the additions of ore and basic material.

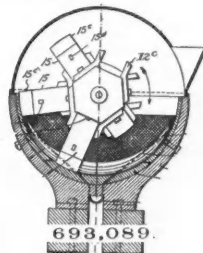
693,076. **ROASTING, SMELTING AND MATTING FURNACE.**—William D. C. Spike and James T. Jones, Tacoma, Wash. The combination with the combustion-chamber, and smoke-stack, of the metal-well, melting-hearth and roasting-hearth located adjacent to each other and communicating one with another and located between the combustion-

chamber and smoke-stack, and the preliminary-roasting means, consisting of a number of tilting grate-bars located one above the other in the smoke-stack at opposite sides of the stack, the inner ends of the grate-bars along one



side of the stack extending over the bars projecting from the other side and adapted when tilted to discharge their contents onto the opposite set of grate-bars, and the inner ends of both sets of bars terminating short of the adjacent wall of the stack to cause the products of combustion to pass in a zigzag course through the stack and around the grate-bars.

693,089. **PULVERIZING-MILL.**—Charles Wallace, Denver, Colo., assignor to the New Era Machinery Company, Denver, Colo. The combination with a suitable mortar or casing, of a rotary stamp-holder, stamps slidably mounted therein, and means mounted on the stamp-holder for supporting a stamp above the pulverizing-bed of the mortar.



693,103. **PILING-MACHINE.**—Daniel J. Brophy, Montreal, Canada. In a piling system, the combination of an elevator mechanism, a substantially horizontal conveyor mechanism, load-transfer means bridging the space between the elevator and conveyor mechanisms whereby a load is automatically shifted from the elevator to the conveyor mechanism, and load-delivery mechanism arranged to receive the load from said conveyor mechanism.

693,119. **DRAWING TUBES.**—Samuel E. Diescher, Pittsburg, Pa. The combination of a series of two or more dies, a mandrel passing through the dies, means for holding the mandrel stationary and means for pulling a tube through the dies and along the mandrel, whereby the tube is subjected to transverse reduction and longitudinal tension while being operated on.

693,120. **HEATING-FURNACE.**—Samuel Diescher, Pittsburg, Pa., assignor to Samuel Diescher & Sons, Pittsburg, Pa., a copartnership of Pennsylvania. A furnace having in combination a heating-chamber having oppositely-arranged charging and discharging openings, a series of fire boxes or chambers arranged below the floor of the heating-chamber and provided with openings at an angle to a straight line passing through the charging and discharging openings for the passage of heat and products of combustion into the heating-chamber, and burners arranged in the fire boxes or chambers.

693,126. **STEAM-PUMP.**—Felix Freyhold, Washington, D. C. The combination with a pair of pump-cylinders having water inlet and discharge openings, and steam-inlet openings, of valve mechanism arranged to admit steam alternately to said cylinders, and connections between said mechanism and both cylinders whereby the combined movement of both cylinders, caused by expansion and contraction, will be transmitted to said mechanism.

693,137. **APPARATUS FOR THE MANUFACTURE OF ILLUMINATING GAS.**—Charles W. Isbell, New York, N. Y. An upright gas-retort, having a movable bottom and a pan in the bottom for the collection and retention, for further distillation, of tar or liquid matter that may be distilled from the charge in the retort and pass downward therefrom.

693,148. **PROCESS OF TREATING ORES.**—Elizabeth B. Parnell, Carshalton, England. In the treatment of refractory ores, a process which consists in subjecting them to the action of chromic acid and then roasting them.

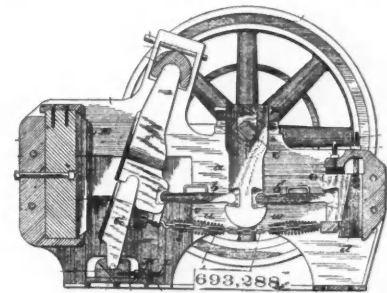
693,216. **ELECTROLYTIC ELECTRICITY-METER.**—Charles O. Bastian, London, England. In electrolytic meters, the method of preventing overheating or melting of one or more of the electrode-conductors, at the upper surface of the electrolyte, which consists in preventing the access of air or other gases to said conductors at said point.

693,252. **BRICK-KILN.**—Jonathan P. B. Fiske, Newton, Mass. A brick-kiln comprising inclosing walls provided at

their top with a receiving-plate, a cover or crown composed of suitable fire-proof material terminating adjacent to but not resting on said walls, and having metal beams extending beyond said fire-proofing material and resting on said receiving-plate, and a sealing medium closing the joint around the top of the walls between said cover and said walls.

693,266. **EXCAVATOR.**—William M. Gross, Ogden, Utah. The combination with a frame or stand, of a crane adapted to swing on a vertical axis, an elevator comprising an endless series of buckets and mounted on the crane, means for raising and lowering the elevator-frame, and a swinging brace for supporting the lower portion of the elevator.

693,288. **ROCK BREAKER.**—George Lowry, Tiffin, Ohio. The combination with a stationary jaw, of a vibrating jaw comprising a lower section supported and fulcrumed at its

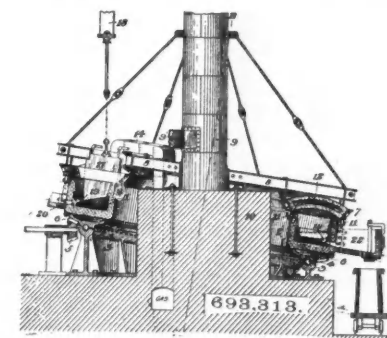


lower end, an upper section supported by the lower section and having a bearing upon the upper edge of said lower section, said upper section also being provided with a bearing and fulcrum at its upper edge, and means for operating said vibrating jaw.

693,289. **STONE-CRUSHER.**—George Lowry, Tiffin, Ohio. The combination with the casing, the gyratory shaft and the crusher-head, of a crushing-ring longitudinally adjustable in said casing, a chute provided with a horizontal external flange, an internal annular shoulder on the casing on which said flange rests and screw-bolts threaded through said flange and forming an adjustable seat for the crushing-ring.

693,306. **STONE-SAW.**—James Peckover, Philadelphia, Pa. A stone-saw comprising a blade having a series of recesses in the edge of the same and teeth formed between said recesses, each of said teeth projecting in a curved line from the sides of said recesses alternately on opposite sides of the blade.

693,313. **TREATING ORES OR SIMILAR MATERIALS.**—John A. Potter, Cleveland, Ohio. A rotary furnace



having a body of annular form, and a roof covering at least a portion of said annular body, said roof being hollow and having inlets for gas and air, and downwardly-directed ports.

GREAT BRITAIN.

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

Week Ending January 23, 1902.

88 of 1901. **COAL MINING MACHINE.**—H. V. Neukirch, Zwickau, Germany. Method of mounting undercutting coal mining machines at the side of the face, so as to make it movable at right angles to the face.

2,407 of 1901. **SULPHIDE TREATMENT.**—A. Germot and H. Fievet, Paris, France. Converting sulphites into sulphates by the action of ozonized air.

4,214 of 1901. **CRUSHING-ROLLER.**—J. C. Wegeriff, London. Crushing-roller, rotating within and in contact with a revolving ring, the axes of the roller and ring being oblique and in different planes.

4,524 of 1901. **CONCENTRATOR.**—J. A. B. Wesley, Gawler, South Australia. Concentrating table having an adjustable elliptical motion in a horizontal plane.

13,862 of 1901. **CONVERTER LINING.**—W. Oswald, Coblenz, Germany. Making hearths and converter linings of bricks of burnt magnesite, in which the blast channels are already formed.

PERSONAL.

Mr. Frank Fletcher, of the Compania Industrial, of Chihuahua, has been in Parral, Mex.

Mr. J. W. Neil, of Salt Lake, Utah, has gone to Butte, Mont., on a professional visit.

Mr. R. H. Brown is consulting engineer of the Nova Scotia Steel and Coal Company.

Mr. Henry L. Frank, of Butte, Mont., recently left for the East, to be absent about 3 months.

Mr. Wm. V. Pettit, owner of the Adela silver mine, has returned to Parral, Mex., from Philadelphia, Pa.

Mr. E. A. Regestein has been appointed instructor in electrical engineering at Lehigh University.

Prof. J. W. Gregory has been appointed acting head of the Geological Survey of Victoria, Australia.

Mr. A. C. Carson is the new manager of the Boss Tweed and Clipper group of mines at Pony, Mont.

Mr. J. D. Wood, vice-president of the Daly-West Company, has returned from a trip to the Pacific Coast.

Dr. W. A. Noyes, of Terre Haute, Ind., has been elected editor of the American Chemical Society to succeed Mr. Edward Hart.

Mr. W. H. Simonds, of the Hillside Gold Mining Company, operating at Central City, Colo., is making a business trip to St. Joseph, Mo.

Mr. J. W. Phillips, of Spokane, Wash., has gone to Mexico City. He was accompanied by men from Kansas City, St. Louis and New York.

Mr. J. W. Cleveland, of Philadelphia, Pa., is in Chloride, Ariz., inspecting the new concentrating plant of the Minnesota Copper Company.

Mr. E. McCormick, of Chihuahua, Mex., was recently appointed superintendent of the Aberdeen Consolidated Company's mines at Lordsburg, N. M.

Mr. Grant Snyder, of the Utah & Eastern Company, has returned to Salt Lake from a 3 weeks' trip to New York, Washington and other eastern points.

Mr. H. R. Countryman, of the firm of Luckraft & Countryman, of Cripple Creek, Colo., has left Republic, Wash., for Arizona, on professional business.

Mr. George K. Fisher, who has charge of the construction of the United States Smelter in Salt Lake Valley, has been in California on mining business.

Mr. E. J. Adams, manager of the Bullion Mining Company, operating at Pine Creek, in Gilpin County, Colo., is making a business trip to Lincoln and Omaha, Neb.

Mr. C. A. Burcham, vice-president of the Yellow Aster Mining Company, has been appointed superintendent of the company's mines and mills at Randsburg, Cal.

Mr. E. L. Wyckoff, president of the A. Wyckoff & Son Company, manufacturer of wood mine pipe, of Elmira, N. Y., is on a 4 weeks' trip to Cuba, Porto Rico and Mexico.

Mr. A. J. Moxham has resigned as manager of the Dominion Iron and Steel Company's plant at Sydney, N. S. Mr. Moxham will remain a director, and also be vice-president.

Messrs. T. Dingler, B. A. Kipp, J. Scheuer, Fred Heiden and E. Waters, of Milwaukee, Wis., have been visiting Gilpin County, Colo., as stockholders in the Horseshoe Mining Company.

Mr. F. C. Smink, long general manager of the Reading Iron Company, has been elected president, succeeding Mr. George F. Baer, now president of the Philadelphia & Reading Railway Company.

Mr. H. W. Hardinge, mining engineer, of Denver, Colo., has been in La Cananea, Mex., lately superintending the construction of the 500-ton concentration plant of the Greene Consolidated Copper Company.

Mr. F. D. Smith, of the Chainman Mining and Electric Company, has left that company, and has gone to New York, whence he will go to the City of Mexico. He will engage with the Reyna Estate to manage its mining properties.

Mr. Harry R. Hall, who had charge of repairs of the Pacific Steel Company's charcoal blast furnace at Irondale, Wash., has been appointed superintendent of blast furnaces of the Lake Superior Power Company at Sault Ste. Marie, Ont.

Col. F. W. Lewis has taken a contract for building the new concentrating plant for the old Mono Mine in Ophir District, Utah. The contract for the machinery equipment has been awarded to the Acme Mining Machinery Company, of Salt Lake.

Mr. A. L. Schultz, formerly manager of the American Bridge Company in the Pittsburg, Pa., district, has resigned, and is succeeded by Mr. Marshall Williams, formerly inspector of shop practice at the Pencoyd Works of the A. & P. Roberts Company at Pencoyd, Pa.

Mr. Joseph S. McDonald, formerly in the employ of the Westinghouse Electric and Manufacturing Company at Pittsburg, Pa., has gone abroad, and will

take charge of the brass and gray iron foundry of the Westinghouse Electric Company, Limited, at Birmingham, Eng.

Mr. Henry Leschen and his son, of the Leschen & Sons' Rope Company, of St. Louis, Mo., were visitors at Black Hawk, Colo., last week to see the satisfactory working of the new aerial tramway which they recently constructed for the Carr Mine & Colorado Company, Limited.

Col. James L. Gaines, for years general manager of the Tennessee division of the Tennessee Coal, Iron and Railroad Company, has tendered his resignation. A report is current that Col. Gaines will go with the Cumberland Iron, Coal and Coke Company, of which Mr. Nat. Baxter, formerly with the Tennessee Coal, Iron and Railroad Company, is president.

Mr. William F. Word, of Butte, Mont., well known in Helena, has been appointed assistant superintendent of the Butte & Boston mines in addition to his former duties as assistant superintendent of the Colorado Smelting Company's mines. He will have charge of the mines under the general supervision of Mr. John Gillie, the general superintendent.

OBITUARY.

Stewart Johnson, who died of pneumonia recently after a brief illness at Anaconda, Mont., had been engaged with the Amalgamated Copper Company for the past 6 years. He was superintendent of the silver refining department in connection with the copper works. He was about 26 years of age, and originally went to Montana to accept the position of chemist in the refinery.

Samuel F. Roberts, aged 64 years, one of the leading coal operators of the Monongahela Valley, died February 15 at his residence in Elizabeth, Pa. Mr. Roberts was born in Temperanceville, and, when quite young, removed to Elizabeth. Early in life he engaged in the coal business and became a member of the firm of Horner & Roberts, for years among the largest shippers on the rivers.

Joseph Cornish, one of the old mining captains and prospectors of Negaunee, Mich., is dead of pneumonia, after a long illness from a complication of diseases. Mr. Cornish was about 55 years of age, and had been in the upper peninsula for 35 years. He was the first captain of the Queen Mine, was one of the first captains at the Macumber Mine, and was at one time in charge of the work at the Swanzy Mine. He leaves a widow and 7 children.

Col. Francis J. Turner, a noted Boer scout, formerly a resident of Brooklyn, N. Y., died in London on February 18. He was a civil, mining and mechanical engineer, and had acquired large interests in South Africa. As leading scout of the Boer army in the first 18 months of the war, he led some daring raids. He was severely wounded in the battle of Colenso, and was sent to Holland, via Australia and America, both to recuperate and to do important work for the Boer cause. He was planning to return to South Africa.

Capt. Thomas Couch, who died in San Francisco recently, was one of the best-known mining men in Montana. He was born in Piaiz, Cornwall, 58 years ago, and came to America in 1863. For a year and a half he worked at copper mines in the Lake Superior country. In 1865 he went to San Francisco, and was engaged in mining in California, Nevada and Utah until he went to Montana in 1883. It is the opinion of many mining men that to him is largely due the credit of demonstrating the vast extent of the copper bodies on the Anaconda Hill at Butte. He first did this in the Mountain View Mine, after the financial resources of its owner, Charles X. Larrabee, were exhausted in development. Capt. Couch, who had watched the development of the Mountain View, went east and interested capital in the property, and spent more than a year in opening it. He sank the shaft to greater depths than the Anaconda had gone at that time, and opened up a property that has since paid millions of dollars in dividends. In addition to a handsome commission for purchasing the mine, he is said to have received from the stockholders upon the incorporation of the Boston & Montana Company 1,000 shares of the stock as a gift, the stock then being quoted at \$70 per share. For 9 years Captain Couch was at the head of the company as general manager of its mining affairs. He was instrumental in having the smelting plant erected at Great Falls. Some years ago Capt. Couch purchased a ranch near Great Falls. Upon his retirement from the management of the Boston & Montana he traveled extensively, taking a well earned rest, and next turned his attention to mining in Mariposa County, California. More recently he engaged in placer mining at Oroville, Cal., with a dredging plant, and this enterprise is said to have been a great success. During the past few months he had been in poor health. Capt. Couch was known as a big, warm-hearted man who was never known to have done a petty thing. He left a wife and one son.

SOCIETIES AND TECHNICAL SCHOOLS.

HARVARD UNIVERSITY.—Improvements have been completed in the Rotch building during the last few months which add largely to its facilities for the study of mining engineering. A gift from J. J. Storrow, '85, has made possible the entire refitting of the laboratory of metallurgical chemistry. A new laboratory, to be known as the "Simpkins Assay Laboratory," has been fitted up in a large room in the addition on the east side, and another, the "Simpkins Metallurgical Laboratory," which is now being equipped, will occupy the remainder of this section. A large room in the northwest corner of the building is to be used for the study of steel; and a complete set of instruments is being installed for this purpose. The laboratory of metallography has been moved to the old Infirmary building.

MINE MANAGERS' ASSOCIATION OF AUSTRALASIA.—The annual meeting of this association was held at the Ballarat Mining Exchange December 28. The balance sheet showed the association to be in a satisfactory financial position, £200 being at deposit, and £83 to credit of current account. The election of officers resulted as follows: President, W. F. Emery; vice-presidents, George Fragel and I. Jansen; treasurer, George Fuller; secretary, John Sharpe; auditor, T. F. Hicks; General Committee: Capt. Trethowan, John Rowe, James Black, W. Sutton, R. Sheridan, James Martin, Thomas Tregurtha, G. F. Peel, A. G. Sergeant, Thomas Smith, Joseph Weir, William Firth; Legislative Committee: E. J. Alexander, Capt. W. Treloar, Capt. F. D. Johnson, Capt. W. Oats, James Hardwick, Thomas Esdaile, Capt. J. M. Potter, Capt. J. Provis, Capt. A. Paul, W. Sterritt, W. Josephs, Joseph Hammer, William Harris.

The report of the president referred among other matters, to the question of certificates for mine managers which had been placed before the Minister for Mines (Hon. J. B. Burton) by a deputation from the association, and the reply of the Minister thereto. The secretary's report by Mr. John Sharpe stated that the association is now represented in several leading mining centers in foreign parts—Celebes, Borneo, Sumatra and South Africa—in all of which places they had correspondents. Mr. Sharpe dealt very fully with his visits to the branches in other States, and spoke of the cordiality of the receptions accorded him, and the facilities given for inspecting the mines and plants on the various fields.

ENGINEERS' CLUB OF ST. LOUIS.—At the meeting, on February 19, 19 members and 6 visitors were present. Messrs. Geo. D. Rosenthal, Wm. M. Hand, Frederick W. Hulme and Reno DeOrville Johnson were elected to membership.

E. A. Buckley, Missouri State Geologist, read a paper on "Street Paving." In most cases the style of pavement was limited by the cost. In general the question of maintenance was deserving of greater consideration than first cost. On important streets with heavy traffic granite blocks were nearly always used, and are unexcelled for the purpose. Even surfaces and close joints were conducive to comfort for users and longer useful life of horses and vehicles. Brick pavements were largely used on streets where the traffic was moderate. The various tests for paving brick were described in considerable detail, and the absorption test was regarded as of more importance than it had been considered in the past.

In all block pavements, careful attention should be paid to the foundations and drainage. When cement grouting was used the traffic should be entirely suspended till the cement has thoroughly set. It would be an ideal condition if all water and gas pipes, electric vaults and sewers could be installed in underground vaults before the pavement was laid, as the disturbances from these causes frequently caused more damage to the pavement than years of traffic. Macadam and telford pavement should never be installed unless provision was made at the same time for their maintenance. Macadam pavements of any other than granite or trap rocks were worthless, being muddy in wet and dusty in dry weather.

Wooden block, asphalt and other pavements were described and their limitations considered. The best grades of each variety of pavements are, in the property locality, better suited to the conditions than all other varieties; but a poor grade of any kind of pavement is out of place anywhere.

In the discussion which followed the reading of the paper, Messrs. Wheeler, Flad, Lubberger and others participated.

INDUSTRIAL NOTES.

The St. Louis Plate Glass Company is to be incorporated under the laws of Missouri, with a capital of \$2,000,000.

The Baldwin Locomotive Works, of Philadelphia, Pa., will make a shipment of 4 locomotives this month for use on the Imperial Government Railways of China.

The International Salt Company, of Illinois, a subsidiary company of the International Salt Company,

of New Jersey, has bought out the L. J. Pettit Salt Company.

Messrs. Pilling & Crane, of New York City, announce that they have removed their New York office from 56 Pine street to the Empire Building, 71 Broadway.

The Howell Drill Company, of Plymouth, Pa., has received an order from a large mining firm in Siberia for a number of mining drills similar to those used in the Pennsylvania anthracite mines.

The Link-Belt Machinery Company, of Chicago, Ill., has contracted to furnish 2 of its latest pattern placer mining dredges to the Zaragoza Mining Company, of Zaragoza, Colombia, South America.

The Jeansville Iron Works Company, of Jeansville, Pa., is reported to have received a fair sized electric pump order through the Denver Engineering Company. The pumps will be used for mines in Mexico.

The Marion Steam Shovel Company, of Marion, O., has decided to erect 2 large additional buildings to its plant besides those recently completed. Plans are being prepared, and work will begin as soon as weather permits.

The Standard Pneumatic Tool Company, of Aurora, Ill., has opened Canadian offices at 103 Union Station Arcade, Toronto, and appointed J. B. Wilson, formerly connected with the mechanical department of the Grand Trunk Railway, manager.

R. D. Wood & Company, of Philadelphia, are reported to have secured a large contract for cast-iron pipe to be forwarded to China. The sizes of the pipe will vary from 4 in. to 12 in. About 900 tons will be shipped in March to Tongku.

The Rogers Locomotive Works, of Paterson, N. J., is about to award a contract for one 100-ton and two 25-ton electric traveling cranes. The company is preparing to buy a considerable number of new tools for equipping its shops at Paterson.

The Stilwell-Bierce & Smith-Vaile Company, of Dayton, O., with New York City offices in the Washington Life Building, has just shipped 3 carloads of pumping machinery to be utilized on the Central Aguirre, one of the largest sugar plantations in Porto Rico.

The Sydney Steel Products Company is to establish a plant at Sydney, N. S., for the manufacture of wire rods. James Pender, managing director of James Pender & Company, Limited, manufacturers of wire nails, of St. Johns, is the promoter. The capital is to be \$500,000.

The Detroit, Mich., Graphite Company has increased its capital from \$25,000 to \$100,000. The corporation owns about 880 acres of land in Baraga County, all of which is located in L'Anse Township. The graphite is shipped to Detroit, where it is used in the manufacture of paint.

Ben Catchings, J. S. Dwyer and others have incorporated the Southern Rolling Mills Company, capital stock \$60,000. The company intends to erect rolling mills for making steel bars at some point in Alabama. So far no site has been selected. The company is now negotiating for machinery.

Westinghouse, Church, Kerr & Company, of New York City, have received an order for 2 1,000-kw. Westinghouse-Parsons turbo-generating sets for the DeBeers Consolidated Mines, Limited, of Kimberley, South Africa. This equipment will furnish current for a power transmission system in the DeBeers mines.

The recent annual election of directors for the St. Louis, Mo., Hydraulic Press Brick Company, resulted in the selection of the following: Festus J. Wade, E. C. Sterling, H. W. Eliot, W. E. Smith, Henry C. Scott, John A. Holmes and William B. Dean. The directors organized by electing Mr. Sterling president and Mr. Eliot secretary and treasurer.

At the recent annual meeting of the stockholders of the Reading Iron Company, in Philadelphia, the following directors were elected: George F. Baer, F. C. Smink, J. Lowber Welsh, Joseph S. Harris and S. R. Seyfert. At a subsequent meeting of the directors George F. Baer was elected chairman of the board and F. C. Smink president of the company.

The Pelton Water Wheel Company, with New York offices at 136 Liberty street, is reported to have recently secured orders for 3 300-h. p. water wheel equipments, to be used for electric transmission by the Hilo Electric Power and Refrigerating Company of Hilo, Hawaiian Islands. A 200-h. p. air compressor plant has been contracted for by British Columbia.

The St. Clair Furnace Company, one of the subsidiary companies of the Crucible Steel Company of America, has awarded the contract for its ore handling machinery for its new furnace plant at Clairton, Pa., to the Brown Hoisting Machinery Company, of Cleveland, O. The plant will consist of a car dumper, 2 bridges and ore and coke bins each 700 ft. long.

The Colorado Iron Works Company, of Denver, Colo., has recently opened offices in New York City,

in the Broad Exchange Building, 25 Broad street. In addition to the general office the firm states that it has one of the most complete engineering departments to be found in the city, and is prepared to furnish customers or any one else with detailed information in regard to mining, milling and smelting equipments.

The Ottumwa Iron Works, of Ottumwa, Ia., making mining machinery, is installing for the Chicago & Northwestern Railroad Company, at the coal mines at Buxton, Ia., two pairs of large hoisting engines of modern design. The hoists are of the direct-acting double-cylinder, double drums, Tangye bed type, with steam cylinders, 18-in. by 32-in. stroke. The engines are equipped with post brakes and balanced valves.

The proposed extension of the works of the Monterey Foundry and Manufacturing Company, of Monterey, Mex., for manufacturing gasoline engines, will include a machine shop, 60 by 250 ft.; boiler and blacksmith shop, 80 by 160 ft.; pattern and carpenter shop, 60 by 80 ft.; foundry, 60 by 180 ft., and office, 60 by 65 ft. Work will begin within the next 3 months. All the machinery, etc., will be of United States manufacture.

The Pittsburg Reduction Company has purchased from Henry D. Sexton, 20 acres of land near the Four-Mile Crossing, in East St. Louis, Mo., upon which it will erect a factory for the manufacture of aluminum wire. Representatives of the company have stated that the works will be erected immediately, and that the plant will start work with a large force of men. It will be operated in connection with the plans at Niagara Falls and Pittsburg.

The Southern Pacific Railway Company has decided to improve its facilities at various points for building and repairing rolling stock, and to this end has placed with the American Bridge Company, of New York, contracts for a boiler shop at East Portland, Ore.; boiler and machine shops at San Francisco, Cal.; boiler and machine shops at Los Angeles, Cal.; machine shop at El Paso, Tex.; machine shop at Houston, Tex. These buildings are all about 120 by 250 ft., and are to be equipped with traveling cranes.

It is stated that the Omaha Smelter of the American Smelting and Refining Company has discontinued the smelting of South African and Canadian ores, owing to the small percentage of profit. It is stated that these ores carry a large amount of lead, which has become less profitable by reason of a decline in prices. The closing of the smelter at Argentine, Kan., has materially increased the work at Omaha, and much of the Argentine machinery is being installed at the Omaha plant. This and the increasing receipts of American ore are also given as a reason for shutting foreign ores out of the Omaha Smelter.

The Taylor Iron and Steel Company, of High Bridge, N. J., states that it is making a specialty of large sized revolving cylindrical screens for use in crushing and sizing plants. The company states that its screens are substantially built, all parts subject to wear being made of manganese steel. The company reports also doing a large business with gold dredging companies, to whom are furnished manganese steel pins, bushings, linings, bucket lips, rollers, grizzlies, chutes, chains, etc., and cast steel buckets, links and tumblers. A contract for the practical rebuilding of a large dredge in Colorado is now being executed.

The General Fireproofing Company, of Youngstown, O., has been organized with a capital stock of \$500,000 to manufacture herring bone lath and all manner of expanded metal fireproof building materials. The buildings will be of brick and steel construction, 2 stories high, and about 350 or 400 ft. long. There will be 2 main buildings. As yet no site for the plant has been secured. The plant of the International Metal Lath Company, of Niles, O., will be moved to Youngstown to be rebuilt, enlarged and operated with the new plant. The officers of the company are: President, Myron I. Arms; secretary, W. H. Foster; treasurer and general manager, W. A. Kingsley.

The Salt Lake Hardware Company, of Salt Lake, Utah, has filled an order for high grade crushing rolls for the Royal Copper Company to be used in the experimental mill being installed at its Cactus Mine in Beaver County. In addition the company recently sold the University of Utah a plain slide-valve steam engine, a Witte gas engine, a surface condenser and a vacuum pump to be used in the mechanical and engineering department of this institution. F. C. Richmond, who has charge of the machinery department of the company, states that his company has secured the agency for the Witte Iron Works of Kansas City, and that the company will carry a complete line of gasoline hoists and engines.

The Allis-Chalmers Company has received an order through its Salt Lake office, H. V. Croll, manager, for a 60-stamp mill, each stamp weighing 850 lbs., from Allen C. Mason, of Helena, Mont. The mill will be built on the Winston property, 4 miles from Helena, and will be driven by 3 electric motors, 2 for the 60 stamps and one for the large Gates crusher. This mill will have several new features in its construction,

among which is a special new design of conveyor for the ore bins, and heavy cast iron anvil blocks placed under the mortars, resting upon a large concrete foundation, instead of the ordinary wooden mortar block which has been universally used. This construction is expected to increase the crushing capacity of the stamp from 20 to 25 per cent. The mill will probably be in operation by June 1.

TRADE CATALOGUES.

Some advance sheets from its forthcoming 1902 catalogue, sent out by the Marine Iron Works of Chicago, Ill., describe several patterns of simple and compound marine engines built by the company.

Catalogue No. 8, published by the Allis-Chalmers Company, Fraser & Chalmers Works, Chicago, Ill., describes crushers, rolls and pulverizers. The pamphlet contains 44 pages and is of the usual high standard of the company's publications. Gates, Dodge, Clake and Foster crushers are described briefly, also rolls of a variety of types, including the standard, the extra heavy, the high speed, and the geared types. For very fine pulverizing the pamphlet recommends ball mills.

Extensible trench braces are described in a neat 20-page pamphlet published by the Dunn Manufacturing Company, of Pittsburg, Pa. The company manufactures these braces, or ditch jacks, in 2 styles, a standard all iron brace for ordinary trench work and a combination screw and timber brace for wide and deep trenches. Each brace, the pamphlet states, is fitted with a patent recessed ball and socket joint shoe, or adjustable foot, allowing the brace to take a firm and equal bearing at any angle. Numerous cuts show the braces in use for sewer work and in the New York City subway.

ALASKA.

DOUGLAS ISLAND.

Alaska-Mexican Mining Company.—This company has elected the following directors: William Alvord, president; H. H. Taylor, F. W. Bradley, E. W. Hopkins and R. D. Fry. A. T. Corbus, secretary, and Joseph MacDonald, superintendent. The monthly report for January 15 gives 20,015 tons ore crushed, yielding \$20,836, and 390 tons sulphurets, valued at \$19,422. The gross receipts for the month were \$43,198, the ore averaging \$2.15 per ton, and the working expenses were \$29,119.

The compressor building at the mine was destroyed by fire on February 11. From the compressor building the flames spread to the hoist and the tramway and shaft house. These were also destroyed, as was a nearby mill building. Considerable damage was done to the shaft. The miners below ground escaped injury.

Alaska-United Mining Company.—This company has chosen the following directors: William Alvord, president; H. H. Taylor, F. W. Bradley, E. W. Hopkins and Robert Mein. A. T. Corbus, secretary, and Joseph MacDonald, superintendent. The report for the month ending January 15 gives 19,710 tons of ore crushed, yielding \$18,751, and 398 tons of sulphurets valued at \$11,713. The total receipts were \$33,440; the ore averaged \$1.70 per ton. The working expenses were \$20,699.

ARIZONA.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Elkart.—Theo. B. Comstock is again to take charge. Both mine and mill have been closed for some time for want of water.

Gold Road.—Developments have reached a depth of 200 ft., and a crosscut shows 30 ft. of ore.

Minnesota.—George Hoyt and Fred Leonard, of Chloride, have sold this group of mines, near Boundary Cove, to Carl Schader and associates, of Los Angeles. There are 10 claims.

Minnesota Mill.—This new plant is now at work.

Planet.—A rich body of ore has been opened on this property near Signal. E. H. Webb is superintendent.

Rico.—This mine, in Todd Basin, near Chloride, is being worked by Clark Bros., who have a fine silver ore in sight.

Samoa.—After a long spell of idleness this mine adjoining the Lucky Boy on the south is to start work soon.

Sunrise.—John Barry is putting from 40 to 50 men at work on this mine near Chloride. A new concentrating plant is talked of.

Telegraph.—A cash deal has been made for this mine, near Chloride, to James A. Smith and W. D. McCright. The mine is one of the Burro group, on Burro Creek.

Tom Reid and Ben Harrison.—Capt. De La Mar has taken a bond on these mines from Joe Anderson, Eli Hilty and D. Tooker, of Chloride. The veins are large and carry pay values in gold.

Treasure Hill Mining Company.—This company has been incorporated to work mines at Stockton Hill.

YAVAPAI COUNTY.

Jerome Canyon Copper Company.—This company is installing a complete new plant in its property in Jerome Cañon, Verde District. The plant consists of a steam hoist, an upright 20-h. p. boiler, engine, cable, buckets, etc., sufficient to sink to a depth of 500 ft.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

Bunker Hill.—At this mine, Amador City, C. R. Downs, superintendent, drifts will be run several hundred feet further on the vein in hope of striking a better grade of ore.

Kirkwood.—Arrangements have been made by E. H. Harrington and others to reorganize the company. A 5 years' bond has been secured, and operations will shortly be resumed. The mine is at Jackson.

Lincoln.—The shaft on this property, at Sutter Creek, is down 1,800 ft., and Mr. E. C. Voorheis, president, says the company will begin drifting in another 70 ft. The shaft is to go to 2,000 ft.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

Gold Hill.—It is stated that very rich specimen rock has been struck in this mine, near Angels.

Melones Consolidated.—Sixty stamps of the new 120-stamp mill at this mine, at Robinsons, of which W. C. Ralston is general manager, are now ready to drop. The other 60 stamps are on the ground. There are 12 Wilfley and Halleck concentrators and 24 Frue vanners, with 2 rock breakers. The mill is to be run by water power, taken from the Stanislaus River, 4 miles distant. On the 1,100-ft. level there is a tunnel 4,200 ft. long and on the 875 there is one 2,200 ft. long. There are about 2 miles of underground workings. There are 2 ore bins at the mill, one with capacity of 800 tons and the other 3,200 tons. After several years' work the mines have now reached a productive point, and the mill is about to start.

San Bruno.—The first payment on the bonds of the San Bruno, Monte Cristo and Good Hope mines, at Mokelumne Hill, has been made.

EL DORADO COUNTY.

(From Our Special Correspondent.)

Church.—A drift has been started in this mine, at El Dorado, toward the School Girl, with the hope of striking the old Cosumnes ledge at a depth of about 1,000 ft.

School Girl.—This mine, at El Dorado, is worked by W. Felton, J. Vose, A. Hanley and J. Snider, who have leased it from Mr. Harpending. They keep 10 stamps busy.

Vandalia.—This mine, at Canyon, belonging to John Rosenfeld's Sons, of San Francisco, is preparing for work on a large scale, and considerable machinery has been purchased.

FRESNO COUNTY.

(From Our Special Correspondent.)

Copper King.—The Board of Supervisors of Fresno County, after having completed a personal examination of the road on which the traction engines of the Copper King Mining Company have been hauling ore, has come to the conclusion that the complaints were much exaggerated. It found the road in good condition, and that teams could get along anywhere. On its return the board adopted a resolution instructing the District Attorney to dismiss the suit against the Copper King Company, which enjoined that company from using traction engines on the road for hauling ore to Clovis. As soon as suit is dismissed, the board will vote on the matter.

Wabash Mining Company.—This company, of Los Angeles, Dr. J. H. Bryant, president, owns 16 claims adjoining those of the Copper King, at Letcher, and a plant has lately been installed consisting of boilers, hoist, air-compressor, pumps, etc. There is a good water supply.

KERN COUNTY.

(From Our Special Correspondent.)

Amalie Mining Company.—This company, at Amalie, C. E. Gunn, superintendent, is sinking a new shaft on a 30-ft. ledge a mile south of the post-office. The ore is low grade and "rebellious," and a special reduction plant will be necessary.

Assurance Company.—This mine, at Woody, H. T. Austin, superintendent, has had its mill put in shape, and the shaft is being sunk.

Buena Piedra.—New rollers have been put in the mill, and the mine pumped free of water.

Placer Locations.—John Kerr and J. Elwood have purchased 80 acres of placer ground on upper Poso Creek, 6 miles from Granite, and will build a 4-mile pipe line to bring in water. The ground is to be worked by sluicing, there not being enough fall for hydraulicking.

MARIPOSA COUNTY.

(From Our Special Correspondent.)

Garibaldi.—This mine, at Kinsley, J. R. Porter, superintendent, is doing well. The ore is of good

grade, and there is plenty of it reported. The mill is running steadily.

Princeton.—At this mine, belonging to the Mariposa Mining and Commercial Company, at Mount Bullion, a new station is finished at the 1,250-ft. level. The quartz paid the expenses of excavation. Two McCormick turbines and conduit to run the 400-kw. Westinghouse generator have been received. The Alice Mine, under lease to Champion and Maloney, is producing. Sulphurets from the Princeton are being shipped to the Selby Smelter.

MONO COUNTY.

(From Our Special Correspondent.)

Crystal Lake Gold Mining Company.—This company owns at Lundy the May Lundy, Bryant, Lucky Morton, Jackson and Lakeview mines. R. T. Pierce is superintendent and Davis & Soule, of Waterville, Me., are managers. Eighty-five men are employed on the property. Of the new 2,700-ft. tunnel 1,300 ft. are now completed. The tunnel will tap the ledges of the Crystal Lake Mine at a depth of 2,500 ft. The workings of this mine are now 1,200 ft. below the croppings. About 45 ft. per week is being made in the tunnel work. The tunnel will obviate pumping.

Golden Gate.—A tunnel is being run to tap the 7-ft. ledge recently found in this mine, at Antelope Valley.

Mineral Ranch Gold Company.—This company, a Boston one, is to work the Anthony group of mines near Ballarat.

NAPA COUNTY.

(From Our Special Correspondent.)

Boston Consolidated.—This mine, of which B. M. Newcomb is superintendent, mined and treated last year 19,045 tons of cinnabar ore, yielding 1,545 flasks, or 118,192 lbs.; average yield, percentage, .0031; cost of ore reduction, 61c.; cost of mining, \$2.14, and including development work, \$2.58. A new furnace was put up during the year.

Napa Consolidated.—This quicksilver property, at Oat Hill, B. M. Newcomb superintendent, mined and furnished last year 33,930 tons of ore yielding 4,800 flasks of mercury. The cost per ton of ore reduction was 66c. The cost per ton of mining ore was \$2.82, and cost, including development work, \$3.50; cost per ton of mining ore and reduction including general expense, \$4.60. The total pounds of quicksilver produced were 367,200; average yield, percentage, .00541.

NEVADA COUNTY.

(From Our Special Correspondent.)

The mine owned by G. Fischer and Charles Belden, at Maybert, is yielding good ore, and development is pushed.

Buckeye.—This mine, in Willow Valley District, has been incorporated under the laws of New Jersey. The directors are: T. B. Gray, J. T. Morgan and George H. Shaw, of Nevada City; J. H. Allen, of Newark, N. J., and W. I. Sweet, of New York. Mr. Gray is president, Mr. Morgan secretary, and Mr. Shaw treasurer. This mine 30 years ago was a good property.

California.—Superintendent Ed. Lawrence, of the California or Gold Tunnel Mine, Nevada City, is to install a new electric pumping and hoisting plant. The hoist is to have a capacity of 2,000 ft.

Grass Valley Consolidated.—This is the new name of the company now operating the old Electric Mine, near Grass Valley. A new plant has been put in by Superintendent Oscar Coffin. G. W. Root, of San Francisco, is president of the company.

Grey Eagle.—This mine, at Maybert, has been bonded by William Tiernan to S. F. Allen, of Oakland.

Midnight.—This mine, also known as the Tilley, at Nevada City, has been leased by a party of miners named Hawke, Cleveland, Marowich and Calanan, who will work it themselves.

Mountaineer Mill and Mining Company.—This company's property, at Nevada City, has been purchased by F. J. J. Sloat, of Hamilton, O., and Superintendent William Dennis is preparing to reopen the mine.

Murcic.—This mine, near Grass Valley, is to be unwatered by J. C. Campbell, who has bonded it.

Pine Hill.—A new compressor is to be put in this mine, at Wolf. New power machinery is to be installed.

Santa Rosa.—The 4 claims on Canada Hill, Nevada City, are to be worked by the owners, William Floyd and Fred Searles and W. H. Bray, of the Posey Mine. The superintendent is to be William Floyd. A tunnel is to be driven 500 ft.

Yuba.—H. E. Averill, R. D. Jackson and D. R. Finlayson have been testing ores from this mine, at Maybert, and is expected that work will be resumed on a larger scale.

ORANGE COUNTY.

(From Our Special Correspondent.)

Santa Ana Tin Company.—This mine is in Trabuco Canyon, Santa Ana Range, 14 miles northeast

of Al Toro station, on the Southern California Railroad. Gail Borden is the principal owner and G. A. Connor manager. The office is at Los Angeles. Thirty men are employed, and a 10-stamp mill is ready to start running. The ore is to be cyanided for gold and concentrated for tin. There is no well defined ledge. The mine is 10 miles south of the old Temescal tin mine, which produced some tin a few years ago, but closed down after heavy loss to the English capitalists who purchased it.

SAN BENITO COUNTY.

(From Our Special Correspondent.)

Aurora.—This quicksilver mine, near San Benito, has made its first shipment of mercury, consisting of 8 flasks.

New Idria.—This quicksilver mine last year obtained from 31,866 tons of ore 4,800 flasks of mercury. The cost of reduction per ton was 64c., and of mining, including development work, \$1.82. The total expenditures were \$169,855, of which \$101,480 was for labor. Each flask of mercury contained 76½ lbs.

SAN DIEGO COUNTY.

(From Our Special Correspondent.)

California King Gold Mines Company.—Twenty-five freight cars loaded with machinery, etc., for this company at Pichacho are side-tracked at Yuma. Teams will take the machinery to the mines. It is to be a dry-crushing roller plant. The rails to connect mines and mills are also at Yuma.

SHASTA COUNTY.

(From Our Special Correspondent.)

Mount Shasta Gold Mines Corporation.—The new plant of this company, at Shasta, F. E. Ware, superintendent, is to have a capacity of 50 tons of ore daily. The mill is in course of construction. This company has also recently purchased the McClure group of copper claims, near Bully Hill, and has also begun to work the Summit and Graves groups of copper claims near Kennett under bond.

Wynne.—The land on the Wynne place, near Horse-town, 17 miles from Anderson, is to be worked by a San Francisco company by a dredger. The ground is located on a high flat.

SIERRA COUNTY.

(From Our Special Correspondent.)

Mohawk.—New hoisting works are to be erected on this mine in the Plumbago District.

Swansea.—The tunnel on this property, at Chips Flat, is 2,200 ft. in, and is expected to reach the channel in 150 ft. more. The mine is being worked by J. Brock, F. Godfrey and others. The mine was once worked 40 years ago, but the miners failed to reach the gravel channel.

SISKIYOU COUNTY.

(From Our Special Correspondent.)

Weideman & Williams.—This claim, on the North Fork of Greenhorn, is to be reopened by E. Northcutt.

COLORADO.

BOULDER COUNTY.

Boulder Oil Field.—The first car of oil from this field was forwarded to the refinery at Florence on February 18. It came from the McKenzie well.

Colorado.—The Linnell Bros., of Victor, are taking the water out of this mine at Ward.

Morning Star.—C. E. Hawkins, of Denver, has sold all his interests in this mine at Ward to Mr. and Mrs. W. E. Dwight, of Boston. The company is to be reorganized and is now being incorporated under the laws of Wyoming by the name of the New Morning Star Mining Company. Leasers have been at work for some time in the upper levels of the Morning Star and have been shipping considerable good ore, said to average 6 ozs. of gold.

West Point.—This mine, at Ward, is having its machinery repaired preparatory to going to work.

CLEAR CREEK COUNTY.

(From Our Special Correspondent.)

Big Five Federation.—Air drills have started in the Central tunnel, but the power furnished by a dynamo is not sufficient for such a large compressor. The company is drifting on the Edgar vein with air drills, and also cross-cutting about 60 ft. per month in the Miami Tunnel.

East Argentine District.—About 8 miles above Georgetown, near the Continental divide, a great amount of prospecting has been carried on. Several strikes have been made in the Waldorf Company's group of claims, and in 3 different places lead ore has been opened. The company has also taken the Owsley claim, which shows a streak of ore. It is stated that R. C. Vidler interested sufficient capital in the Horse-shoe claims to drive a tunnel through the range a distance of 3 miles. The North Star claim has a small streak of ore that assays 11.80 oz. gold and 524 oz. silver.

Seaton Mining and Milling Company.—Manager F. S. Goldsmith says that a new air compressor will be installed in the Foxhall level, and that sinking of the shaft-winze, now down 800 ft., will continue. It

is showing about 3 ft. of smelting ore, and a streak of mill ore. A drift in the Newhouse Tunnel will also be started at 2,000 ft. depth to reach this shoot.

United Light and Power Company.—This company, at Georgetown, which supplies the towns of Georgetown, Silver Plume and Idaho Springs with lights, has ordered a new 300-h. p. generator from the General Electric Company. The company is supplying power to a number of mines and mills, and has requests for additional power which could not be supplied without another dynamo.

GILPIN COUNTY.

(From Our Special Correspondent.)

Mining Deeds and Transfers.—G. Weisbeck to C. M. Rutherford, 1-4 interest in Hickory lode, Nevada District; C. W. Ladd to S. & L. Sternberger, Cataract lode, Russell District; O. Ruffcorn to the Western Venture Mining Company, the Yellow Hammer group of 8 lodes in Phoenix District; the Klondyke group of 10 lodes and a 1-2 interest in the Revenge lode in the Caribou District; Marion Rogers to M. & H. Hazard, 1-3 interest Sunset lode, Pleasant Valley District; Frank Graham to C. W. Baldwin, 1-3 interest '98 and Joker lodes, Gregory District.

Receipts of Machinery.—One 5 h. p. gasoline engine for D. H. Allen, Black Hawk; one car of machinery for the Bonanza Mill, Black Hawk, and one steel cable, 7-8-in. thick and 1,200 ft. long for the Running Lode Mine, Black Hawk.

Butler Consolidated Mines Company.—Sinking has started and at least a lift of 100 ft. will be sunk, making the shaft 430 ft. deep. Mill ores are being taken out running between 2 and 3 oz. gold per cord with the tailings selling for as high as \$25 per ton. G. W. Mabee, Jr., Central City, is in charge.

East Calhoun.—A local pool has taken a lease on this property in Leavenworth Gulch. It will be under the management of A. Christopher, Central City. Smelting ore carrying values of about \$100 per ton was formerly taken out.

Fanny.—Shipments of ores from this mine near Black Hawk gave returns of \$165 per ton, the ore running 71 per cent in lead and the balance in silver. Local parties are working on a lease.

Grand Central Mining Company.—A 6-ft. crevice of milling ore has been opened up in the 300 west level of the Grand Central Mine and the continued development has put the property in shape for regular shipments. The ores are bringing very fair returns. D. McMasters, Central City, is manager.

Patch Mining Company.—The engineer lost control of the brakes on the hoist at the California Mine recently and the cogs of one drum were stripped clean, both of the big water barrels went down the shaft and the ropes, both 3,000 ft. in length, went into the shaft tearing out about 100 ft. of timbering. At least one new rope will be needed and the delay will be expensive.

Pine Creek District.—This district is located about 6 miles northwest of Colorado City. Among the most prominent properties are: Schultz Wonder Tunnel, now in over 700 ft., from which a cross-cut of 150 ft. to the Breckenridge shaft has been run; the Michigan Hill Tunnel, the Copper Glance and the Bavard Tunnels, on Arizona Hill, and the Bullion Tunnel.

Town Topics Gold Mining Company.—A strike in the 420-ft. level of the East Notaway Mine in Russell District shows free gold and sylvanite carrying values away into the thousands of dollars per ton. The company has already paid 4 dividends of \$5,000 each, is shipping good mill and smelting ores, and intends to put on a larger plant of machinery. M. D. Draper, Central City, is superintendent.

JEFFERSON COUNTY.

Carpenter Smelter.—It is stated this smelter at Golden has closed for about 2 months on account of a shortage of ore. The Saratoga Mine at Idaho Springs, which furnishes a large part of the ore, is temporarily closed and other mines owned by the company do not produce enough to keep the plant running steadily. During the shutdown a refinery is to be built and a new furnace. The plant will take custom ores when it starts again.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Sulphide Situation.—Part of the Union Smelter will go into commission this week to crush sulphide ore and so help out the Arkansas Valley plant. This will assist in relieving the congestion of the ore market that has existed for the past 2 months.

Manganese Shipments.—An effort is being made to get concessions from the railroads on manganese shipments to the Illinois Steel Works; if secured the manganese output will increase at once.

A. Y. & Minnie.—No work has been done on this property below the 400-ft. level. The new management will sink the shaft and drill holes will at once start to ascertain how deep the shaft will have to go.

American Placer.—This and adjoining territory comprising over 10,000 acres, has been leased by E.

A. Horner, of Leadville, Col., backed by Milwaukee men. An immense plant of most modern machinery is to be purchased, and it is announced that operations will be the most extensive ever made by any placer mining company in the district.

Belgian.—New lessees working at the 460 ft. level in upraising have a 2 ft. vein showing lead and carbonates averaging \$30 to the ton. Arrangements are being made to ship.

Black Prince.—The ore recently struck is reported increasing in width and value with development. The great mass is a hard carbonate with galena scattered through it.

Caribou.—This mine, in the Leadville Basin, is shipping 125 tons daily of exceptionally high grade in silver. Some of the ore goes to the Germania plant at Salt Lake.

Chippewa Leasing Company.—Much new development and prospecting work are being done. Shipments are from small streaks, and average 15 tons a day of gold ore running over 1½ oz.

Colorado-Manhattan Gold Mining and Leasing Company.—This new incorporation has 14 acres, embracing the Montgomery, Alma and Bryan claims. The base of operations will be the Montgomery shaft, now 240 ft. deep, from which a churn drill revealed some good values a few years ago. The company is preparing to sink. The officers are, C. W. Leininger, president; M. Kahn, vice-president; A. R. Milks, secretary; S. G. Kahn, treasurer; and these men with Wm. Keenholts of New York, are the directors.

Coronado.—The pumps and machinery have been sold by the sheriff and bought in by representatives of the Colorado Iron and Fuel Company, which owns the Sixth Street shaft.

Mike & Starr.—As the Buena Vista Smelter is about rebuilt, shipments of copper sulphides are to resume through the Yak workings, at 30 tons a day.

New Elkhorn Mining Company.—Manager Walter S. Kelley has taken over and taken out the pumping machinery. He has been prospecting, and recently the conditions appeared to show improvement, but the directors decided to close the proposition for the present.

New Leadville Home Mining Company.—The ore production is 300 tons per day of first class iron. The bulk of the ore comes from the Penrose and Bon Air shafts.

New Monarch Mining Company.—Work on the new smelter at Salida is being pushed. The company is opening up some fine oxidized lead ore through its Virginus claim, and blocking out great quantities of sulphides.

New Northern Mining Company.—This property has been leased to new people, who will work at the 500 and 550 ft. levels, and can ship 25 tons a day of iron from above the water level. There is good iron below the 550 ft. level, but pumping will be required.

Penn Mining Company.—The output is 50 tons of siliceous ore daily. There are large reserves of this material.

Phoenix Mining Company.—The damage by fire has all been repaired, and shipments have resumed from the Sixth Street Mine. An immense manganese body has been developed, from which 175 tons a day will be shipped to the Pueblo steel works.

Rialto Leasing and Mining Company.—The shaft is down over 1,300 ft., and sinking rapidly by air drills. There is little trouble with water. It is to cut the big iron sulphide shoot of the Greenback. Boston people are largely interested.

Rubic.—At 500 ft. a fine sulphide body that will run 13 to 17 per cent lead has been developed, and shipments have resumed at 30 tons per day.

South Evans & Ball Mountain Development Company.—The company has its tunnel in 500 ft., is entering virgin territory, and has encountered good streaks of siliceous ore.

Valley Leasing Company.—This new company to work the Valley Dispute and Forest Rose claims near the Monarch, has incorporated at \$1,500,000. Incorporators are: W. H. Vinton, Brattleboro, Vt.; E. C. Robertson, Hinsdale, N. H.; W. F. Fogg, Springfield, Mass. Preparations are made to begin work at once, and it is announced that an entirely new shaft will be sunk.

Virginus.—A new drift is started at the 250 ft. level in an iron body 38 ft. thick. The output is 40 tons a day of good iron ore daily.

LARIMER COUNTY.

(From Our Special Correspondent.)

Red Elephant Mining and Milling Company.—John C., Emily W. and A. D. Abbott, of Fort Collins, have incorporated this company to develop the Red Elephant Mine in the northwestern part of North Park.

OURAY COUNTY.

Saratoga Pyritic Smelting Company.—This company was recently incorporated to erect a smelter in

Ironton, near the Saratoga Mine, by E. F. Anderson, E. C. Rhodes, F. E. Brophy, E. H. Mather and W. J. Sawyer. The capital stock is \$250,000. The Saratoga Mine, of which L. R. Fry is manager, is reported to contain large bodies of low-grade ores, which could not be shipped at a profit owing to the expense of transportation to railroad.

SAN MIGUEL COUNTY.

(From Our Special Correspondent.)

Butterfly-Terrible Mining Company.—This company, at Ophir, has installed an air compressor and machine drills at the mill cross-cut tunnel. The tunnel, when completed, will be 1,000 ft. long, and will intersect the vein about 600 ft. below the lowest workings of the Butterfly Mine. The mill has been shut down for 6 weeks pending the intersection of the vein. D. J. Sayer is manager.

Liberty Bell Mining Company.—This company is driving a cross-cut tunnel, the lowest in the county. The company is employing about 130 men, but a much larger force will be put on in the spring. The water supply now is very short, and the mill is not running full capacity. The new canvas table plant for the slimes is in operation. The tailings are first treated by cyanide and then by the canvas tables.

Ophir Consolidated Mining Company.—This company, at Ophir, of which W. S. Buckley is manager, is contemplating great improvements during the coming season, and much development work will be prosecuted. A 50-stamp mill will be built. The company is now employing 30 men, but the force will be increased later.

San Bernardo.—This mine, at Ophir, is employing 18 men and making regular shipments of high-grade ore. Major Litchfield, former manager of the Valley View, at Telluride, is the resident manager.

Smuggler-Union.—The mines are running steadily; 450 tons of ore daily are sent over the tramway to the mills at Pandora, and from 4 to 5 cars of concentrates are shipped. The new buildings are nearly completed. The new stone office at the mine will be ready in a few days. The company is employing over 500 men at the mines and mills, and a new bunk house will be built this summer.

Tomboy Gold Mines Company, Limited.—This company, at Telluride, will build in addition to the new mill, a large timber shed, a blacksmith shop, tunnel house and a combination bunk and boarding house, which will contain the mine offices, and bath rooms; the bunk house will be divided into rooms, and the company intends to assign 2 men to a room. The entire building will be heated by steam and lit by electricity. The company is now employing 350 men. Both the Tomboy and Columbia mills are running full capacity. The Tomboy has had a lease on the Columbia Mill for the past 10 months, and is running the mill on Argentine ore. It is shipping from 3 to 4 cars of concentrates per day. The principal gold values are saved on the plates.

Uranium Discovery.—A reported discovery of uranium deposits by G. A. B. Frenzel, at Newmire, 15 miles from Telluride, is attracting attention, and a lot of several tons has gone to eastern testing works.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Jessemine.—H. Whitehead, manager, is actively developing the property. This mine has long been a producer of sulphide ore of good quality.

TELLER COUNTY—CRIPPLE CREEK.

Eight assay offices in this district, from Victor to Cripple Creek and Gold Field, were wrecked by dynamite used by unknown men on the night of February 23. In each case the buildings were badly damaged and the delicate balances and other equipment injured. The offices wrecked include the Davenport and the Vanderwalker, Morgan & Williams, at Victor, the Benjamin at Cripple Creek and the Boyce at Cripple Creek. The belief is expressed that the acts are the result of a general movement to rid the district of all high grade ore purchasing institutions. For years there has been systematic stealing of rich ore from the mines, amounting to thousands of dollars monthly. It is alleged that more than 50 assayers in the district have made a business of buying such ore. Recently the Mine Owners' Association discovered that shipments of high grade ore had been made by assayers to smelters at San Francisco and Salt Lake, but all efforts to stop the traffic were unavailing.

(From Our Special Correspondent.)

Coriolanus.—A lease has recently been granted on this property, on Battle Mountain, and it is understood that work will shortly be resumed. The property is situated not far from the Ajax Mine, is in a very good location, and has shipped considerable ore in the past 8 years.

Elkton Consolidated Gold Mining Company.—It is reported that the Walter shoot has been cut in the 7th level north and that the value of the ore is as good as ever. This shoot has been one of the richest in the entire district and an immense amount of ore has been shipped from it.

Gold Dollar Consolidated Company.—It is understood that this property is to be equipped with a large new hoist. Work has already begun. A new compressor will be put in also. This property is on the east side of Beacon Hill, a consolidation together with the Gold Dollar and Mable M. properties. Except the El Paso, on the west side, this is the largest property on Beacon Hill. It is one of the early shippers of the camp.

Golden Cycle Mining Company.—The output for January amounted to \$48,000. The net profits, after deducting mining expenses, are about \$20,000, about the same as during December. The output for January was greater than for December, but the expenses were also more on account of considerable development work, including shaft sinking toward the 800-ft.

Gould Mining Company.—This company has bought the Minnehaha claim of the Monarch Company on Raven Hill, close to the Jenny Sample, which also belongs to the Gould Company. When this deal is completed, it will give the Gould Company about 50 acres of ground, most of it on or near Raven Hill. This company has shipped quite a little ore at different times from its Rhinoceros and Jenny Sample claims. The price paid for the Minnehaha claim is reported as 235,000 shares of the Gould stock. A meeting of the stockholders of the Monarch Company is called for March 24 to ratify the sale.

Isabella Gold Mining Company.—It is understood that this company will pay considerable attention to exploring at the surface of its ground, a large amount of which has never been explored. The company is doing considerable work, and a number of lessees are also busy.

Laura Lcc.—Considerable development work is to be done on the new strike on Mineral Hill. This strike has created a great deal of excitement in local mining circles. Some very good ore has undoubtedly been discovered, but it is too early to tell what the outcome will be. Considerable prospecting has been done on Mineral Hill, but so far nothing permanent has been discovered. Developments are watched with interest.

New Mining Leases.—W. A. Otis & Company have decided to throw open to desirable lessees considerable property including a number of claims throughout the district, some in very choice positions. A lease has been granted on the Burns claim of the Acacia Company and also one on the Pharmacist Company. It is reported that George Wrockloff, who made a large amount of money leasing on the north end of the Burns claim of the Acacia Company, has obtained a lease on the Morning Star lode on Beacon Hill, belonging to the Morning Star Gold Mining Company. On the whole leasing is much more active than it was 3 or 4 months ago.

Reucau Drainage Tunnel.—A number of mine owners recently met in Colorado Springs to discuss matters in relation to a deep drainage tunnel. Mr. Von Reucau states that he has had from Europe some encouraging advices in this matter.

Sedan Gold Mining Company.—S. M. Kellum has obtained a year's extension on his lease, and will sink the shaft another 100 ft. This property is on Galena Hill, and has been in litigation for 2 years.

GEORGIA.

POLK COUNTY.

(From Our Special Correspondent.)

Rockmart Slate Quarries.—These quarries have been purchased by a newly formed company, known as the Southern States Portland Cement Company. This company intends to work the slate quarries, and at the same time to utilize the waste in the manufacture of cement. The company has also secured a considerable tract of land nearby, with deposits of limestone. The company intends to begin at once the erection of an extensive plant. The president of the company is W. F. Cowhan, who has opened an office in Atlanta.

IDAHO.

CUSTER COUNTY.

(From Our Special Correspondent.)

Crooked River Mining and Milling Company.—The property of this company, comprising 55 quartz and placer claims, is situated at Bonanza. The quartz claims of one group extend along a dyke of felsite from 200 to 700 ft. wide. Another system of veins extend into this dyke. The locations extend for 3 miles along Crooked River, and for 2 miles along Quartz Creek. The company is hauling in machinery for a 10-stamp mill. It is the intention to have the mill running by July. The mill building will be arranged for 20 stamps. The management intends to increase the milling capacity to 100 stamps or more. The motive power will be furnished by impulse water wheels, supplied from a ditch $\frac{3}{4}$ of a mile long which takes the water from the main river. The situation of the property is 70 miles from the terminus of the Northern Pacific Railway at Stites. The company is capitalized at \$1,500,000 in \$1 shares. The officers are: President, P. R. Hogan, of West Superior, Wis.; secretary-treasurer, T. S. Hogan, of Butte, Mont.;

superintendent, Wm. Hogan, of Elk City. The ore is free milling. Wilfley tables and Frue vanners will be used to take care of any sulphurets found.

The plan and construction of the mill is under the supervision of D. H. Hamilton, who was for some years attached to the Anaconda Copper Mining Company in the same capacity. It is expected that the company will soon be in the market for milling machinery. The principal office is with the secretary-treasurer at Butte, Mont.

LEMHI COUNTY.

Copper Queen.—This group, of 12 claims in Blackbird District, is reported under option to Eastern men for about \$100,000. The vendors are A. H. Ford, A. J. Brown, F. S. Wright, J. C. Fox and Jonathan Black, of Salmon City. The payment period covers 22 months, the first to come when the property has been finally passed on. It is a gold-copper proposition, and in one portion of it an 8-ft. ledge of ore is said to show 27 per cent copper and \$8 in gold. The entire ore zone is said to average more than 100 ft. wide.

Lemhi County Placer Company.—Prof. Tibbals and F. C. Semmek, of Salt Lake, Utah, have taken a hand on this company's property near Salmon City, comprising 4,600 acres of ground, formerly known as the Kirtley diggings. The bond is said to be for \$200,000.

(From Our Special Correspondent.)

Boston-Idaho Mining Company.—The company is capitalized at \$500,000, divided into shares of the par value of \$1 each. The officers are: W. H. Tibbals, president; F. C. Gilpatrick, vice-president; R. P. Hunter, treasurer; E. J. Waugh, secretary. The company owns the Emerald Isle and Dummy claims, with a lease and bond on the Shamrock claim in the Spring Mountain District.

OWYHEE COUNTY.

Addie Consolidated Mining and Milling Company, Limited.—This company has been organized to work the Addie, Addie Fraction, Omega, Calaveras and Josephine claims near Silver City. The capital is \$1,000,000 in \$1 shares. The principal stockholders are S. D. McLain, O. S. Wigglesworth, A. F. Stevens, A. K. Bishop and C. C. Hedum, all of Silver City. The claims are located near Webfoot and Slaughter House gulches. Development is to start soon and a mill may be erected.

SHOSHONE COUNTY.

Golden Chest Mining Company.—This company is now using waterpower. The water is brought from Bear Creek. There are 2 wheels, a 5-ft. one driving the 20 stamps, the rock breaker and the tailings plant, and a 5-ft. one working the air compressor, the pumps and the dynamo. They are fed from a 22-in. pipe with a perpendicular fall of 220 ft., and furnish an abundance of power.

KANSAS.

ALLEN COUNTY.

(From Our Special Correspondent.)

Lanyon Zinc Company.—This company's rolling mill at Lanyonville is nearing completion. This concern is in the gas region and will use natural gas for fuel.

Standard Acid Company.—This company's Iola plant will probably start March 1. The plant will employ about 60 men. Three furnaces of 2 blocks each have been completed.

MARYLAND.

Consolidation Coal Company.—At a meeting of the stockholders in Baltimore, on February 19, the following officers were elected: President, Charles K. Lord; directors, Edward R. Bacon, L. F. Loree, O. G. Murray, Arthur Hale, George M. Shriver, George C. Jenkins, L. G. Haas, C. L. Woolford, James M. Quigley and George A. von Lingon.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

St. Mary's Mineral Land Company.—This company has issued its report for the year ending December 31, 1901. The present company is the successor to the St. Mary's Canal Mineral Land Company having acquired all but 10 shares of the stock of the old St. Mary's Company. The sales during the year amounted to \$374,209, of which \$361,550 was received from the sale of 640 acres in fee simple. Of the land sold 480 acres were conveyed to the Champion Copper Company and payment was made by that company's endorsement of "\$6.25 per share paid" on the 50,000 shares of stock owned by the St. Mary's Company.

(From Our Special Correspondent.)

Several car-loads of sulphide ores are received each week at the Dollar Bay works from the Rock Lake District in Canada.

Baltic.—Openings at the mine are becoming extensive, and no difficulty will be experienced in supplying the second head with selected rock. The head goes into commission this week.

Calumet & Hecla.—This company is increasing its

output, and fire has been started in an additional furnace at the smelting works.

Centennial.—Considerable progress has been made installing the new hoist at "A" shaft. The Nordberg Manufacturing Company, of Milwaukee, Wis., has the work in charge. The engine has cylinders 34-in. and 72-in. and 72-in. stroke. The double conical drum is 18½ by 18 ft., with lathe-turned grooves capable of holding 6,000 ft. of 1½-in. cable. The engine is equipped with steam brake and steam reversing gear. It is expected to be ready within 2 months.

Lake Superior Smelting Company.—Two furnaces at the Hancock works are again in commission refining mineral from the Atlantic Mine.

Mineral Range Railway.—Two consolidation locomotives have been received from the Rogers Locomotive Works, Paterson, N. J., for the rock run between the Tamarack-Osceola mines and the mills. The locomotives are the largest in Northern Michigan, with cylinders 22-in. by 30-in., 11-ft. firebox, and weigh, with tender, about 157 tons.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Michigan.—This property recently shipped 20 tons of mass and barrel copper to the smelters at Hancock. An unusually large amount of mass copper is being encountered in "A" shaft.

IRON—MARQUETTE RANGE.

Kloman.—This mine, at Republic, near the Republic Mine, may be sold. Because of complications over the title the mine has been idle since 1881, but the title has recently been cleared. The mine is believed to have a continuation of the Republic ore body. Of 20,000 shares of the mining company, Iron Mountain, Mich., parties own 14,000. Of the remaining 6,000 Andrew Carnegie is said to have 2,800, Henry Phipps 1,600 and Mr. Miller, of Pittsburg, 1,600. An offer of \$175,000 is reported to have been made for the mine; the owners ask \$200,000.

Republic.—The new ore-crushing plant of this mine at Republic is all ready. It is not the intention of the company to do any crushing during the winter months, the plant being sufficient to crush all the ore shipped during the shipping season. All the hard ore mines of this range are now equipped with crushing plants.

United States Steel Corporation.—H. O. Young, of Ishpeming, Mich., representing the company, has purchased the fee of 640 acres, or ¼ each of sections 28, 29, 32 and 33 on the Cascade Range. The lands are known as the Wick property, and contain the Richmond, Starwest and Platt mines. The ores are siliceous, running about 40 per cent iron and .030 to .040 phosphorus. There is a lease of the Richmond to Alex. Maitland and others, and it has 15 years to run. The Platt is being unwatered by the Donora Mining Company, a connection of the Union Steel Company, of Pittsburg. The Starwest, known also as the Prout or Wheat, has not been active for months. The ores from these mines are used in mixture with the low silica ores of the Mesabi Range. The supply on the lands is very great. It will be years before the corporation can take ore from 2 of the mines, and meantime the leaseholders may make large inroads on the supply.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

Joplin Ore Market.—Zinc and lead ore prices remained practically unchanged during the week. Lead ore is strong at the same price as has been paid for over a month, \$21.75 per 1,000 lbs., delivered. The entire production is cleaned up each week, with the local smelters the principal buyers.

The highest price reported paid for zinc ore during the past week was \$31.50 per ton. Several lots sold upon a confidential price may have exceeded this price. The assay basis ranged from \$26 to \$29 per ton for 60 per cent. ore.

During the corresponding week of last year zinc ores' highest price was \$27 per ton, and lead ore brought \$23 per 1,000 lbs. delivered. Following is the turn-in by camps of the Joplin District for week ending February 22:

	Zinc lbs.	Lead lbs.	Value.
Joplin	3,416,950	451,670	\$61,078
Carterville	1,507,690	304,730	26,228
Galena-Empire	840,080	100,510	13,107
Webb City	511,300	26,930	7,233
Aurora	446,600	17,930	4,846
Neck City—Alba	434,190	—	6,513
Oronogo	432,190	15,420	6,636
Zincite	255,960	5,700	3,707
Duenweg	320,670	33,430	4,806
Stotts City	123,390	—	1,780
Spurgeon	93,110	46,800	2,135
Cave Springs	100,650	2,960	1,373
Carl Junction	183,880	—	2,666
Granby	122,000	20,000	1,781
Sherwood	214,840	—	3,008
Roaring Springs	90,340	—	1,129
Badger	64,970	—	910
Central City	54,870	—	712
Springfield	36,000	—	511
Total	9,250,180	1,034,980	\$150,258
Total since Jan. 1	79,862,020	9,121,670	\$1,275,500
Total corres. week, 1901	11,758,090	1,353,300	\$157,555
Zinc value for week	\$127,733	lead value	\$22,525
Zinc value since Jan. 1	\$1,079,890	lead value	\$195,610

The Missouri and Kansas Zinc Miners' Association,

which was organized under the laws of West Virginia, has decided to reorganize under the laws of Missouri. The association found that it was impossible to carry on exports without reorganization, as the full capital stock had not been paid up as required of foreign corporations.

John Jackson.—This mine, 2 miles west of Joplin, has made another record in the production of zinc ore. This mine held the record of the district by producing over 416,000 lbs. of zinc ore during one week in October, 1900, but last week it produced 588,740 lbs. After paying all the expenses the mine made a profit of \$1,000 per day. Up to date this mine has produced 34,000,000 lbs. of zinc ore which brought \$432,000. Last week's production was loaded in 11 cars, which were made into a special train and shipped to the Illinois Zinc Company, at Peru, Ill.

MONTANA.

FERGUS COUNTY.

(From Our Special Correspondent.)

Barnes-King Gold Mines Company.—This concern has recently been organized under the laws of South Dakota to take over the group of mines of the same name, situated near the new town of Kendall. The capitalization is \$2,500,000. The incorporators are Hugh G. Curran, Clarence C. Payne and Oscar Nelson.

North Moccasin Gold Mining Company.—The plans for the new cyanide mill, to be built near the Kendall property, have been completed by the company's engineer, Wm. McClean. The mill will have a daily capacity of 100 tons.

FLATHEAD COUNTY.

(From Our Special Correspondent.)

American Kootenai Mining Company.—A compressor plant has been ordered from Chicago for this West Fisher gold property. The property is equipped with a new 10-stamp mill. The company's headquarters are at Libby.

Butte Oil Company.—Owing to inability to secure casing, drilling on the first well is suspended until the casing ordered is on the ground.

Flathead Oil Company.—A drilling equipment for this company is being hauled from the railroad at Belton to the property near the foot of Kintla Lake. Butte and Kalispell people are interested.

Illinois & Montana Mining Company.—This company's property, situated in the West Fisher Mining District, and under the management of John H. Geiger, of Libby, is developed enough to justify the company in placing machinery on the property and building a 10-stamp mill in the spring. Lumber for the mill is being cut.

Libby Creek Placer Mining Company.—A car of hydraulic pipe for this company, whose operations are on Fisher Creek, has reached Libby, and is being hauled to the diggings. A Pelton wheel is to furnish power for a saw mill to cut lumber for the new bed-rock flume. Fred. Whiteside, of Kalispell, is manager.

Snowshoe.—This property, after several reverses, is again a producer, the new management having opened 7 ft. of good concentrating ore.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Baltimore.—The interest of Mr. Prichard in the bond and lease taken some months ago by William Owsley and Mr. Prichard on this mine, 3 miles from Boulder, on Boomerang Gulch, has been purchased by Messrs. Kirk & Clinton, of Butte. A car of siliceous ore is going to the smelter at Anaconda daily, the smelter making a treatment rate of \$5 per ton.

MISSOULA COUNTY.

(From Our Special Correspondent.)

Tarbox Mining Company.—The recently installed plant on this St. Regis property, consisting of a hoist and compressor, is working smoothly. L. L. Larson and Richard Dixon, secretary and president, respectively of the company, have gone to Buffalo, N. Y., to confer with the Eastern stockholders. The gentlemen claim to be well pleased with the condition of the property.

SILVER BOW COUNTY.

Colusa-Parrot.—Senator W. A. Clark has sold this group of mines to the Amalgamated, or Anaconda Company. The consideration is withheld from the public. The purchase by the Amalgamated Company was made as a settlement of litigation between the Anaconda and Senator Clark's Colusa-Parrot Company. The great Anaconda lode was involved in the controversy, it having been charged that there was a union between that vein and the Colusa-Parrot vein, and that the Anaconda had been mining on the Colusa-Parrot property. The litigation, it is said, will now be discontinued. The group sold includes the Colusa-Parrot, Parks-Parrot and part of the Micawber.

(From Our Special Correspondent.)

Minnie Healey.—J. K. McDonald, representing Miles Finlan in the latter's case against F. Aug. Heinze, involving the title to this property, has been

granted leave to withdraw the application made for an extension of time in which to file transcript on appeal from judgment of the Circuit Court, and the appeal was dismissed without prejudice.

Smokehouse.—The suit of James A. Murray vs. the City of Butte, tried in Anaconda, in which Murray laid claim to the streets and alleys on the surface of this claim, was decided against the plaintiff. This decision is a reversal of a similar suit brought by Murray against the lot owners, decided in 1886.

West Olive Branch.—A new lease and bond has been taken on this property by Alex. Johnson and Victor Hoffman; the water is being pumped from the 200-ft. shaft.

NEW MEXICO.

LINCOLN COUNTY.

(From Our Special Correspondent.)

Bonito District.—This district continues to attract attention owing to the finds reported of quartz containing free gold. The Free Gold Claim, owned by A. R. Byrd, is being developed by a tunnel.

TAOS COUNTY.

Cerrillos Smelter.—This plant has started to buy ore. The tramway is completed, the track scale is in place and the ore bins are ready. There will be some delay in starting the smelter on account of a lack of water, but a well is now down 106 ft. A residence is being built for Superintendent H. L. Wells.

Copper Hill Mining Company.—Judge McFie recently heard the case of the Copper Hill Mining Company against the collector of Taos County to restrain him from collecting taxes for 1900 on the pipe lines of the plaintiff company. This case is considered in conjunction with that of the Abendroth & Root Company against the Copper Hill Company to foreclose a mechanic's lien. The interesting issues involved were whether a pipe line is personal or real property and whether a restraining act permitting the seizure for taxes applies to real estate as well as personal property.

Fraser Mountain Copper Company.—The Rio Hondo District, north of Taos, is being developed by this New York and New Jersey company. Reduction works and other improvements are contemplated.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Gold Find at Pringle.—John Erpelding claims to have discovered a body of \$30 ore in the limestone formation 3 miles northwest of Pringle Station.

May Mining and Milling Company.—Officers have been elected as follows: T. V. Garlock, president; C. F. Carr, vice president; T. W. Delicate, treasurer; J. R. Smith, secretary; W. W. Olds, general manager. Other directors are: I. M. Donaldson and F. L. Dunn. Arrangements have been made to resume work on the property April 1.

Old Bill.—The hoisting machinery is being put in and the shaft will be sunk deeper. The property is under bond to J. B. Safford and associates, of Chicago.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Horseshoe Mining Company.—It is reported that the company's mining property and mill have been sold to an eastern syndicate, the first payment being made. D. E. Murphy, of Milwaukee, represented the purchasers. Anson Higby, who has been the resident agent for the Horseshoe Company, has been engaged as manager. The Horseshoe holds 400 acres of mining ground around Basu Mountain and Ruby Basin, and 1,000 acres west of Spearfish Canyon, all patented. The Kildonan chlorination plant, at Pluma, belongs to the company. It is being converted into a cyanide plant. The stock in the Horseshoe Company is held by Montreal men.

Imperial Mining and Milling Company.—This company has purchased the Porea claim in Blacktail Gulch of H. B. Young, of Deadwood, for \$12,000. The claim joins the Wells-Fargo group of the Golden Reward Company, and lies near the Imperial Company's main group. The last of the machinery is being placed in the new 200-ton cyanide plant in Deadwood.

Ruby Gulch Mining Company.—James Conzett and others are the incorporators. The company owns the Portland group of claims in Ruby Gulch, Bear Butte District. Mr. Conzett is president.

Shamrock.—George Oberg recently shipped a carload of silver-lead to an Omaha smelter. The claim is situated in Big Strawberry Gulch and is being worked under lease.

Spearfish Mining and Reduction Company.—Ore is being mined on the Black Diamond claim and stored at the new cyanide plant, half a mile distant. The ore is obtained at the surface by stripping off a few feet of soil.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Calumet Group.—The owners, S. A. Baxter and others, of Lima, are preparing for extensive develop-

ments. This is a copper property, adjoining the Maloney-Blue Lead on the south, and a large quantity of good copper ore is piled up on the ground taken from outcroppings of different ledges.

Lulu Mining Company.—This company has recently been organized to work the Lulu group of claims near Hill City. The incorporators are: John R. Wilson and M. L. Day, of Deadwood, and Joseph McClure, Hill City. The company is capitalized at \$500,000. It holds a bond on the property from Joseph McClure.

UTAH.

(From Our Special Correspondent.)

Salt Lake Bullion Settlements.—The settlements for the week ending February 22 are: Ore, \$126,800; bullion, \$68,300; silver-lead ore, \$45,500; cyanides, \$3,900; copper bullion, \$28,000.

The settlements at Salt Lake for the week ending February 15, for bullion, cyanides and silver-lead-copper ores were \$187,000.

BEAVER COUNTY.

(From Our Special Correspondent.)

Horn Silver.—A disagreement between the management of this mine and the local management of the American Smelting and Refining Company over the smelting charges has resulted in an order to close down on extraction and reduce the force to the smallest number possible to keep the mine in shape.

CARBON COUNTY.

(From Our Special Correspondent.)

San Rafael Oil Company.—The report given out that this company had struck a gusher of oil is a mistake. The flow encountered was gas. The indications are that a good well may be forthcoming, but as yet the property cannot be called a gusher or a producing well.

IRON COUNTY.

(From Our Special Correspondent.)

Johnny.—Under the management of W. F. Dooly 10 men are blocking out bodies of gold ore and preparing for extended work. The erection of a 20-stamp mill is being considered.

Jumbo.—News of a promising nature is given by the management of this mine, situated about one mile from the Johnny. The gold ore encountered is yielding good values.

Opair.—This property at Stateline has closed down, pending developments in the failure of the Detroit, Mich., Savings Bank, in which the president of the company, F. C. Andrews, was involved. The payroll will be met by the officers in Detroit. It is anticipated work will be resumed by the other owners soon, and that all accounts will be fully satisfied.

JUAB COUNTY.

(From Our Special Correspondent.)

Grand Central vs. Mammoth.—Judge Marioneaux has handed down his decision in favor of the Grand Central Mining Company. After being twice defeated in its contest with the Grand Central, it is expected that the Mammoth will continue the fight to the highest court of appeal.

Lower Mammoth.—The ore body recently opened is said to contain as much as \$26 in gold, while heretofore the values were indifferent.

Mammoth.—The management is preparing to treat the gold bearing ores now blocked out by cyanide. Tests will be made to determine the efficiency of the process ores.

Sheva.—Work is being prosecuted on this claim, which after years of litigation has passed into the hands of a strong company. A force of 5 men has been clearing the mine and laying track into the old tunnel. This force is increased to 10, of whom 6 are to be put on promising ore shoots. Former shipments from this property were high grade.

Swansca.—Fifteen cars of ore reached the smelter at Salt Lake last week. The ore runs so high in iron that the company is understood to have secured concessions from the smelter.

SALT LAKE COUNTY.

Quincy.—A cave-in in the 300-ft. level injured no one. Many tons of rock and earth filled the level, but the management says there will be no delay to speak of, and that the output will continue.

(From Our Special Correspondent.)

Butterfield.—An endeavor to reopen this mill and mine is being made by Receiver G. W. Keel.

Grizzly.—A new fissure followed about 20 ft. in this mine at Alta, has opened into an ore body, showing 15 ft. of ore. The ores are both shipping and milling, and the company is considering erecting a mill the coming season to treat its milling grades.

Silver Shield Mining Company.—At a meeting of the shareholders the following officers were elected: Henry Cohn, president; H. S. Joseph, vice-president and manager; J. W. Langly, secretary; A. Hanauer, Jr., treasurer, who, with A. P. Mayberry, D. S. Taggart and Lewis Moore, form the directorate. They

have gained privilege to use the United States Company's tunnel, which they will extend into the territory of the Silver Shield, and thus drain the latter property at a much lower depth; also have the added advantage of unloading ore at the cars.

Tiewaukee.—This mine has closed to await the settlement of the Detroit Savings Bank failure with which the president, F. C. Andrews, was connected.

United States Mining Company.—It is the intention of this company to build a rope tramway about 2 1/2 miles long to cheapen the cost of transportation.

Utah Consolidated.—Three cars of copper bullion have been shipped East aggregating 180,000 lbs.

York.—Developments are said to show a 10-inch streak of clean galena in a 6-ft. vein. Work is going ahead as rapidly as possible.

SEVIER COUNTY.

(From Our Special Correspondent.)

Coconino Copper Company.—This company, which has been installing the Neil process of leaching, will soon have its mill ready.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—The following are the receipts from this camp for the week ending February 22: Quincy, ore, 1,237,720 lbs.; Ontario, ore, 1,267,400 lbs.; Daly-West, ore, 1,621,700 lbs.; Anchor, ore, 325,100 lbs.

Daly.—At the annual meeting on February 17 the following officers were elected: C. L. Rood, president; David McKenzie, vice-president; J. B. Haggin, treasurer. These, with Charles Reed and George M. Scott, are directors. W. R. Wightman was elected secretary.

Daly-West Mining Company.—At the annual meeting of the stockholders on February 17 a resolution was passed authorizing the sale of the company's assets to the Daly-West Mining Company, recently organized under the laws of Colorado. The new company is capitalized the same as the old company for \$3,000,000 divided into 150,000 shares of the value of \$20 each. The officers of the new company are: A. Hanauer, president; A. C. Ellis, Jr., vice-president; Henry McCormick, secretary and treasurer; these, with J. A. Kirby and J. F. Allen, are directors. The reason given for the change is that in case of litigation it is more desirable to have the cause tried before the federal courts, which is possible in the case of a foreign corporation, than before the State courts. The officers of the old company elected are: J. E. Bamberger, president; J. D. Wood, vice-president; W. S. McCormick, treasurer; they, with W. H. Dickson and Ezra Thompson, are directors. J. Barnett is retained as secretary. A detailed annual report was furnished the stockholders. The management has taken control of the property of the Little Bell group, consisting of about 20 claims lying south of and adjoining the Quincy. The consideration is said to be about \$100,000.

TOOELE COUNTY.

(From Our Special Correspondent.)

Consolidated Mercur.—Values from \$4.50 to \$20 per ton are reported showing in the breast of the main incline. The level running west from the 500 ft. station is said to give averages of \$12.50, and the level east from same station \$8 to \$10 average.

Cyclone.—The management is driving from the 155 ft. level, expecting to tap the ore-bearing channel already located. The property has lately been surveyed.

Hidden Treasure.—This mine, owned by T. R. Jones et al., has suspended shipments pending better conditions of roads. A heavy tonnage will go out as soon as the roads are in better shape.

Honorine.—Water level has been reached in the shaft started above the mouth of the tunnel, at a depth of 225 ft. The pumps are running, and the shaft will be sunk 200 ft. deeper.

Mono Mining and Milling Company.—This company is capitalized for \$50,000 divided into shares of the value of \$1 each. Officers are: George A. Land, president; J. Campbell, vice-president; Edward Hall, secretary and treasurer. The company owns a lease on the dump and old workings of the Mono and Star mines in Dry Canyon, Ophir Mining District.

Overland.—Under the management of G. A. Duncan, the present owners have started underground developments from which important results are expected. The present workings are in what is known as the "silver" or "lower" vein of the Mercur system, which is the poorest in gold values of the several veins in the district. The manager is cross-cutting east from the level to the higher grade veins. A new vein has been cut showing cinnabar, with gold values, while the higher grade veins lie about 150 ft. east of the breast of the cross-cut.

Sunshine.—The new mill with a simplified method of treating the ores will be ready to go in commission soon.

Utah Copper and Gold Mining Company.—The capital stock is fixed at \$500,000, divided into shares of the par value of \$1 each. The officers are: J. T. Hammond, president; W. J. Robinson, vice-president; D. R. Hammond, secretary and treasurer. The company owns the North Greenback group of claims, comprising the North Greenback and the North Greenback Nos. 1, 2 and 3, and a lease and bond on the Lone Jack, Isabella, American Eagle, Mountain Chief, Anaconda, Black Hawk, Anderson and Nettie Nos. 1 and 2, situated in Hickman and Dry Canyons, on the east side of Skull Valley.

West Argent vs. East Argent.—The West Argent Mining Company has on its hands a contest with the East Argent Mining Company over the shaft which is said to be on both properties.

WYOMING.

CARBON COUNTY.

Ferris-Haggarty.—The Mine and Smelter Supply Company of Denver, Colo., has undertaken the construction of what will be the longest aerial tramway in the world. It is to connect this mine at Encampment with the Boston & Wyoming smelter, 15 1/2 miles distant. The Finlayson system adopted is that built by the A. Leschen Rope Company, of St. Louis. The tram will have a capacity of 400 tons a day.

FOREIGN MINING NEWS.

AFRICA.

NATAL.

The Mines Department reports that in December there were 3,336 persons employed in the collieries of the Colony, 2,196 underground and 1,140 on the surface. Of these persons 177 were white men, 1,735 negroes and 1,424 East Indians. The total coal mined during the month was 49,412 tons, against 42,933 tons in December, 1900, showing an increase of 6,479 tons. The coal exported for the month was 5,528 tons, and 22,188 tons were sold to steamers in the port of Durban.

RHODESIA.

The detailed statement of the Rhodesia Chamber of Mines for December shows 11 working mines. The return was from mills, 13,298 oz.; from tailings, 1,876 oz.; total, 15,174 oz. bullion. For the full year the total was 172,061 oz., against 91,940 oz. in 1900, showing an increase of 80,121 oz., or 87.1 per cent. The total for 1901 was equal to 153,134 oz. fine gold, or \$3,165,280.

TRANSVAAL.

The total gold production for January is reported at 70,340 oz. fine gold, or \$1,453,928. In January, 1901, no production was reported; in January, 1899, when the mines were in full operation, the total was 431,010 oz.

Bonanza, Limited.—For January this company reports 7,872 tons crushed. The return was from mill, 4,756 oz.; from cyanide works, 2,080 oz.; total, 6,836 oz. fine gold, an average of 0.87 oz. per ton.

Crown Reef Gold Mining Company.—For January this company reports 10,590 tons ore crushed the yield being, from mill, 4,074 oz.; cyanide works, 2,279 oz.; slimes plant, 115 oz.; total, 6,468 oz.; an average of 0.61 oz. per ton. The total returns for the month were £23,077; expenses, £14,010; leaving a profit of £9,067.

Goldenhuis Deep.—January returns from this mine showed 90 stamps at work and 12,280 tons ore crushed. The returns were: Mill, 3,655 oz.; cyanide plant, 1,672 oz.; slimes plant, 253 oz.; total, 5,580 oz. fine gold, an average of 0.45 oz. per ton. The net profits for the month were £9,200.

Robinson Gold Mining Company.—This company reports for January, 66 stamps working and 8,477 tons ore crushed. The yield was, from mill, 5,283 oz.; cyanide plant, 1,305 oz.; total, 6,588 oz. fine gold, or 0.78 oz. per ton. The net profit for the month was £20,700.

AUSTRALIA.

QUEENSLAND.

Mount Morgan Gold Mining Company.—This company reports for January 14,059 tons of ore treated by chlorination, the result being 11,222 oz. gold; an average of 0.79 oz. per ton. The quantity treated was limited by short supply of water.

TASMANIA.

The total value of minerals exported from Tasmania in 1901 was £1,637,902, against £1,778,135 in 1900; showing a decrease of £140,233, or 7.9 per cent, last year. The leading items, in order of their value, were copper, silver, tin and gold.

Mount Lyell Mining Company.—This company reports for the four weeks ending February 5 a total of 22,964 tons of ore smelted, the yield being 778 tons blister copper, containing 770 tons fine copper, 55,889 oz. silver, and 1,704 oz. gold. The average return was 3.35 per cent copper, 2.43 oz. silver and 0.07 oz. gold to the ton.

BRAZIL.

(From Our Special Correspondent.)

Monazite Sands of Bahia.—After passing through the necessary legal forms, the tenders of Messrs. John Gordon, Carl Schnitzspahn & Co., and John Maria de Silva, Jr., were presented to the Finance Minister. The Minister decided to accept the tender of Messrs. Carl Schnitzspahn & Co., who agree to accept the government terms in full. Among other clauses are the following:

(1) Payment of a fee of 100 contos (\$25,000).
(2) Payment of an export duty of 40 per cent, as follows:

(a) A minimum payment of £20 (\$100) per ton of sand extracted annually; or (b) a deposit of £18,000 (\$90,000) for every 200 tons of sand purified.

(3) In case of the value of the product being such that this payment is less than that due on the above basis, the balance due to the government is to be settled on documentary evidence of the actual receipts.

(4) The term of contract shall be for 10 years with right of renewal for a further 10.

(5) The concessionaire shall deposit the sum of 50 contos (\$12,500) in state bonds as a guarantee.

CANADA.

BRITISH COLUMBIA—SLOCAN DISTRICT.

Slocan Ore Shipments.—The total amount of ore shipped from the Slocan and Slocan City mining divisions for the year 1901, according to the new Denver Ledger, was, approximately, 30,000 tons. Since January 1 to February 8, the shipments have been as follows:

	Week.	Total.
Payne	115	115
Ivanhoe	40	185
Sunset (Jackson Basin)	20	180
Reco	80	80
American Boy	84	84
Arlington	60	500
Hewett	55	411
Bosum	40	140
Last Chance	20	30
Wonderful	20	20
Enterprise	60	60
Monitor	60	204
Queen Bess	60	60
Whitewater (for January)	607	607
Silver Glimmer (for January)	35	35
Ottawa	7	7
Total tons	884	2,758

ONTARIO—MANITOU DISTRICT.

(From Our Special Correspondent.)

Consolidated Silver Mines of Lake Superior.—The old silver mines of the Thunder Bay District, west of Port Arthur, that have been idle for the past 15 years, have been consolidated by this company, and are being pumped out. The properties included are the West End Silver Mountain, East End, Badger, Porcupine and West Porcupine mines. Each once produced native silver and sulphides, but closed when the price of silver slumped. They were then far distant from any railroad communication, and the cost of transportation was heavy. Now the Canadian Northern road passes close by Silver Mountain, and it is estimated that the expense of operation has been lowered 60 per cent. For several years the West End Silver Mountain Mine has been shipping to American smelters some rich silver ore. This mine is reported to have paid handsomely, and is the basis of the new combination. Porcupine, Badger and West End are somewhat developed.

Mammoth.—This gold property, on the upper Shebandawan Lake, will put in air drills. Seventeen men have been at work all winter, and a considerable showing of ore is reported in a wide body of quartz. A 4-drill compressor plant is being hauled to the location.

Sturgeon Lake.—Considerable work is underway, and some splendid gold specimens are coming out. What this may mean is hard to determine, as the whole West Algoma region has been more notable as a "specimen country" than as a location for profitable good mines.

YUKON TERRITORY.

Tredgold Water and Mining Syndicate.—A. U. C. Tredgold, Sir Thomas Tancred and other members of this syndicate, have been given by the Dominion Government, so it is said, title in fee to all lapsed or vacant placer claims on Hunker, Bear and Bonanza creeks and all their tributaries. Eldorado Creek is a tributary of Bonanza, and is therefore included. Lapsed or vacant placers are those which have reverted to the Government owing to non-compliance with the law. They revert from the original locators. So sweeping is the concession that all bench claims vacant or to become vacant, it is alleged, are included. This will give away all the vacant ground in a portion of the country known to be rich. Of the paying creeks only Dominion, Gold Run and Sulphur on the Indian River will remain open to prospecting.

The Government authorities say that under its contract the company must supply a certain quantity of water at certain prices to miners, and this is in

the interest of the whole region. The particular ground of objection is as to the company getting the abandoned claims on Bonanza and small tributary creeks. But before this a very large sum of money will be required to be expended by the company.

The proposal had been before the Government in one shape or another for several years. It had its origin in a project to introduce hydraulic power in the Yukon to utilize water and distribute it over areas of mining land not workable under present conditions. Tredgold and others were willing to invest several millions in the scheme, but not before they received concessions from the Government which would insure a reasonable return on the money invested. A clause has been inserted protecting miners in so far as they can demand and secure water and thus work their own lands.

CENTRAL AMERICA.

COSTA RICA.

(From Our Special Correspondent.)

El Porvenir.—The Rio Grande Gold Mining Company, the new owners of this mine, have contracted with competent engineers for the development of the property, by a 1,000-ft. main tunnel at a low level with various upraises, cross-cuts and drifts. The work is to begin at once. Power drills will be installed ready for work May 1.

El Tsuku.—R. E. Crespi, accompanied by Messrs. Scowden and Lawlor, has returned from an exploration of these properties in the province of Talamanca, on the Atlantic slope. The country is wild and rugged with no labor supply, and is inhabited by a few Indians. The party reports deposits of ores containing pyrites, sphalerite, stibnite, etc., all of which are slightly auriferous. The character of the ores and lack of facilities for the introduction of adequate machinery do not warrant the attempt to handle the properties. Mr. Scowden reports over 10,000,000 tons of low grade ore. This disposes of a much-discussed mining prospect in Talamanca.

Las Canas Syndicate.—Leo A. Scowden and Theodore Lawlor have accepted a commission from R. E. Crespi to report on the properties of this syndicate. The properties comprise several thousand acres.

MEXICO.

CHIHUAHUA.

(From Our Special Correspondent.)

Hidalgo Mining Company.—The company's saw mill has been given the contract for the timber for a 100-ton mill on the property of the Red Hill Mining Company.

Palmillo.—The firm of Wendler & Blanckensee, in connection with Wm. V. Pettit, about 2 months ago secured a lease on a portion of this famous vein and began extensive development. The main body of ore has been encountered, averaging 60 oz. in silver and 1 oz. in gold. The vein is 12 ft. wide. Nine cars of ore have been shipped to the Compania Metallurgica, of Torreon, and the Mapami smelters. The company is pushing work and expect to double the present output within 60 days.

COAHUILA.

Compania Carbonifera de Monterey.—This company has been organized at Monterey with a capital of \$1,000,000 to develop coal fields near Muzquiz. Eugene Kelley, of New York City, is interested in the enterprise. The other incorporators are: Vicente Ferrera, Thomas Menderichaga, Francisco G. Sada, Isaac Garza, Adolfo Zambrano, Enrique C. Creel, Jose M. Garza Galan, Laure Carillo, Alejandro Elquebabal and Andres Garza Galan. The stockholders are all interested in the Monterey Steel and Iron Works, and the object of the new company is to furnish that plant with coal.

NEW ZEALAND.

(From Our Special Correspondent.)

Gold and Silver Exports.—The gold export from the colony in 1901 was the highest recorded for 30 years: 455,559 oz. (crude), valued at £1,753,783 (\$8,768,915). This is an increase over 1900 of 83,560 oz. in quantity and £320,830 in value. During 1901 the export of silver amounted to 562,598 oz. valued at £64,488 (\$322,440), a record for New Zealand.

Reefton Gold-fields.—During 1901 the New Zealand Consolidated Gold-fields Company has obtained very satisfactory returns from its Reefton mines. The December return was £12,262 (\$61,310), from 6,958 tons.

SOUTH AMERICA.

BRITISH GUIANA.

Exports of diamonds from the colony in January were 820 carats, valued at \$10,224, against 187 carats, valued at \$2,640, in January, 1901.

MINING STOCKS.

(Complete quotations will be found on pages 337 and 338.)

New York. Mexico. San Francisco.
Boston. London. Salt Lake City.
Philadelphia. Paris. Spokane.
Colo. Springs. Toronto. St. Louis.

New York. Feb. 27

The copper stocks are still in professional hands. A little stir was occasioned by the report that Senator Clark's properties in Butte, Mont., had been acquired by the Amalgamated Company. Thus were to be settled certain important law suits pending against Amalgamated. If this report is true, it is believed in the Street that Amalgamated stock will rise, though the week's prices fluctuated only a fraction over 2 points, from \$69 1-4 to \$71 3-8 on fair trading. Anaconda's extreme prices were \$34 1-4 and \$32 3-4, at which small sales were made. The curb coppers were fairly active. Greene Consolidated, of Mexico, found buyers at \$23@24; British Columbia at \$8 1-4@8; Union, of North Carolina, \$3 1-8 @3 1-2.

A sale of Ontario Silver, of Utah, is noted at \$8.25. The company has just declared a 30c. dividend, being No. 224, and bringing the total paid to \$14,782,000 on a capital of \$15,000,000. Horn Silver brought \$1.65, a gain of 25c. since last week.

Standard, of California, came forward at \$3.30, and sales of Quicksilver common were made at \$3 1-2 @3 3-4, and of the preferred at \$9 1-4.

In the Colorado list comparatively little is doing. Of the Cripple Creek stocks Eltkon changed hands at \$1.25. Jack Pot at 28@25c., and Isabella at 28@25c. Small Hopes, of Leadville, recovered to 40c.

The Comstock group was slow, as only a few specialties are traded in. Consolidated California and Virginia sold at \$1.40@1.50, Ophir, \$1.15@1.25; Hale & Norcross, 35@36c., and Mexican, which has just levied a 10c. assessment, moved at 50c.

Boston. Feb. 26.

(From Our Special Correspondent.)

The shares of the South Range group have become the favorites in local speculation, and will probably continue so. Baltic and Copper Range are now vying with Trimountain for speculative honors, and although the latter has made another \$30 advance during the week the market for the former two is considerably broader. Copper Range Consolidated was put on the unlisted department Thursday and immediately sprang into favor. The opening sale was \$45.50, and to-day the stock touched \$49.50, with slight reaction. The old Baltic and Copper Range receipts are still quoted. In the former case the stock has risen \$8.50 in the week to \$49.50, and in the latter an advance of \$13 is recorded to \$74, both, however, showing reactions.

Trimountain, which is Lawson's favorite, rested at the \$95 mark, but Monday it started up to \$102, with \$108 the closing for Tuesday. To-day was the banner day, however, and with a mighty whoop it rose to the dizzy height of \$125 per share. On sales of 700 shares it reacted to \$105, closing near that price. This shows how fictitious the market is, yet it can be said that there has been some outside buying of late. Certain it is that any stock offering is greedily snapped up. Perhaps Mr. Lawson's move to-day was to celebrate his 44th birthday. Centennial has again been a factor, rising \$3 to \$18.75, notwithstanding Lawson's denial that he was in any way interested in this property.

Dominion securities continue in favor, although sharp reactions occurred during the week. From \$85.25, Dominion Coal broke to \$78, but it rallied to \$88.50 within 24 hours, and closed \$5.75 higher than a week ago at \$85.25. Dominion Iron and Steel advanced from \$33.50 to \$38.50, and dropped back to \$34.50, closing with a net advance of \$1. The basis for the advance in these securities is reported that Dominion Coal will be leased to Dominion Iron and Steel under a 6 per cent dividend option, but the plan has not yet been perfected. Manipulation has been responsible for a large part of the advance in these securities, and the Canadian interests have shown themselves adepts at the business.

The soliciting of proxies for a change in the management of the Old Dominion Mine is going on merrily, yet the stock shows but little change from day to day. The animation shown in Trimountain and Copper Range securities has infused new life into the whole mining list, and several stocks have shown material advances. Particular ones are Mohawk to \$37, Mass to \$18.75, Trinity to \$13, Victoria to \$6 and Utah to \$25. Boston Consolidated has attracted attention on the curb, having risen 100 per cent, to \$4.75, within a few weeks. This is adjacent to the Utah Consolidated and Bingham Consolidated mines in the Bingham Camp, Utah. Development work has succeeded in opening ore-bodies running 5 per cent copper besides gold and silver values. The an-

nual report of the Tecumseh Mining Company shows cash on hand January 1 last of \$20,387. Mining here has been of an uncertain quantity. It is believed here that the Amalgamated dividend will be the same as the last one.

Salt Lake. Feb. 22.

(From Our Special Correspondent.)

The week on the Stock Exchange has been marked by decidedly bearish tendencies, and many of the stocks have felt the effect. The total number of shares sold was 387,158, which brought an aggregate value of \$200,912.41.

E. H. Mead has been elected to fill the vacancies in the office of secretary of the Galena, West Century and Golconda mining companies caused by the resignation of A. A. Shorten.

Assessment No. 3 of 4c. a share has been levied by the Albion Mine. The money is payable immediately and becomes delinquent March 19. The sale of the delinquent shares will take place on April 10.

The April Fool Gold Mining Company has levied an assessment of 5c. per share. Stock will be declared delinquent on March 24, and will be sold at auction on April 12.

San Francisco. Feb. 22.

(From Our Special Correspondent.)

The market was rather weak at the opening, but improved later, with better prices and quite a good show of buying orders. The north end stocks were those most in demand. Prices at the close were higher and firm.

Some quotations noted are: Consolidated California & Virginia, \$1.35; Ophir, \$1.05@1.10; Silver Hill, 60c.; Mexican, 40c.; Chollar, 17c.; Potosi, 15c.

The holiday coming at the close of the week made very little difference in the trading.

Sales at the Producers' Oil Exchange have been moderate only this week, but with little weakness in prices. Thirty-three sold at \$7.50; Home, \$3.80; Reed Crude, 37c.; Oil City, 20c.; Independence, 8c.; Petroleum Center, 7c. The low-priced speculative stocks showed the heaviest business.

London. Feb. 14.

(From Our Special Correspondent.)

The mining stock market has been much quieter this week and there has not been a great volume of business in South Africans. Prices have been firm and both brokers and the public are watching the market keenly. Promoters are actively preparing for exploiting the market on the termination of hostilities and already quite a number of new companies have been formed to act as promoting companies, some of them being unfortunately of a type that will do neither shareholders nor South Africa any good. Some of the new companies are being registered in the Transvaal under the old laws, but it is probable that they will have to be registered again when the new constitution is settled. The registration of new companies on the way has not created a very good impression.

The preparations for the development of Rhodesia are going on rapidly. This week the public are be-

DIVIDENDS.

Name of Company.	—Latest Dividend—		Total	Total to Date.
	Date.	Per Share.		
*Alabama Coal & I., pf.....	Mar. 1	1.75	43,750	437,500
*Bald Butte, Mont.....	Mar. 10	.06	15,000	1,162,148
*Bunker Hill & Sullivan, Ida.....	Mar. 4	.07	21,000	1,348,000
*Central Lead, Mo.....	Mar. 15	.50	5,000	280,000
Chicago Crude Oil, Cal.....	Mar. 1	.01	10,000	10,000
*La Fortuna, Ariz.....	Mar. 8	.05	12,500	1,113,500
*National Lead, pf.....	Mar. 15	1.75	269,844	12,144,404
Ontario, Utah.....	Mar. 20	3.00	45,000	14,782,000
*O. & Ind. Nat. Gas.....	Mar. 1	1.00	90,000	810,000
*Republic I. & St. P.....	Apr. 1	1.75	355,371	3,909,080
*Rocco Homestake, Nev.....	Mar. 10	1 1/2	4,500	67,500
San Carlos Minillas, Mex.....	Feb. 28	4.43	11,075	67,500
*Silver King, Utah.....	Mar. 10	.668	100,000	5,050,000
Sta. Marie de Guad, Mex.....	Mar. 10	4.43	11,075	314,750
*St. Joe Lead, Mo.....	Mar. 10	.15	37,500	3,497,000

*Monthly. †Quarterly. ‡Semi-annual.

ASSESSMENTS.

Name of Company.	Loca- tion No.	Delinq.	Sale.	Amt.
Albion.....	Utah 3	Mar. 19	.....	.04
Andes.....	Utah 3	Mar. 18	.....	.05
Annadale.....	Utah 1	Feb. 15	Mar. 12	.00 1/2
April Fool.....	Utah 1	Mar. 24	.....	.05
App Con.....	Cal. 1	Feb. 4	Mar. 5	1.00
Cadmus.....	Cal. 1	Mar. 10	.....	.08
Con. St. Gothard.....	Cal. 20	Mar. 5	Mar. 24	.05
Emerald.....	Utah 1	Feb. 15	Mar. 12	.00 1/2
Garibaldi.....	Cal. 2	Mar. 15	Mar. 20	.01 1/2
Lady Washington.....	Nev. 2	Feb. 23	Mar. 20	.03
Marina Marsicano.....	Cal. 27	Feb. 17	Mar. 10	.02
Mexican.....	Nev. 2	Mar. 25	.....	.10
Minnie.....	Utah 4	Feb. 22	Mar. 25	.001
Northern Light.....	Utah 7	Mar. 10	Mar. 29	.02
Mistletoe.....	Cal. 1	Mar. 15	.....	.01
Orient.....	Utah 2	Feb. 15	Mar. 15	.00 1/2
Pilot.....	Cal. 1	Mar. 18	.....	.10
Reward.....	Cal. 1	Mar. 12	.....	.01
Sierra Nevada.....	Nev. 2	Mar. 25	.....	.10
Silver King.....	Ariz. 23	Mar. 11	Apr. 8	.25
Sunrise.....	Utah 1	Feb. 17	Mar. 10	.00 1/2
Tintic Copper King.....	Utah 1	Feb. 5	Mar. 5	.00 1/2
United Sunbeam.....	Utah 3	Mar. 4	Mar. 21	.10
Utah Con.....	Nev. 1	Mar. 1	Mar. 25	.05
Yellow Jacket.....	Nev. 1	Feb. 8	Mar. 18	.10

ing invited to subscribe to the Wareleigh Rhodesia Development Company, Limited, which has been formed to exploit a group of claims in the Silukwe District of Rhodesia. The properties are very similar to others already developed in that country, and consist of quartz veins averaging 2 to 3 ft. wide and assaying \$10 or \$15 per ton. The flotation is in the hands of Messrs. Morison & Marshall, of London, who are already well known as introducers of South African and other properties, and no doubt they will raise sufficient money required for working capital.

The West Australian mining market continues well, owing to the Lake View position. Nothing further has been heard from Mr. Govett with regard to the condition of the mine and the possibilities as to future output, so that nobody is at all inclined to touch the market. The most active share continues to be great Tingall in the Murchison district. The £1 shares are being split into two of 10s. each and the quotation of the new share is about £9 as compared with £16 for the old share. There are plenty of people who think the price will go higher, so the market is strong. But the present price is far away beyond the intrinsic value and is entirely due to stock exchange booming.

The Indian section is not one of violent fluctuations though the market in the shares is always strong and well supported. Attention has been drawn to the shares this week by the publication of the information that the leases of the principal mines have been renewed for a period of 30 years from 1910, the date when the present leases expire. Nobody expected that the leases would not be renewed, but there was some doubt as to the terms, as the Mysore Government has rather a bad reputation for being grasping. The new terms involve an additional payment of 2 1-2 per cent, the dividends paid over and above the present royalty of 5 per cent on all gold produced. These terms are considered very reasonable, especially as the Government are facilitating the operations by providing a plant for conveying power from Cauvery Falls to the mines. The saving obtained from this scheme will be much more than the additional payment to the Government. The new arrangement is too far in advance to have any effect on the market, but the settlement of the question at so early a date has tended to strengthen the tone.

The company called the Sultana Mine of Canada, Limited, that was formed in 1899 to take over the mine of that name in Rat Portage District, has had a very unsuccessful career. The mine has not been able to earn a profit for the year ended September 30, 1901, the report for which has just been issued. A loss also occurred during the first year of work, though the mine was supposed to be a going concern and the vendor was paid £225,000 in shares for the property. The amount of capital subscribed is about £20,000, and there is a mortgage of £10,000 contracted by the vendor before the company was formed. The directors have to report that the ore in the south shaft has pinched out and that the manager is turning his attention to discovering a faulted ore body in a different part of the mine. The yield of the 7,000 tons milled during the year was only \$5.15 per ton, which is highly encouraging. The outlook for shareholders at the present time is certainly far from hopeful.

Paris. Feb. 16.

(From Our Special Correspondent.)

The mining stock market shows a better condition, more activity being manifest. The metallurgical stocks have been in better demand.

The rise in the South African gold stocks seems to have reached its limit. This has been carried in London to a point which does not appear to be at all justified by existing conditions. For instance, no one seems to consider the large sums which will be required to put the mines and mills in a good state when the resumption of work is possible. Already the raising of funds has begun, and this will continue for some time.

The foreign merchandise trade of France for the month of January is reported by the Ministry of Commerce as below:

	1901.	1902.
Imports	Fr. 396,131,000	Fr. 362,989,000
Exports	285,113,000	314,080,000
Excess, imports	111,018,000	48,909,000

There was a decrease of 33,142,000 fr. in imports, and an increase of 28,967,000 fr. in exports; leaving a decrease of 62,109,000 fr. in the excess of imports.

The gold and silver movement in France for the full year is reported as follows:

	Imports.	Exports.	Imp.	Excess.
Gold:				
1901	Fr. 428,284,000	Fr. 144,467,000	Imp. Fr. 283,817,000	
1900	459,111,000	125,568,000	Imp.	333,543,000
Silver:				
1901	97,777,000	140,515,000	Exp.	42,738,000
1900	145,840,000	204,786,000	Exp.	58,946,000

Imports of copper and nickel coins were 108,000 fr., nominal value, last year, against 62,000 fr. in 1900. Exports were 696,000 fr., against 334,000 fr. in the previous year.

The French coinage executed at the Paris Mint during the year 1901 is reported as follows:

	Pieces.	Value.
Gold	4,753,472	Fr. 74,879,110
Silver	13,020,000	12,400,000
Bronze and nickel	10,760,000	600,000
Total	28,473,472	87,879,110

For the gold coinage there was used the equivalent of 31,409,450 fr. in bar gold, and 43,469,260 fr. in old and worn coins re-melted. The silver coin was entirely made from old coins re-melted. The new standard for silver coinage is only .835 fine, the old coins being .900 fine. Besides the French coinage proper the following coins were made for French colonies, the values only being given:

	Gold.	Silver.	Bronze.
Indo-China	Fr. 3,001,200	Fr. 20,088,000	Fr. 578,809
Tunis		1,800,000	
Great Comoro			20,000
Total	3,001,200	21,888,000	598,809

Besides all this work the Mint executes a considerable coinage for foreign countries. The value of this foreign work in 1901 was as follows:

	Gold.	Silver.	Nickel and Bronze.
Brazil			Fr. 9,444,506
Venezuela		Fr. 1,170,971	
Monaco	Fr. 1,529,100		
Crete		1,900,000	31,245
Morocco		606,650	
Ethiopia		487,354	
Totals	1,529,100	4,164,975	9,475,711

The total number of pieces struck at the Mint during the year was 78,250,880, which represents a great amount of work done.

COAL TRADE REVIEW.

New York. Feb. 28.

ANTHRACITE.

The anthracite trade shows no important changes as yet. Storms in the early part of the week hindered transportation greatly, but the main lines are now all open, and coal is going forward more promptly than for some time. Car supply at the mines which had been cut down by storms is improving, and the outlook now is that the supply before long will equal the demand. As to labor troubles, the prospect is doubtful. It is stated that John Mitchell, president of the United Mine Workers, recently sent a letter to the president of each anthracite railroad inviting the latter to be present at a meeting of the officials of the Mine Workers on March 12. Mr. Mitchell was in New York City within a week, but it is tolerably certain that he did not see any of the railroad presidents, but did see a certain member of the Civic Federation on whose help he evidently places great confidence. The chances of a strike cannot be determined until after the meeting on March 12. If no excessive demands are then made, there will be no strike, but it is altogether likely that the anthracite operators will not consent to any arrangement looking to such a hard and fast scale of wages and hours of work as prevails in the bituminous regions.

The mines are busy and the February output, in spite of the interruptions by storms, should be large. The January shipments are officially estimated at 4,538,138 tons, as compared with 5,183,392 tons in January, 1901. Considering that during the early part of January this year many mines in the Lehigh and Susquehanna regions were in bad shape from the December floods, the output was very heavy.

As April is but a month away, there is considerable speculation in the trade over the probabilities of spring discounts being then announced. So far as can be learned the matter has not yet been discussed by the presidents of the railroads interested except in an informal manner. Everything depends on the attitude of the miners. Nothing will be done about discounts until it is certain that the danger of a great strike is past. As to any changes from last year's prices, the only point that has come up for serious discussion so far relates to egg coal. It is quite probable that the new schedule will put this size on a parity with stove and chestnut in the East. It virtually has been on a parity with those sizes in the interior and in the West. Sales agents claim that the consumers in the East have not been getting the benefit of the lower price of this size compared with stove, but that the difference has all gone to the jobber or retail dealer.

Trade in the Northwest continues fairly active, though milder weather has affected demand. In Chicago territory as well demand has fallen off somewhat, but as the all-rail movement has been delayed by storms, supplies at nearly all points depending on all-rail shipments are very light. Along the lower lakes and in Canadian territory demand is still active, and the supply of chestnut and of steam sizes is not nearly as good as desired. In the all-rail trade at points further East and at points along the Atlantic seaboard demand is good. Storms greatly hindered coastwise shipments, and practically no coal cleared from Philadelphia until within a day or two. At New York Harbor shipping ports the situation was nearly

as bad. The steam sizes are still scarce, and command full prices for anything like prompt delivery. We quote as follows for free-burning white ash coal f. o. b. New York Harbor points: Broken, \$4; egg, \$4.25; stove and nut, \$4.50; pea, \$3; buckwheat \$2.50.

BITUMINOUS.

At the meeting of the Bituminous Association on February 21 in Philadelphia harmony prevailed. The members decided unanimously to stand by last year's prices without changes, and circulars have since been sent out to the trade calling attention to the fact. Apparently the trade expected last year's figures to continue. There is little comment on the circular and little business done. In fact it is many years since the contract season has been as quiet as it is now. Producers are not rushing after new business, and there is no pushing nor especial activity among sales agents. Very few contracts have been closed, and the only important one is the rather remarkable long-term contract closed a few weeks since by the New York, New Haven & Hartford Railroad. The general policy of the trade just now is to go slow, probably on account of prevailing conditions governing deliveries. Every one seems a little afraid to take new business, and for the next few weeks trade will probably be largely confined to working off old contracts. One thing is gradually becoming more evident, that is that the middleman is not to be of as much importance as formerly. In this respect the bituminous trade will follow the example already set by the anthracite. There will be complaints from old-established firms, but the elimination of middlemen is a logical outcome of the power held by a few very large concerns, and should not in the long run hurt the consumer.

The statement is given out unofficially that the main line roads are to make the same through charges from mines to tidewater this year as last. There seems, however, to be a determination among producers to get a little more than is called for by the Association scale on all rail business. Car supply continues the dominating factor in the trade, and the uncertainty regarding better transportation facilities is probably the chief factor in delaying contracts for the coming year. People do not care to take new business without having a better idea of what may be the outcome. The promises of better car supply and more motive power made by the railroads are general, not specific, and are not reassuring.

During the past week snow storms have interfered greatly with the movement of coal by rail, its re-handling at tidewater and with coastwise traffic. Telegraph wires about New York Harbor and to points on Delaware Bay are still down, making it difficult for shippers to keep in touch with vessels.

The far East is calling for considerable coal; arrivals have been very light, owing to storms. Along Long Island Sound the trade is taking all the better grades of coal it can get and filling in when necessary with the poorer grades. The supply of these is none too good. At New York Harbor ports early in the week ice conditions about docks and in the Kills made coal scarce, and prices have been firm. All-rail trade is taking all the coal it can get, and is calling for more. Transportation from the mines to tidewater is irregular, but fairly good considering the weather. Car supply at the collieries is still from 25 to 50 per cent of the number wanted. In the coastwise market there is little doing. Traffic was at a standstill most of the week, and a great many craft have been in danger from ice. Philadelphia and Baltimore have been closed, and ice has hindered navigation at Norfolk and Newport News. We quote current rates from Philadelphia as follows: Boston, Salem and Portland, \$1; Providence, New Bedford and Long Island Sound, 90c.; Wareham, Lynn and Newburyport, \$1.10; Portsmouth, \$1.05.

Best grades of Clearfield coal are selling at \$2.85@ \$2.90 f. o. b. New York Harbor shipping ports; poorer grades are selling as low as \$2.60. The high grade coals are still out of the market.

Birmingham. Feb. 24.

(From Our Special Correspondent.)

The coal production in Alabama to-day is as heavy as it ever has been. There is a healthy demand for the product.

State Mine Inspector J. deB. Hooper is now at work on his annual report for the year 1901, and this week will give the figures to the printer. Three or four mines in the State, which will report about 100,000 tons of coal, have yet to send in their report. The following official figures (not estimating those yet to be heard from) have been compiled: Bibb County, 1,240,358 tons; Blount, 143,583; Cullman, 2,000; Etowah, 74,544; Jefferson, 5,315,644; Marion, 54,485; Shelby, 171,946; St. Clair, 82,207; Tuscaloosa, 387,356; Walker, 1,268,022; Winston, 10,965; small mines, 25,000; total, 8,776,110 tons. The production in 1900 amounted to 8,273,362 tons, showing an increase with these figures alone of 502,748 tons. There was a falling off of more than 200,000 tons in Walker County during the year 1901, as compared to the production of 1900, while Jefferson County

showed an increase of more than 100,000 tons. Bibb County had nearly 290,000 tons increase last year. There were 37 fatal accidents in the mines during the year 1901, the same number as during the year 1900.

During the past week Col. T. H. Aldrich sold between 3,000 and 4,000 acres of coal lands in Jefferson County to the Alabama Steel and Wire Company for \$95,000, and the lands will be developed extensively. W. E. Leake, formerly with the Corona Coal and Coke Company, has become interested in the Abernant Coal and Coke Company, and is operating in the Blue Creek fields of Jefferson County.

Contracts will be let shortly by the Louisville & Nashville Railroad Company for the construction of 4 or 5 miles of track in Blount County to reach coal-fields, where there is promise of considerable development.

Chicago. Feb. 25.

(From Our Special Correspondent.)

Complaints continue about the scarcity of soft coal from Eastern mines, particularly Hocking, for which there is much demand. The mild weather of the last few days helps the condition of things somewhat, but there seems little general improvement in the railroad situation. Congestion of traffic is reported everywhere, and the hope of speedy improvement is indulged in by few dealers, with the opening of lake traffic several weeks away and everything depending on the railroads. With the promise of spring in the air, however, there is reason to believe that there must be improvement soon. There has been practically no change from the prices quoted last week: Birdseye cannel, \$5.50; West Virginia splint, \$3.50; Hocking lump, \$3.50; Youghiogheny lump, \$3.45; West Virginia lump, \$3.35; lower vein Brazil block, \$2.70; Indiana semi-block, \$2.50; Clinton lump, \$2.25; Deep River lump, \$2.15; steam lump, \$2; smokeless lump, \$3.90; smokeless egg, \$4; smokeless mine-run, \$3.50; Indiana and Illinois mine-run, \$2; blacksmith's coal, \$3.40. In the region north-west of Chicago the scarcity of coal continues, and wholesalers are kept busy answering questions from that direction, as to probable relief from the pressure.

Anthracite continues steady at \$6, with the same scarcity of nut that has existed for the last two weeks.

Cleveland. Feb. 25.

(From Our Special Correspondent.)

At the Chicago meeting this week it is quite likely that definite action will be taken upon the price of coal shipped to the Northwest. Owing to the fact that coal is now upon an all-rail basis in the Northwest, and that the stocks have been completely consumed it would be reasonable to suppose that the prices will be advanced over the rate of last summer. However, there is decided competition this year, several new and powerful companies having entered the field. It is generally held that more coal will be sent by the lake route this year than ever before. The break in the weather has lessened the domestic trade somewhat.

Pittsburg. Feb. 26.

(From Our Special Correspondent.)

Coal.—The operation of the railroad mines was more favorable this week, most of them running in full with a good supply of cars. The river mines are still handicapped on account of the frozen streams, but a break will occur before the end of the week. There are about 20,000,000 bush. of coal loaded and ready for shipment to Southern ports, which will be started as soon as the ice passes out, making navigation safe. All likely will get out, as the pilot strike is at an end, and there are many tow boats in port. A meeting of representatives of the two coal combinations and leading independent operators was held during the week to take up the matter of prices for next year beginning April 1, when the annual wage scale becomes effective. It was decided to defer action until March, as some details of the local mining scale remain unsettled. A conference between representatives of the Pittsburg District organization of the United Mine Workers and the two coal combinations began on Monday to arrange what is known as the dead-work scale which covers points not mentioned in the general scale. The sessions will continue for several days.

Connellsville Coke.—The production showed a gain, but shipments are still seriously retarded by a shortage of railroad cars. Contract prices remain at \$2.25 for furnace and \$2.75 to \$3 for foundry, but large premiums were paid for prompt delivery. In the last issue of the *Courier* the production for the week was given at 212,183 tons, an increase of 1,364 tons compared with the previous week. The shipments for the week aggregated 9,096 cars distributed as follows: To Pittsburg and river tipples, 3,546 cars; to points west of Pittsburg, 3,978 cars; to points east of Connellsville, 1,572 cars. This was a decrease of 291 cars compared with the shipments of the previous week.

Foreign Coal Trade. Feb. 27.

The export market here continues quiet, notwithstanding low ocean freight rates. No new charters are noted.

Exports of fuel from Great Britain in January are reported as below, in long tons:

	1901	1902.	Changes.
Coal	3,048,987	3,027,160	D. 21,827
Coke	65,977	57,723	D. 8,254
Briquettes	91,271	88,891	D. 2,380
Totals	3,206,235	3,173,774	D. 32,461

In addition to these exports, there were 1,871,900 tons of coal shipped abroad in January for the use of ships engaged in foreign trade, against 1,551,600 tons last year.

German correspondence states that the reports from the coal trade are uniformly bad. In Silesia mining has been going on at a still slower pace, and reductions of coal prices, as well as wages, are expected at an early day. In Saxony a reduction of prices has been made this week, and the Berlin dealers reduced their prices last week. In Westphalia, shipments in January were fully 7½ per cent less than in December. In view of the difficulties of making sales, the Coal Syndicate held a meeting last week, at which the prevailing opinion was that domestic consumption could not be materially increased through a further reduction of prices; hence it was decided to make unusual efforts to increase the export trade by lowering prices for foreign orders. On the other hand, it is announced that the competition of English and American coal is growing more troublesome for German producers. While the importations of English coal at Hamburg in January amounted to only 138,960 tons, as against 153,073 tons in January, 1901, English dealers have just taken large orders for Hamburg at prices that cannot be met by Westphalian producers. It is a significant fact that English coal made the largest increase last year among all the sources supplying the Berlin market. The local receipts reached 2,036,881 tons, against 1,958,040 tons in 1900. Of the arrivals last year, 431,457 tons came from England, which was an increase of 70,515 tons upon 1900. Besides the above receipts of coal, 1,068,585 tons of brown coal, or lignite, were received, against 1,020,706 tons in 1900.

Advices from Stockholm state that the administration of the Swedish State railways has decided to experiment with Canadian coal, and as a trial shipment the steamer Drottningsofia has just arrived at Gothenburg with about 7,000 tons. This coal is shipped by the Dominion Coal Company from Sydney, Cape Breton.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of February 15 that the general tone of the Welsh coal market is again distinctly weaker, both for Cardiff and Monmouthshire descriptions. Quotations are: Best Welsh steam coal, \$2.66 @ \$3.78; seconds, \$3.48; thirds, \$3.36; dry coals, \$3.36; best Monmouthshire, \$3.36 @ \$3.48; seconds, \$3.24; best small steam coal, \$2.28; seconds, \$2.04; other sorts, \$1.80.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2-1-2 per cent discount.

The tone of the freight market remains very steady, but rates show little quotable change. Some rates from Cardiff are: Algiers, \$1.30; Marseilles, \$1.35; Genoa, \$1.38; Naples, \$1.38; Singapore, \$2.76; Las Palmas, \$1.38; St. Vincent, \$1.56; Rio Janeiro, \$2.58; Santos, \$2.88; Buenos Aires, \$2.34.

Shanghai, China. Jan. 7.

(Special Report of Wheelock & Co.)

Coal.—A very fair business took place in Japan coal, owing principally to the further decline in rates of freight to \$1.20 per ton. Cardiff remains exceedingly quiet. Sydney Wollongong is very much overstocked in this market, and prices generally tend to weakness. We have heard of a sale at 13.57 taels per ton, but commissions to be paid brings it down to about 12.75 taels per ton. Arrivals of all kinds of coal during the fortnight ended January 8 were 26,276 tons. We quote per ton as follows: Welsh Cardiff, 17 taels (\$11.39); Australian Wollongong, 13.75 taels (\$9.21); Hongay lump, 9 taels (\$6.03); Japan, Takasima, Namazuta and Muke all contracted for; but other sorts, 6 @ 8 taels (\$4.02 @ \$5.36); Chinese, Kai-ping, navy coal, \$16; locomotive, \$13; household and No. 1 slack, \$10; No. 2 slack, \$7.75, and No. 3 slack, \$6.50.

Kerosene Oil.—There has been a still further decline in different brands all round. There are rumors of sales of Devoes at Tea Shop at 1.58½ taels per case, net, and we have also heard of sales from first hands at 1.68 taels per case, less 2 per cent, in fairly large quantities. The price of bulk oil is now as low as 0.89 tael net for cargo on the spot, while importers' rate is 0.94 tael, less 2 per cent, for 10 gals. Stocks, including arrivals, are 945,750 cases American, 973,700 cases Russian and 221,000 cases Sumatra; total, 2,140,450 cases. Quotations per case

are: Devoes, by importers, 1.68 taels, less 2 per cent, and at Tea Shop, 1.58½ taels; Russian, anchor chop, 1.50 taels; other chops, 1.44 taels, and bulk oil, in 2 tins, 1.28 taels, and loose, 0.89 tael; Sumatra, Langkat bulk oil, same as Russian.

IRON MARKET REVIEW.

Birmingham. Feb. 24.

(From Our Special Correspondent.)

The feature of the pig iron market in Alabama during the past week is the announcement of the entire withdrawal of one company from the market. There is a good demand yet even with delivery during the last four months of the year. A local buyer in small lots stated that an effort was made to get some iron during the past week, and iron from a certain furnace could not be purchased at any price. Immediate delivery iron commands 50c. over the quoted figures. The furnacemen in this State continue to hold off from advancing prices, hoping to hold a steady and more profitable market with quotations reasonable. The shipments are good. The railroads are receiving requests for cars, and their representatives have only trouble in getting the manufacturers to route their product.

The local consumption is heavy, all the iron using plants being well stocked with orders. Many of the concerns heretofore buying in small lots have been compelled to buy ahead on account of the conditions of the market and the actual necessity of securing iron before it has all been sold ahead.

The following prices prevail: No. 1 foundry, \$12.50; No. 2 foundry, \$12; No. 3 foundry, \$11.50; No. 4 foundry, \$10.50 @ 11; gray forge, \$10.50; No. 1 soft, \$12.50; No. 2 soft, \$12.

A sale of large proportions could have been made during the past week, it is stated, at \$12 for No. 1 foundry, but it could not be handled, the furnacemen not desiring to make concessions in the first place, while the time of delivery given was not sufficient.

The finished iron and steel market conditions continue bright. The rolling mills are in active operation, with the order books well filled and good prices obtaining. The steel plant at Ensley has more than half of the open-hearth furnaces in operation with a good production of steel. The steel wire, rod and nail mill, the steel rail mill, the plow factory and the rolling mills are requiring regular quantities.

The litigation of the Alabama Steel and Wire Company is still on, and promises to be kept up for some time. The petition for the receivership will be heard in the Chancery Court March 24. C. E. Robinson, a minority stockholder in the Alabama Steel and Wire Company, is the instigator of the petition. During the past week there was a rumor out that the steel wire trust was behind the litigation. In the meantime the plant is in operation shipping quantities of its product.

During the past week A. P. Gaines, of South Pittsburg and Bristol, Tenn., a young but competent furnaceman, arrived in the district to become manager of the Bessemer Division of the Tennessee Coal, Iron and Railroad Company. Mr. A. P. McClure, who took charge of the work some time ago, will be in charge of furnaces for the company while Mr. Gaines will have charge of the bessemer furnaces.

There are rumors of the erection of two other iron blast furnaces in this district, one at Woodward, by the Woodward Iron Company, and the other at Trussville, by C. F. Buck & Co. Both appear to be certain, though no positive announcement is made. The Woodward Company will construct a 250-ton furnace, while the Trussville folks will erect a 200-ton furnace. Mr. John Dowling, formerly superintendent of the Bessemer Division of the Tennessee Coal, Iron and Railroad Company, has taken an interest in the Trussville concern and is now in charge. The 300-ton furnace of the Republic Iron and Steel Company is still unfinished. It is believed that the completion of this furnace will mean the erection of a large steel plant at Thomas, where the Republic company owns 2 furnaces already in operation, coke ovens and extensive properties.

Buffalo. Feb. 28.

(Special Report of Rogers, Brown & Co.)

The phenomenal conditions surrounding the pig iron market continue as pronounced as ever. It is a strong market. We have the curious spectacle of many furnaces selling as much as \$1, and in some cases \$1.50 per ton lower than their customers would pay and lower than others are paying to other furnaces, all done for the sake of holding the market steady and preventing an inflation in prices which would later react to the detriment of both buyer and seller. In this way there is a rather wide range in prices, but our quotations below are intended to reflect the average price. As a rule, furnaces are declining to make sales to any but their regular customers. All business in this locality is now for the last half or last quarter of the year, with consider-

able tonnage booked for the first quarter of 1903. This is not through any desire of the sellers to contract their product ahead, but is the outgrowth of the wish of consumers, who, having contracted their own product, wish to insure a regular supply of their favorite brands. We quote below on the cash basis, f. o. b. cars Buffalo; No. 1 strong foundry coke iron, Lake Superior ore, \$18.25; No. 2 strong foundry coke iron, Lake Superior ore, \$17.75; Southern soft No. 1, \$17.75; No. 2, \$17.25; Lake Superior charcoal, \$20.

Chicago. Feb. 25.

(From Our Special Correspondent.)

Active buying still characterizes the pig iron industry, most of the orders being for delivery in the last half of the year. Though there is constant complaint about the inability of the railroads to furnish adequate transportation, foundries are pouring in orders, and the furnaces are crowded to meet the demand everywhere. Prices remain firm at the advance reported last week, to-day's quotations being for Northern No. 1 \$17.50@18, and for No. 2 \$17@17.50; for Southern No. 1 \$16.15@16.50, and No. 2 \$15.65@16.15.

Coke has declined somewhat, being now quoted at \$5@5.50, against \$5.50@5.75 a week ago. The supply is very tight, scarcity being reported for all kinds, with the greatest demand and loudest complaints about Connellsville coke. No improvement apparently exists in the railroad situation.

Cleveland. Feb. 25.

(From Our Special Correspondent.)

Pig Iron.—There is very little actual relief in the situation at the furnaces as far as coke and cars are concerned. Coke is scarce, and the shortage in cars continues. Orders are being taken for the second half of the year, and none whatever for the first half. Leading furnaces are simply retaining sufficient stock to supply the pressing needs of their regular customers. The buying is simply enormous, and there is apparently no end to the demand. Notwithstanding the demand no advance in prices is sought. In fact, the furnacemen are very well content with their present profits, and are well aware that any attempt to advance prices would restrict consumption and provoke inevitable disaster. In fact, with careful management on all sides there is no reason why the present season of prosperity may not continue.

Finished Material.—Orders and contract bookings continue to be in excess of shipments, and all the mills are way behind on their orders. Nearly every one is asking an advance on bar steel, and while the price is nominally 1.50c. Pittsburg, it is doubtful if any can be got for less than 1.60c. There is no quotable change in bar iron. Plate orders are coming in more freely, and more tonnage is booked ahead. The demand for steel billets is insistent, but the supply is scarce. The market all round is very firm.

Scrap.—Scrap is scarce, and the market is consequently firm. The prices have undergone no change during the week.

Philadelphia. Feb. 27.

(From Our Special Correspondent.)

Pig Iron.—The fear of a pig iron famine is still haunting foundry and mill men. The evidence of a shortage in Eastern and middle Pennsylvania is not hard to find. News gathered from consumptive channels shows that nearly all users have contracted to do work for which they have not yet secured material. The talk about advancing prices has truth in it, but on the other hand there is not much business being booked at the higher prices. Several orders have been placed for Southern iron at top prices, and there is a drift of inquiry that way for more. Users of bessemer are rather agitated over the latest inside news from large sources of supply, and a further advance seems the next thing to look for. Basic is also wanted by a few Eastern buyers, and would be taken in large quantities were it not for the lack of supplies, high asking prices and obstacles to delivery. Foundry pig of all kinds is wanted. No. 1 is selling around \$18.50; No. 2, \$18; forge, \$17.50; common, \$16.75; basic, \$18; bessemer would bring \$20.

Billets.—There are changes in billets, but the parties to the negotiations are not talkative. Premiums are probably being arranged. Old customers are on the warpath for supplies, and new ones are left out in the cold. There is a renewal of a rumor that an arrangement was closed this week for supplies from Germany. The market quotation for American billets is \$32.50.

Bars.—The quieter market is partly due to unfavorable weather and to oversold conditions. The future of this branch of the market lies in the action of large consumers. If they crowd orders in faster than they need material an advance may come. Steel bars are 1.65c.

Sheets.—Galvanized sheets have been meeting with attention from a few large consumers. The mill con-

ditions are unchanged. Premiums are the rule rather than the exception.

Merchant Steel.—The enormous consumption in progress enables all makers to hold highest quotations given.

Plates.—This branch of the iron industry is approaching conditions which may open the way to concessions before many months. All our manufacturers report fair trade, and no change in prices. Sheared plate is 1.80c.; flange, 1.90c.; fire-box, 2c.

Structural Material.—The business of the past week has shown that outside buyers are getting helped out here. Mills here in some cases have considerable Western business, and are promised as much more as they can take. Urgent buyers decline to give bonus prices. A good deal of new work is now nearly ready for specification.

Old Rails.—Old iron rails are \$22@23, and they never reach the open market. All chances for old rails are snatched up in advance. Some few lots have been promised to urgent buyers, but no dates for delivery have been fixed yet. There is quite a rush for old steel rails at about \$19, and by the opening of spring a good deal of this stock will change hands.

Scrap.—The scrap dealers have things their own way, and prices are correspondingly strong. Scarcely any scrap has been moved for a week, and some consumers are at their wits' ends. Choice heavy is held at \$15; heavy steel, \$19 or near it; machinery cast, \$15; choice railroad—of which none is heard of—is \$21@22; wrought turnings, \$14; cast borings, \$7.50@8, according to a few small recent sales.

Pittsburg. Feb. 26.

(From Our Special Correspondent.)

Present conditions in the iron market are unprecedented. Buyers continue to force prices up above the fixed rates by urgent demands, and sales at the maximum quotations have been made for delivery throughout the balance of the year. All grades of pig iron are in demand, and customary differentials are mere history. Bessemer iron invariably ruled the highest in price, with basic about \$1 a ton lower, foundry No. 2 a shade below that price and gray forge prices the lowest. This week basic iron is hard to get at bessemer prices and foundry No. 2 for spot shipment sold at an advance over bessemer. Gray forge for the second half has sold as high as foundry iron in some instances. A producer, in speaking of these conditions, said that buyers must be going wild. The scarcity of all grades of pig iron continues, although a number of furnaces that had been idle on account of a shortage of coke are again in operation, not more than 4 or 5 of the Valley furnaces being banked this week. Most of the Southern furnaces have withdrawn from the market temporarily, and while offers were made no new business was booked. A heavy tonnage of bessemer, foundry and forge iron was contracted for this week for delivery throughout the second half, some at higher prices than former quotations for the third quarter. The situation promises to be disturbed by labor troubles. The International Association of Blast Furnace Employees has been gaining in strength since its formation. At a meeting of the vice-president of the various districts and the Executive Committee held at Youngstown on Monday night, the meeting continuing until early yesterday morning, it was decided to make a demand for three turns a day of 8 hours each, instead of two shifts of 12 hours each, without any reduction in pay. This will increase the labor cost for producing pig iron fully 50 per cent. It was announced to-day that the time for putting the demand into force had not been definitely decided upon, but would either be on April 1 or May 1.

There is no bessemer pig iron to be had from the Valley furnaces for delivery during the balance of the first half. The United States Steel Corporation placed an order with the Bessemer Association as referred to in last week's letter for bessemer pig iron for the third quarter. The first order was for 97,000 tons, and later an order for 6,000 tons was placed. This tonnage was at \$16, Valley furnaces, the price fixed by the association, and unless there is a marked improvement in the production, there will be but little more iron available for third quarter delivery. The car supply is better this week, and furnaces are receiving more coke than at any time for two weeks.

If the demand for structural material keeps up as in the past few weeks all the mills will be out of the market for the balance of the year after July 1. It is believed that much building contemplated for the coming spring will be greatly delayed or abandoned owing to the inability of the mills to supply the material. The mills that are being operated to their utmost capacity are likely to be closed for a few days by the expected flood. The two rivers are closed by ice gorges, and a break may come at any time. This will result in high water, and all the plants along the banks of the rivers will be forced to suspend operations.

Pig Iron.—Sales of bessemer pig iron this week aggregated 8,000 tons for delivery throughout the last

half at prices ranging from \$16 to \$16.50, Valley furnaces. Basic iron is quoted at \$16, Valley, for second half delivery. The demand for foundry No. 2 continues heavy, and fully 15,000 tons were sold for future delivery at \$17.25@17.50, Pittsburg, while \$18 is reported to have been paid for prompt shipment. About 12,000 tons of gray forge were sold this week for delivery during the second half at prices ranging from \$16.50 to \$17, Pittsburg.

Steel.—No sales of bessemer steel billets are recorded in the Pittsburg District this week. One or two small sales are reported in the Wheeling District at \$31. No prices are named here, as none is to be had. Steel bars and plates continue active, but prices are unchanged. Premiums are being paid on bars for prompt shipment. The mills are crowded with specifications, and but little new business is being accepted for delivery before July 1. Bars are still quoted at 1.50c. and tank plate at 1.60c.

Sheets.—The sheet market is very firm, and buyers are anticipating their requirements before the opening of the active season for the sheet trade. The American Sheet Steel Company continues to quote No. 28 gauge at 3.10@3.20c. and galvanized sheets at 70 and 10 per cent off. The independent mills are getting higher prices, but are pretty well sold up, and complaints are being made about deliveries.

Ferro-manganese.—The price of domestic 80 per cent remains at \$52.50 a ton, and the foreign product is held at \$50.

New York. Feb. 28.

Pig Iron.—There is less demand for forward delivery, but the market is very strong, and spot iron is hard to get. We quote for tidewater delivery: No. 1X foundry \$17.85@18.50; No. 2X, \$17.25@17.85; No. 2 plain, \$17@17.30; gray forge, \$16.50@16.85. For Southern iron on dock, New York, No. 1 foundry, \$16.25@16.75; No. 2, \$15.75@16.50; No. 3, \$15.25@15.75; No. 4, \$14.75@15.25; No. 1 soft, \$16.50@16.75; No. 2, \$15.75@16.25.

Bar Iron and Steel.—The market continues strong. We quote 1.63c. for common bars in large lots on dock; refined bars, 1.73c.; soft steel bars, 1.73c.

Plates.—Demand is strong, and prices are firm at the old figures. We quote for tidewater delivery in car-loads: Tank, 1/4-in. and heavier, 1.78c.; flange, 1.88c.; marine, 1.98c.; universal, 1.78c.

Steel Rails and Rail Fastenings.—There have been no developments of interest during the week. Standard sections are still quoted at \$28 at Eastern mills; light rails at \$28@30, according to weight. Spikes are 1.80c.; splice bars, 1.65c.; bolts, 2.65@2.80c.

Structural Material.—Demand continues active, and a considerable tonnage is to be imported. We quote for large lots at tidewater as follows: Beams, 1.80@1.95c.; tees, 1.85c.; angles, 1.80c.

CHEMICALS AND MINERALS.

(For further prices of chemicals, minerals and rare elements, see page 340.)

New York. Feb. 27.

The foreign chemical and mineral trade of Great Britain during January compares with the same month last year as below:

Imports.	1901.	1902.	Changes.
Bleaching powder, cwts.	19,020	20,393	I. 1,373
Soda compounds, cwts.	20,825	18,077	D. 2,748
Borax, cwts.	50,934	30,854	D. 20,080
Brimstone, cwts.	51,470	41,678	D. 9,792
Pyrites, tons	70,322	63,066	D. 7,256
Saltpeter, cws.	23,160	25,101	I. 1,941
Nitrate of soda, tons.	6,587	7,883	I. 1,296
Phosphates, crude, tons.	34,929	28,284	D. 6,645
Exports.			
Alkali, cwts.	300,145	316,228	I. 16,083
Bleaching powder, cwts.	135,680	102,265	D. 33,415
Copper sulphate, tons	7,059	1,088	D. 5,971
Chemical manure, tons	25,914	35,396	I. 9,482
Cement, tons	22,814	24,642	I. 1,828
Salt, tons	35,845	52,324	I. 16,479

The imports were valued at £273,236, against £310,473 in January, 1901; the decrease of £37,237 (£186,185) being due chiefly to pyrites, phosphates and borax.

The value of exports was £478,242, which compares with £592,492 last year; the falling off of £114,250 (£571,250) being credited to copper sulphate and bleaching powder.

Heavy Chemicals.—Good demand, and with more settled weather an improvement in transportation is expected. Prices show little change from last week. Domestic high-test alkali at 75@80c. per 100 lbs., f. o. b. works, and for foreign, 90@92 1-2c. in New York. Domestic caustic soda brings \$1.95@2 per 100 lbs., f. o. b. works, for early shipment, and \$1.90@1.95 for future deliveries. Ordinary bicarb. soda

is quoted at \$1 per 100 lbs., in kegs, f. o. b. works, and extra grades, \$3 up, per 100 lbs., f. o. b. works. Domestic sal soda is firm at 55c. for 100 lbs., f. o. b. works, as stocks are moderate. Foreign sal soda is quiet at 65@67 1-2c. per 100 lbs. in New York. Freer offerings of bleaching powder have eased Continental brands to \$1.70@1.75 per 100 lbs., and prime Liverpool at \$1.75@1.80. Domestic chlorate of potash has been strengthened by the limited spot supply; crystals bring \$8.50 per 100 lbs. and powdered \$8.25. But contracts for future delivery are still being booked on basis of \$7.75 f. o. b. works.

Acids.—Contract deliveries are slow, owing to poor transportation facilities. Prices are unchanged. Some export business is noted in blue vitriol on the basis of \$4 per 100 lbs., c. i. f. In January the total value of the exports from New York averaged \$3.99 per 100 lbs., while the market price here averaged \$4.39. January a year ago the export value averaged \$4.36, and the New York market, \$5.09. The fall in this year's prices is due chiefly to the weak copper market.

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

Acetic, com'l 28%.....\$1.80	Oxalic, com'l.....\$4.75@5.00
Blue vitriol.....4.25@4.50	Sulphuric, 50 deg., bulk ton.....14.00@18.00
Muriatic, 18 deg.....1.50	Sulphuric, 60 deg.....1.00
Muriatic, 20 deg.....1.62½	Sulphuric, 60 deg., bulk.....18.00@20.00
Muriatic, 22 deg.....1.75	Sulphuric, 66 deg.....1.20
Nitric, 30 deg.....4.00	Sulphuric, 66 deg., bulk.....21.00@23.00
Nitric, 38 deg.....4.25	
Nitric, 40 deg.....4.50	
Nitric, 42 deg.....4.87½	

Brimstone.—New York received 3,050 tons this week, nearly all of which will be delivered on contracts booked some time ago. Spot best unmixed seconds are quoted at \$24@24.50, and shipments, \$23@23.25 per ton. Best thirds are \$20.50 per ton, and current thirds \$19.50 for shipment.

Pyrites.—Meeting with good demand at firm prices, in sympathy with the high brimstone market. A charter from Huelva, Spain, north of Hatteras, is noted at 10s. (\$2.40) as prompt.

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. New York and other Atlantic ports. Spanish pyrites contain from 40 to 51 per cent of sulphur; American, from 42 to 44 per cent.

Sulphate of Ammonia.—Gas liquor, 24@25 per cent, quiet but firm at \$2.97 1-2@3 per 100 lbs.

Nitrate of Soda.—The market has assumed a strong and advancing tendency, owing to the scarcity of supplies here and limited stocks in Europe. Consequently high prices rule, and at New York are now on a parity with those quoted in Europe. The situation has been further strengthened by the persistent talk of a proposed strike at Caleta Buena. The freight market is weaker, but this has been offset by the advancing prices for nitrate. Demand in this country is good; spot being quoted at \$2.30 per 100 lbs., arrivals during this month, March, and April, \$2.25; May, \$2.10; June forward to the end of the year, \$2.02 1-2. The steamer *Buckingham* with 22,500 bags is unloading at Philadelphia, while the new steamer *Virginia* with 54,000 bags was due at Baltimore on February 27. This is the maiden trip of the *Virginia*, owned by W. R. Grace & Co., and carries the largest single cargo of nitrate of soda ever imported in this country. The only steamer expected in March is the *Capac* at New York with 25,400 bags.

The European market is in a peculiar position, as the heavy decrease in the visible supply as compared with last year indicates that stocks will likely be completely exhausted by the end of April.

Completed statistics give the exports from Chile in 1901 to all parts of the world at 27,386,112 qtls., as against 31,549,653 qtls. in 1900, showing a falling off of 4,163,541 qtls. or 13 per cent. This decrease in the face of a larger consumption has helped to put prices up to their present high level.

Concerning the market in Chile, we learn from Messrs. Jackson Brothers, of Valparaiso, under date of January 25, that there has been an active demand for all deliveries, and prices have advanced considerably. Transactions in 95 per cent have taken place at 6s. 8½d.@6s. 10d. for February, 6s. 7½d.@6s. 8½d. for March, 6s. 6½d.@6s. 7½d. for April, and 6s. 7½d.@6s. 8½d. alongside for July-December, according to deliveries. In refined sales have been effected at 7s. alongside for prompt, and at 6s. 8d.@6s. 9d. for monthly lots, June-December. Work in Iquique was renewed only for a short time, but no definite arrangement has been arrived at between the producers and the workmen, so that shipment in that port is paralyzed, whereas no troubles have arisen in other ports. We quote 95 per cent at 6s. 10d. February, 6s. 8d. March, 6s. 7d. April-June, 6s. 7½d. July-September, 6s. 8d. October-December, and refined 6s. 11½d. February-March, 6s. 9d. April-December, all ordinary terms sellers. The price of 6s. 10d. with an all round freight of 20s. stands in 8s. 7½d. per cwt. net cost and freight without purchasing commission. Reported sales for the fortnight were 2,107,000 qtls.

Phosphates.—The domestic market shows some improvement in buying, especially of the lower grade phosphates. Abroad reports are current that sellers of high grade Florida rock are willing to shade prices as quoted below for good ports, owing, partly to the favorable freight market which has enabled them to contract for vessel room some time ahead. Other Florida phosphates and South Carolina rock are obtainable at fractionally less than 5d. per unit, c. i. f. United Kingdom or North Sea ports. Tennessee stuff is unchanged in price. Algerian rock is quoted fractionally higher than either South Carolina or Florida pebble phosphates.

Exports of Florida high-grade rock from Savannah in January were comparatively small, being 3,794 tons, of which 2,012 tons went to Italy and the balance to Germany. In the same month last year the shipments were 9,386 tons, and in 1900 they were 8,508 tons.

Complete quotations will be found on pages 264 and 265 of mining stocks listed and dealt in at:

We quote phosphate prices as below.

Phosphates.	Per ton F. o. b.	C. i. f. U'n'd Kingdom or European Ports.	
		Unit.	Long ton.
*Fla. hard rock (77@80%)	\$7.50	7 @7¼d	\$10.92@11.31
*Fla. land peb (68@73%)	3.00@3.25	4½@5¼d	6.83@7.35
*Fla. Peace Riv. (68@73%)	2.25@2.50	4½@5¼d	5.85@6.30
†Tenn. (78@80%), export	3.50	6¼@7d	10.53@10.92
†Tenn. (75%) domestic	3.00@3.25	.....	.....
†Tenn. (73@74%) domestic	2.75@3.00	.....	.....
†Tenn. (70@72%) domestic	2.40	.....	.....
†So. Car. land rock.....	2.10@2.25	.....	.....
†So. Car. river rock.....	3.25	4¼@5d	5.67@6.30
Algerian, rock... (63@70%)	.....	6 @6¼d	8.04@8.70
Tunis, Gafsa... (58@63%)	.....	5 @5¼d	6.00@6.30

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

Liverpool. Feb. 12.

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

The export demand for most lines of heavy chemicals continues on a moderate scale, while quotations are steady.

The exports of bleaching powder and soda compounds for the month of January, as taken from the Board of Trade returns are as follows:

	cwts.
Bleaching Powder.	102,265
Shipments to all quarters, including the United States.	79,523
Shipments to United States alone.....	120,508
Soda ash.....	102,089
Caustic soda.....	18,601
Bicarb soda.....	11,980
Soda crystals.....	39,370
Sodium.....	23,614
Other sorts.....	316,228

In bleaching powder there is a considerable falling off compared with the corresponding month of last year, both in exports to the United States and also to other quarters.

In soda compounds the total is heavier than that of January, 1901, principally owing to the increase under the head of saltcake and also under the head of other sorts, while the leading lines show a falling off.

Soda ash continues to be held for full prices, as to market, and there is a fair trade passing. We quote spot range for tierces about as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces: Soda crystals are in fair request at generally £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special terms for certain export markets. Caustic soda is quiet, but prices are firm, as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Bleaching powder continues dull, but values are unchanged at £6 15s.@£6 17s. 6d. per ton, net cash, for hardwood packages, with special terms for Continental and a few other export quarters.

Chlorate of potash is in light demand at 3d.@3¼d. per lb., net cash.

Bicarb soda is steady at £6 15s. per ton, less 2½ per cent, for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of ammonia meets with a good inquiry, and is firm at £11 13s. 9d.@£11 15s. per ton, less 2½ per cent for good gray 24@25 per cent in double bags f. o. b. here.

Nitrate of soda is in fair request on spot, and held for £10 10s.@£10 15s. per ton, less 2½ per cent for double bags f. o. b. here, as to quality and quantity.

Messina, Sicily. Jan. 31.

(Special Report of Emil Fog & Sons.)

Brimstone.—The statistical position is getting worse. Arrivals from the mines which, during November, had relented owing to the floods, resumed their normal course in December and January. Stocks increased considerably, being at the end of December 100,000 tons in excess of the previous year. Exports during 1901 decreased by 100,000 tons. It had

been pretended that the production could not increase owing to the difficulty of deepening the mines. This, it seems, is not quite the case. Anyhow a considerable diminution in exports is undeniable. The consumption of Sicilian brimstone during last year is reduced by one-fifth, from about 550,000 tons to 450,000 tons. The Anglo-Sicilian Company had been warned, but will not listen, and is continually putting up prices, but the effects begin to tell. Prospects indeed will not look bright, unless the company changes policy. A collapse in prices is inevitable, even before expiration of the remaining 4 years time of the contract. The company continues to refuse any concession in prices. It would make reductions of 2s. to 3s., but for quantities of not under 50,000 tons. We quote f. o. b.: Best unmixed seconds, 85s. per ton; best thirds, 74s. 9d.; current thirds, 71s.; refined block sulphur (100 per cent), 86s. 6d.; refined roll sulphur, in casks, 95s. 6d.; sublime flowers, pure, in bags, 103s. 3d.; and current, 94s. 8d. Freight to the United States have not declined, returns from the United States ports being so bad. Coal freights from England to the Mediterranean are so low that many steamers prefer to lay up. New York, 8s.; Philadelphia, 9s.; Boston, 8s. 6d.; Baltimore, 8s. 3d.; Portland, 8s. 9d.; Baltic ports, 10s.@11s.

METAL MARKET.

New York. Feb. 27

GOLD AND SILVER.

Gold and Silver Exports and Imports.

At all United States Ports in January and Year.

Metal	January.		Year.	
	1901.	1902.	1901.	1902.
Gold.				
Exports.....	\$8,221,159	\$1,973,675	\$8,221,159	\$1,973,675
Imports.....	4,265,626	1,404,787	4,265,626	1,404,787
Excess. E.	\$3,955,533	E. \$568,888	E. \$3,955,533	E. \$568,888
Silver.				
Exports.....	\$4,790,239	\$4,506,213	\$4,790,239	\$4,790,239
Imports.....	3,189,318	2,107,681	3,189,318	2,107,681
Excess. E.	\$1,600,921	E. \$2,401,532	E. \$1,600,921	E. \$2,401,532

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 February 27, 1902, and for years from January 1, 1902, 1901 and 1900.

Period.	Gold.		Silver.		Total Excess Exports or Imports.
	Exports.	Imports.	Exports.	Imports.	
Week ...	\$1,029,216	\$28,103	\$904,335	\$44,704	E. \$1,860,744
1902	7,284,636	306,872	7,781,225	234,000	E. 14,524,989
1901	9,021,340	558,429	6,080,545	662,122	E. 13,881,334
1900	2,124,688	939,275	6,504,140	622,131	E. 7,071,422

Nearly all the gold exported this week went to France, while the silver was destined chiefly to London. Imports were from Central and South America and the West Indies.

Financial Notes of the Week.

Business continues steady, and little change is noted. The speculative markets are quiet and a little uneasy. Money is somewhat firmer in New York owing to considerable drafts for Western and Southern points. Gold exports have been resumed, a total of \$3,500,000 having been taken for shipment to France from New York.

The statement of the New York banks, including the 63 banks represented in the Clearing House, for the week ending February 21, gives the following totals, comparison being made with the corresponding weeks of 1901 and 1900:

	1900.	1901.	1902.
Loans and discounts.....	\$745,455,100	\$911,800,900	\$936,757,600
Deposits	\$26,866,600	1,009,186,900	1,019,474,200
Circulation	17,971,500	31,225,000	31,174,300
Specie	162,684,900	192,953,300	194,898,900
Legal tenders	63,710,300	73,890,100	72,426,300
Total reserve	\$226,395,200	\$266,843,400	\$267,325,200
Legal requirements	206,716,650	252,296,725	254,868,550
Balance surplus	\$19,678,550	\$14,546,675	\$12,456,650

Changes for the week, this year, were increases of \$4,752,900 in loans and discounts; \$4,195,200 in deposits, and \$343,500 in specie; decreases of \$59,800 in circulation; \$398,900 in legal tenders, and \$1,104,200 in surplus reserve.

The demand for silver from the East has been quite good. The Indian bazaars have bought in considerable quantity; but no Continental coinage orders have developed. The market closes steady.

Receipts of silver at the United States Assay Office in New York for the week ending February 27 were 31,000 oz.

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. Ass'd.	\$192,953,000	.....	\$162,684,900	.....
England	175,497,870	.....	188,548,970	.....
France	477,328,290	\$219,553,010	499,798,215	\$211,074,045
Germany	152,935,000	75,305,000	191,205,000	70,720,000
Spain	70,035,000	82,345,000	70,220,000	87,300,000
Netherlands	25,165,000	28,475,000	28,654,000	32,345,500
Belgium	14,475,000	7,240,000	15,416,605	7,708,335
Italy	77,865,000	9,295,000	79,595,000	10,612,000
Russia	365,140,000	32,885,000	375,470,000	35,515,000

The returns of the Associated Banks of New York are of date February 21, and the others February 20, as reported by the *Commercial and Financial Chronicle*. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Shipments of silver from London to the East for the year up to February 13, are reported by Messrs. Pixley & Abell's circular as follows:

	1901.	1902.	Changes.
India	£1,184,500	£1,005,320	D. £179,180
China	74,875	11,500	D. 63,375
The Straits	48,976	.....	D. 48,976
Totals	£1,308,351	£1,016,820	D. £291,531

Arrivals for the week, this year, were £275,000 in bar silver from New York, and £3,000 from Australia; total, £278,000. Shipments were £205,000 in bar silver to Bombay, and £11,500 to Hongkong; total, £216,500.

Indian exchange has been somewhat lower, though the demand for money in India continues good. The Council bills offered in London were taken at an average of 16.004d. per rupee, a total of 41 lakhs of rupees being sold. The demand for silver for Indian account continues moderate.

Imports of specie by water at San Francisco in January were the lightest in any month for several years. The totals were as follows:

	1901.	1902.	Changes.
Silver bullion	\$290,484	\$88,879	D. \$201,605
Silver coin	53,546	3,930	D. 49,616
Total silver	\$344,030	\$92,809	D. \$251,221
Gold bullion	\$47,027	\$43,090	D. \$3,937
Gold coin	2,666,060	3,454	D. 2,662,606
Total gold	\$2,713,087	\$46,544	D. \$2,666,543
Totals	\$3,057,117	\$139,353	D. \$2,917,764

No Mexican dollars were received by water this year. The imports this year were from the following sources: British Columbia, \$8,125; Mexico, \$127,528; Japan, \$3,700.

The foreign merchandise trade of Great Britain in January is valued by the Board of Trade returns as below:

	1901.	1902.
Imports	£45,987,516	£50,131,349
Exports	29,804,838	29,595,020
Excess, imports	£16,182,678	£20,536,328

This shows an increase of £4,143,832, or 9.0 per cent, in imports; a decrease of £209,818, or 0.7 per cent, in exports; and a resulting increase of £4,353,650, or 26.9 per cent, in the excess of imports.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	\$0.43 3/4	\$0.45 1/4
Peruvian soles and Chilean pesos	.40	.44
Victoria sovereigns	4.85	4.88
Twenty francs	3.84	3.88
Twenty marks	4.73	4.85
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

February.	Silver		Copper				Spelter		
	Starling Exchange	N. Y. Cts.	Lake	Electrolytic	London	Lead	N. Y.	St. L.	
21	4.87 3/4	55	25 3/4	12 1/4 @ 12 3/4	11 1/2 @ 12	55 3/4 @ 56	4.05 @ 4.10	4.25	4.10
22	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	4.87 3/4	54 1/2	25 1/2	12 1/4 @ 12 3/4	12 @ 12 1/2	56 @ 57	4.05 @ 4.10	4.27 1/2	4.12 1/2
25	4.87 3/4	55	25 1/2	12 1/4 @ 12 3/4	12 @ 12 1/2	56 @ 57	4.05 @ 4.10	4.27 1/2	4.12 1/2
26	4.87 3/4	55	25 1/2	12 1/4 @ 12 3/4	12 @ 12 1/2	57 @ 58	4.05 @ 4.10	4.27 1/2	4.12 1/2
27	4.87 3/4	55 1/2	25 3/4	12 1/4 @ 12 3/4	12 @ 12 1/2	56 3/4 @ 57 1/2	4.05 @ 4.10	4.27 1/2	4.12 1/2

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.—Although there has been a very good demand from Europe, business in general has again been rather quiet throughout the week. There is, however, a firm undertone, and prices have stiffened slightly, Lake copper being quoted at 12 1/4 @ 12 3/4c.; electrolytic in ingots, cakes and wire bars at 12 @ 12 1/4c., in cathodes at 11 3/4 @ 11 1/2c.; casting copper at 11 7/8 @ 12 1/8c.

The foreign market, which closed last Friday at £55 12s. 6d. opened on Monday at £56, ruled firm at about this figure throughout the week, and the closing quotations are cabled as £56 @ £56 2s. 6d. for spot, £56 10s. @ £56 12s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £59 @ £60; best selected, £60 @ £60 10s.; strong sheets, £69 @ £70; India sheets, £68 @ £69; yellow metal, 6 1/4 @ 6 3/4d.

Exports of copper from New York and Baltimore for the week ending February 26 are reported by our special correspondents as follows: To Great Britain, 1,135 tons; Germany, 1,070; Holland, 321; France, 620; Austria, 525; Belgium, 447; Italy, 70; Brazil, 6; total, 4,194 tons. Also 282 tons matte to Great Britain.

Imports were 489 tons copper from Mexico, and 177 from England; total, 666 tons.

Imports of copper into Great Britain for the month of January were as follows, the totals being given in terms of fine copper:

	1901.	1902.	Changes.
Copper ores	7,409	16,348	I. 8,939
Matte and precipitate	7,630	7,200	D. 430
Fine copper	4,793	9,044	I. 4,251
Totals, fine copper	9,349	14,279	I. 4,930

Of the imports this year 1,258 tons of matte and 2,705 tons of fine copper were from the United States; against 68 tons of ore, 760 tons of matte and 4,834 tons fine copper in January, 1901.

Tin.—Has been quite active, and prices advanced to 25 3/4c. the beginning of the week. Later on a somewhat easier feeling prevailed, and the market closes at 25 3/4 @ 25 1/2c. for spot; 24 1/2 @ 25c. for March; 24 3/4 @ 24 1/2c. for April.

The foreign market, which closed on Friday at £117, opened on Monday at £118 10s., declined on Tuesday to £116, and the closing quotations are cabled as £116 @ £116 2s. 6d. for spot, £111 @ £111 2s. 6d. for three months.

Imports of tin into Great Britain for January, were, in long tons: Straits, 1,690; Australia, 399; other countries, 463; total, 2,552 tons, against 3,641 tons in January, 1900. Re-exports were 1,678 tons, against 2,597 tons last year.

Lead.—A very good demand is reported for all descriptions. The ruling quotations are 4 @ 4.05c. St. Louis, 4.05 @ 4.10c. New York.

The quotations for corroding lead are 10c. per 100 lbs., or \$2 per ton, above those for ordinary commercial lead.

The foreign market continues firm, Spanish lead being quoted at £11 13s. 9d. @ £11 15s.; English lead at £11 16s. 3d. @ £11 17s. 6d.

Imports of lead into Great Britain in January, and exports of lead in all forms, were as follows, in long tons:

	1901.	1902.	Changes.
United States	4,341	4,797	I. 456
Spain	6,732	8,987	I. 2,255
Australia	6,227	7,917	I. 1,690
Other countries	898	1,145	I. 247
Total imports	18,198	22,846	I. 4,648
Exports	2,493	2,253	D. 240
Balance	15,705	20,593	I. 4,888

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spelter.—The firmer tendency about which we reported in our last issue has made further progress. A large demand is reported on the part of consumers, for galvanizing as well as brass purposes. We quote the market at 4.12 1/2 @ 4.15c. St. Louis, 4.27 1/2 @ 4.30c. New York.

The foreign market continues to display considerable strength, good ordinaries being quoted at £18, specials at £18 5s.

Imports of spelter, or metallic zinc, into Great Britain for the month of January were 2,552 long tons, against 3,641 tons in January, 1901.

Antimony.—Is in fair demand. We quote Cookson's at 9 3/4 @ 10c.; Hallett's at 8 @ 8 1/2c.; Japanese, Hungarian, Italian and U. S. Star at 7 3/4c.

Nickel.—The price continues firm at 50 @ 60c. per lb., according to size and terms of order.

Platinum.—Consumption continues good. Ingot platinum in large lots brings \$19.50 per oz., in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 82c. per gram.

Quicksilver.—The New York price continues \$48 per flask for large lots, with a slightly higher figure for small orders. In San Francisco quotations are firm at \$47.50 @ \$48 for domestic orders, and \$44 for export. The London price is £8 15s. per flask, with the same figure quoted from second hands.

Imports of quicksilver into Great Britain in January were 63,066 lbs., against 70,322 lbs. in January, 1901. Exports were 214,448 lbs., against 93,032 lbs. last year.

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

	Per lb.	Aluminum.	Per lb.
No. 1, 99% ingots	33 @ 37c.	Ferro-Tungsten (37%)	25c.
No. 2, 90% ingots	31 @ 34c.	Magnesium	\$2.75
Rolled sheets	4c. up	Manganese (over 90%)	1.00
Alum-bronze	20 @ 23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum.	33 @ 39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	1.50	Molybdenum (Best)	\$1.82
Chromium (over 90%)	1.00	Phosphorus	50c.
Copper, red oxide	50c.	American	7 1/2c.
Ferro-Molyb'dum (50%)	\$1.25	Sodium metal	50c.
Ferro-Titanium (10%)	90c.	Tungsten (Best)	62c.
Ferro-Titanium (20%)	\$1.10		

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

Average Prices of Metals per lb., New York

Month.	Tin.		Lead.		Spelter.	
	1902.	1901.	1902.	1901.	1902.	1901.
January	23.54	26.51	4.000	4.350	4.27	4.13
February	26.68	.....	4.350	.....	4.01
March	26.03	.....	4.350	.....	3.91
April	25.93	.....	4.350	.....	3.98
May	27.12	.....	4.350	.....	4.04
June	28.60	.....	4.350	.....	3.99
July	27.85	.....	4.350	.....	3.95
August	26.78	.....	4.350	.....	3.99
September	25.31	.....	4.350	.....	4.08
October	26.62	.....	4.350	.....	4.23
November	26.67	.....	4.350	.....	4.23
December	24.36	.....	4.153	.....	4.31
Year	26.54	.....	4.334	.....	4.08

Average Prices of Copper.

Month.	New York—		London—	
	Electrolytic.	Lake.	Standard.	1901.
January	11.053	16.25	11.322	16.77
February	16.38	.....	16.90
March	16.42	.....	16.94
April	16.43	.....	16.94
May	16.41	.....	16.94
June	16.38	.....	16.90
July	16.31	.....	16.91
August	16.25	.....	16.50
September	16.25	.....	16.54
October	16.25	.....	16.60
November	16.224	.....	16.33
December	13.845	.....	14.36
Year	16.117	.....	16.53

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.

Month.	1902.		1901.		1900.	
	London.	N. Y.	London.	N. Y.	London.	N. Y.
January	25.62	55.56	28.97	62.82	27.30	59.30
February	28.13	61.06	27.49	59.76
March	27.04	60.63	27.59	59.81
April	27.30	59.29	27.41	59.59
May	27.43	59.64	27.56	59.96
June	27.42	59.57	27.81	60.42
July	26.96	58.46	28.23	61.25
August	26.94	58.37	28.13	61.14
September	26.95	58.26	28.85	62.63
October	26.62	57.59	29.58	63.83
November	26.12	56.64	29.66	64.04
December	25.46	55.10	29.68	64.14
Year	27.11	58.95	28.27	62.33

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

LATE NEWS.

CRIPPLE CREEK—COLORADO.

(From Our Special Correspondent.)

Eight assay offices in the district were blown up by dynamite on the morning of February 24. One was at Cripple Creek, two were in Goldfield and five were in Victor. The total damage is not very great, though some of the buildings were badly shaken. No body was seriously hurt. It is thought that the explosions were the result of concerted action among the mine operators, who, it is supposed, suspected that the assay offices in question had been buying rich ore stolen by miners. Another theory is that the offices were blown up by certain ore thieves, who thought they had not received fair treatment. The persons who used the dynamite are unknown. There is no clue, apparently, to their identity, and no arrests have been made yet.

STOCK QUOTATIONS.

NEW YORK.

Table of stock quotations for New York, listing companies like Alamo, Alice, Amalgamated, and others with columns for par value, Feb. 20, Feb. 21, Feb. 22, Feb. 24, Feb. 25, Feb. 26, and Sales.

Coal and Industrial Stocks.

Table of coal and industrial stock quotations for New York, listing companies like Am. Agr. Chem., U.S. Steel, and others with columns for par value, Feb. 20, Feb. 21, Feb. 22, Feb. 24, Feb. 25, Feb. 26, and Sales.

PHILADELPHIA, PA. \$

Table of stock quotations for Philadelphia, PA, listing companies like Am. Alkali, Am. Cement, and others with columns for par value, Feb. 20, Feb. 21, Feb. 22, Feb. 24, Feb. 25, Feb. 26, and Sales.

MEXICO.

Feb. 15.

Table of stock quotations for Mexico, listing companies like Durango, Ca. Min. de Penoles, and others with columns for Shares, Last div'd, Prices (Bid, Ask), and Sales.

BOSTON, MASS.

Table of stock quotations for Boston, Mass., listing companies like Adventure Con., Aetna Con., and others with columns for par value, Shares listed, Feb. 20, Feb. 21, Feb. 22, Feb. 24, Feb. 25, Feb. 26, and Sales.

Official Quotations, Boston Stock Exchange. Total sales, 158,598 shares. †Ex-dividend. §Ex-assnt. paid.

ST. LOUIS, MO.*

Feb. 24.

Table of stock quotations for St. Louis, MO, listing companies like Am.-Nettie, Colo., and others with columns for Name, Shares, Par, Bid, Ask, and Sales.

*From our Special Correspondent.

SPOKANE, WASH.*

Feb. 22.

Table of stock quotations for Spokane, Wash., listing companies like Black Tail, Ben Hur, and others with columns for Name of Company, Par Val., H., L., Sales, and Quotations.

Total sales 89,787 shares. *Reported by Hunner & Harris.

SALT LAKE CITY.*

Feb. 22.

Table of stock quotations for Salt Lake City, listing companies like Ajax, Anchor, Bullion Beck, and others with columns for Name of Company, Location, Shares, Par Val., Quotations (High, Low), and Sales.

*By our Special Correspondent. Total number of shares sold, 302,536

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.

Table of stock quotations for Colorado Springs, Colo., listing companies like Acacia, Alamo, Am. Con., Anaconda, Anchor, Antelope, Aola, Argentum Jr., Banner, Battle Mt. C., Ben Hur, Black Bell, Blue Bell, Buckhorn, Butterfly Ter., Cadillac, Cent'l Con., Champion, Chicolo, C. K. & N., C. C. Colum., C. G. Est., C. C. & M., Cr'de & C. C., D. C. Con., Dant., Dr. Jack Pot., Echo, Elkton, Con., El Paso, G., Fanny Rawlings, Findlay, Gold Dollar, Gold Cycle, Gold Fleece, Gold Knob, Gold Sov'n, Ida May, Ironclad, Isabella, Jack Pot., Josephine, Key West, Lexington, Magnet, R., Midway, M. J. T., Mobile, Moll Dwyer, Mol. Gibson, Monarch, Montreal, Moon A'e'r, Morn's Star, National, Nellie, V., New Haven, Olive Branch, Oriole, Pappoose, Pharmacist, Pilgrim, Pinnacle, Pointer, Portland, Prince Alb., Princess, Progress, Pythias, Republic, Rob. Burns, Rose Mad, Rose Nicol, Sunset Eclipse, Uncle Sam, Vindicator, Va. M., Work.

Total sales 640,612 shares. *Holiday.

Colorado Springs (By Telegraph.)

Table of stock quotations for Colorado Springs (By Telegraph), listing companies like Acacia, Alamo, Anaconda, Argentum, Battle Mt., Butterfly Ter., Cripple Creek Con., Dr. Jack Pot., El Paso, Elkton, Con., Fanny Rawlings, Findlay, Gold Dollar, Gold King, Golden Cycle, Golden Fleece, Hart, Isabella, Jack Pot., Katinka, Keystone, Last Dollar, Lexington, Mollie Gibson, Moon Anchor, National, New Haven, Pharmacist, Pinnacle, Portland, Vindicator, Con., Work.

MONTREAL, CANADA.

Feb. 24.

Table of stock quotations for Montreal, Canada, listing companies like Big Three, California, Can. Gold Fields, Deer Trail Con., Evening Star, Golden Star, Gold Hills Dev., Knob Hill, Monte Christo, Montreal, G. F., Montreal-London, Noble Five, Novelty, North Star, Payne, Rambler-Cariboo, Republic, Slocan-Sovereign, Virtue, War Eagle.

LONDON.

Feb. 15.

Table of stock quotations for London, listing companies like Alaska-Treadwell, Anaconda, Copiapo, De Lamar, El Oro, Enterprise, Franting & Bolivia, Hall, Mg. & Sm., Le Roi, British Col., Le Roi No. 2, British Col., Montana, Mountain Copper, Stratton's Independence, St. John del Rey, Utah, Ymir, European: Linares, Mason & Barry, Rio Tinto, Tharsis, Australia and New Zealand: Assoc. Gold Mines, Br'ken Hill, Great Bo'd'r Pr'p., Hannan's Brownhill, Kalgurlic, Lake View Cons., Mt. Morgan, Waihi, Indian: Cape Copper, Mysore Gold, Nundydroog, Ooregum, Ooregum, pref., African: British S. Africa, Cape Copper, Cape Copper, pref., City and Sub'n, Crown Reef, De Beers, Ferreria, Giddens Est., Henry Nourse, Jagersfontein, Joh'n'b'g Con., Jubilee, Langlaagte Est., May Con., Meyer & Charlton, Namaqua, Primrose, Rand Mines, Robinson, Sheba, Sim. & Jack Pr'p., Wolhuter.

c.-Copper. d.-Diamonds. g.-Gold. l.-Lead. s.-Silver. *Ex-dividend.

PARIS.

Feb. 13.

Table of stock quotations for Paris, listing companies like Acieries de Creusot, Firminy, Huta-Bank, la Marine, Anzin, Bolco, Briansk, Champ d'Or, Courrieres, Dombrows, Dourges, Dynamite Centrale, Escrombrera-Bleyberg, Huanchaca, Laurium, Malfidano, Metaux, Cle. Fran. de, Mota-el-Hadid, Naptheu, Naptheu Nobel, Nickel, Penarroya, Rebecca, Salines de l'Est, Salines du Midi, Vieille Montagne.

TORONTO, ONT.

Table of stock quotations for Toronto, Ont., listing companies like Ontario: Golden Star, British Columbia: Cariboo McK., Center Star, Crow's N. G., Deer Trail, Fairview, Morrison, Mt. Lion, North Star, Payne, Republic, Virtue, War Eagle Cons., Winnipeg, Wonderful, Develop. Co., Can. G. F. S.

Total sales, 15,700 shares.

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.

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.

COAL, IRON AND INDUSTRIALS.

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—		Cust. Meas.	Price.	Barium—		Cust. Meas.	Price	Graphite—Am. f.o.b. Provi-		Cust. Meas.	Price	Paints and Colors—		Cust. Meas.	Price
Carborundum, f.o.b. Niagara Falls, Powd., F. F. F. F.	lb.		\$0.08	Oxide, Am. hyd. cryst.	lb.		\$0.02 $\frac{1}{2}$	dence, R. I. lump	sh. ton		8.00	Metallic, brown	sh. ton		\$ 19.00
Grains	"		.10	Sulphate (Blanc Fixe)	"		.02	Pulverized	"		30.00	Red	"		16.00
Corundum, N. C.	"		.07@.10	Barytes				German, som. pulv.	lb.	.01 $\frac{1}{4}$ @.01 $\frac{1}{2}$	30.00	Ocher, Am. common	"		9.25@10.00
Chester, Mass.	"		.04 $\frac{1}{2}$ @.05	Am. Crude, No. 1	sh. ton		9.00	Best pulverized	"	.01 $\frac{1}{2}$ @.02	30.00	Best	"		21.25@25.00
Barry's Bay, Ont.	"		.07 $\frac{1}{2}$ @.09 $\frac{1}{2}$	Crude, No. 2	"		8.00	Ceylon, common pulv.	"	.02 $\frac{1}{2}$ @.03 $\frac{1}{2}$	7.75	Dutch, washed	lb.		.04 $\frac{1}{2}$
Crushed Steel, f.o.b. Pittsburg	"		.05 $\frac{1}{2}$	Crude, No. 3	"		7.75	Best pulverized	"	.04@.08	4.00	French, washed	"		.01 $\frac{1}{4}$ @.01 $\frac{1}{2}$
Emery, Turkish flour, in kegs	"		.03 $\frac{1}{2}$	German, gray	"		14.50	Italian, pulv.	"	.01 $\frac{1}{4}$	8.00@8.50	Orange mineral, Am.	"		.07 $\frac{1}{4}$ @.07 $\frac{1}{2}$
Grains, in kegs	"		.05@.05 $\frac{1}{2}$	Snow white	"		17.00	Gypsum —Ground	sh. ton		8.00@8.50	Foreign, as to make	"		.07 $\frac{1}{4}$ @.11 $\frac{1}{2}$
Naxos flour, in kegs	"		.03 $\frac{1}{2}$	Bauxite —Ga. or Ala. mines:				Fertilizer	"		7.00	Paris green, pure, bulk	"		.11 @.11 $\frac{1}{4}$
Grains, in kegs	"		.05@.05 $\frac{1}{2}$	First grade	lg. ton		5.50	Rock	lg. ton		4.00	Red lead, American	"		.05 $\frac{1}{4}$ @.05 $\frac{1}{2}$
Chester flour, in kegs	"		.03 $\frac{1}{2}$	Second grade	"		4.75	English and French	"		14.00@16.00	Foreign	"		.06 $\frac{1}{2}$ @.08
Grains, in kegs	"		.05@.05 $\frac{1}{2}$	Bismuth —Subnitrate	lb.		1.40	Infusorial Earth —Ground				Turpentine, spirits	gal.		.41 $\frac{1}{2}$
Peekskill, f.o.b. Easton, Pa.	"		.01 $\frac{1}{4}$	Subcarbonate	"		1.65	American, best	"		20.00	White lead, Am., dry	lb.		.04 $\frac{1}{4}$ @.04 $\frac{1}{2}$
flour, in kegs	"		.02 $\frac{1}{4}$	Bitumen —"B"	"		.03 $\frac{1}{2}$	French	"		37.50	American, in oil	"		.05 $\frac{1}{4}$ @.05 $\frac{1}{2}$
Grains, in kegs	"		.02 $\frac{1}{4}$	"A"	"		.05	German	"		40.00	Foreign, in oil	"		.07 $\frac{1}{4}$ @.09 $\frac{1}{4}$
Crude, ex-ship N. Y.; Ab-				Bone Ash	"		.02 $\frac{1}{4}$ @.02 $\frac{1}{2}$	Iodine —Crude	100 lbs.		2.45	Zinc, white, Am., ex dry	"		.04 $\frac{1}{2}$ @.04 $\frac{1}{4}$
bott (Turkey)	lg. ton		26.50@30.00	Borax	"		.07 $\frac{1}{4}$ @.07 $\frac{1}{2}$	Nitrate	lb.		.05	American, red seal	"		.08 $\frac{1}{2}$
Kuluk (Turkey)	"		22.00@24.00	Bromine	"		.40	True	"		.04	Green seal	"		.07
Naxos (Greek) h. gr.	"		26.00	Cadmium —Metallic	"		1.40	Oxide, pure cupperas col.	"		.05@.10	Foreign, red seal, dry	"		.05 $\frac{1}{2}$ @.08
Garnet, as per quality	sh. ton		25.00@35.00	Sulphate	100 lbs.		2.00@2.50	"Purple-brown	"		.02	Green seal, dry	"		.06 $\frac{1}{2}$ @.08 $\frac{1}{2}$
Pumice Stone, Am. powd.	lb.		.01 $\frac{1}{2}$ @.02	Calcium —Acetate, gray	"		1.30	Venetian red	"		.01@.01 $\frac{1}{2}$				
Italian, powdered	"		.01 $\frac{1}{2}$	" brown	"		.90	Scale	"		.01@.03				
Lump, per quality	"		.04@.40	Carbide, ton lots f.o.b. Niagara Falls, N. Y. or Jersey City, N. J.	sh. ton		75.00	Kaolin —(See Clay, China.)							
Rottenstone, ground	"		.02 $\frac{1}{2}$ @.04 $\frac{1}{2}$	Carbonate, ppt.	lb.		.05	Kryolith —(See Cryolite.)							
Lump, per quality	"		.03@.20	Chloride, com'l.	100 lbs.		.75@.80	Lead—Acetate, white	"		.07 $\frac{1}{4}$ @.08	Potash			
Rouge, per quality	"		.10@.30	Best	"		1.00	Brown	"		.06	Caustic, ordinary	"		.04 $\frac{1}{2}$ @.06
Steel Emery, f.o.b. Pittsburg	"		.07	Cement				Nitrate, com'l.	"		.06 $\frac{1}{2}$	Elect. (90%)	"		.06 $\frac{1}{2}$
				Portland, Am., 400 lbs.	bbbl.		1.70@1.90	" gran.	"		.08 $\frac{1}{2}$	Potassium			
				Foreign	"		1.65@2.25	Lead —Acetate, white	"		.07 $\frac{1}{4}$ @.08	Bicarbonate cryst.	"		.03 $\frac{1}{4}$
				"Rosendale," 300 lbs.	"		.75	Brown	"		.06	Powdered or gran.	"		.14
				Slag cement, imported	"		1.65	Chloride, com'l.	"		.06 $\frac{1}{2}$	Bichromate, Am.	"		.08 $\frac{1}{4}$ @.08 $\frac{1}{2}$
				Ceresine				Best	"		.08 $\frac{1}{2}$	Scotch	"		.08 $\frac{1}{2}$ @.09
				Orange and Yellow	lb.		.12	Lead —Acetate, white	"		.07 $\frac{1}{4}$ @.08	Carbonate, hydrated	"		.04@.04 $\frac{1}{4}$
				White	"		.13 $\frac{1}{2}$	Nitrate, com'l.	"		.06 $\frac{1}{2}$	Calcined	"		.03 $\frac{1}{2}$ @.03 $\frac{1}{4}$
				Chalk —Lump, bulk	sh. ton		2.45	" gran.	"		.08 $\frac{1}{2}$	Chromate	"		.35
				Ppt. per quality	lb.		.03 $\frac{1}{2}$ @.06	Crude (95%)	lg. ton		6.50@7.00	Cyanide (98@99%)	"		.23
				Chlorine —Liquid	"		.30	Calced	sh. ton		14.00@15.00	Kalnit.	lr. ton		9.05
				Water	"		.10	Bricks	M		170.00	Manure salt, 20%	100 lbs.		.66
				Chrome Ore				Am. Bricks, f.o.b. Pittsburg	"		175.00	Double Manure salt, 48@53%	"		1.12
				(50% ch.) ex-ship N. Y.	lg. ton		24.75	Magnesite —Greece.				Muriate, 80@85%	"		1.83
				Sand, f.o.b. Baltimore	"		33.00	Crude	lg. ton		6.50@7.00	95%	"		1.86
				Bricks, f.o.b. Pittsburg	M		175.00	Calced	sh. ton		14.00@15.00	Permanganate	lb.		.03 $\frac{1}{2}$ @.10 $\frac{1}{4}$
				Clay, China —Am. com. ex-				Finishing	"		.90	Prussiate, yellow	"		.36
				dock, N. Y.	lg. ton		8.00	Magnesium				Red	"		.36
				Am. best, ex-dock, N. Y.	"		9.00	Carbonate, light, fine pd.	lb.		.05	Sulphate, 90%	100 lbs.		2.11
				English, common	"		12.00	Blocks	"		.07@.03	96%	"		2.14
				Best grade	"		17.00	Chloride, com'l.	"		.01 $\frac{1}{2}$	Sylvinit	unit		.36 $\frac{1}{2}$
				Fire Clay, ordinary	sh. ton		4.25	Fused	"		.20	Quartz —(See Silica.)			
				Best	"		6.00	Nitrate	"		.60	Salt—N. Y. com. fine	sh. ton		2.00
				Slip Clay	"		5.00	Sulphate	100 lbs.		.75@.95	N. Y. agricultural	"		1.50
				Coal Tar Pitch	gal.		.08	Manganese —Powdered,				Saltpetre —Crude	100 lbs.		3.50@3.55
				Cobalt —Carbonate	lb.		1.75	70@75% binioxide	lb.		.01 $\frac{1}{4}$ @.01 $\frac{1}{2}$	Refined	"		4.37 $\frac{1}{2}$ @4.62 $\frac{1}{2}$
				Nitrate	"		1.50	75@85% binioxide	"		.01 $\frac{1}{2}$ @.02 $\frac{1}{4}$	Silica —Best foreign	lg. ton		10.00@11.00
				Oxide—Black	"		2.20@2.30	85@90% binioxide	"		.02 $\frac{1}{4}$ @.03 $\frac{1}{4}$	Ground quartz, ord.	sh. ton		6.00@8.00
				Gray	"		2.28@2.40	90@95% binioxide	"		.03 $\frac{1}{4}$ @.05 $\frac{1}{4}$	Best	"		12.00@13.00
				Small, blue ordinary	"		.06	Carbonate	"		.16@.20	Lump quartz	"		2.50@4.00
				Best	"		.20	Chloride	"		.04	Glass sand	"		2.75
				Copperas	100 lbs.		.30@.35	Ore, 50%, Foreign	unit		.20@.21	Silver —Chloride	oz.		.65
				Carbonate	lb.		.18@.19	Domestic	"		.30	Nitrate	"		.37 $\frac{1}{2}$
				Chloride	"		.25	Marble —Flour	sh. ton		6.00@7.00	Oxide	"		85@1.10
				Nitrate, crystals	"		.35	Mercury —Bichloride	lb.		.77	Sodium			
				Oxide, com'l.	"		.19	Mica —N. Y. gr'nd, coarse	"		.03@.04	Bichromate	lb.		.06 $\frac{1}{4}$
				Cryolite	"		.06 $\frac{1}{2}$	Fine	"		.04@.05	Chlorate, com'l.	lb.		.08 $\frac{1}{4}$ @.08 $\frac{1}{2}$
				Blasting powder, A	25 lb. keg		2.65	Sheets, N. C., 2x4 in.	"		.30	Hyposulphite, Am.	100 lbs.		1.60@1.65
				Blasting powder, B	"		1.40	3x3 in.	"		.80	German	"		1.70@1.90
				"Rackarock," A	lb.		.25	3x4 in.	"		1.50	Peroxide	lb.		.45
				"Rackarock," B	"		.18	4x4 in.	"		2.00	Phosphate	"		.02 $\frac{1}{2}$ @.05
				Judson R. R. powder	"		.10	6x6 in.	"		3.00	Prussiate, com'l.	"		.10 $\frac{1}{2}$ @.11
				Dynamite (20% nitro-glycerine)	"		.13	Mineral Wool				Silicate, conc.	"		.05
				(30% nitro-glycerine)	"		.14	Slag, ordinary	sh. ton		19.00	Sulphate, com'l.	100 lb.		.77 $\frac{1}{2}$
				(40% nitro-glycerine)	"		.15	Selected	"		25.00	Sulphide	lb.		.01 $\frac{1}{4}$
				(50% nitro-glycerine)	"		.16 $\frac{1}{2}$	Rock, ordinary	"		32.00	Sulphide crystals	"		.02 $\frac{1}{2}$
				(60% nitro-glycerine)	"		.18	Selected	"		40.00	Sulphur —Roll	100 lbs.		1.85
				(75% nitro-glycerine)	"		.21	Nickel —Oxide, No. 1	lb.		1.00	Flour	"		1.90
				Glycerine for nitro (32 2-10 ² Be.)	"		.12 $\frac{1}{2}$ @.13	No. 2	"		.60	Flowers, sublimed	"		2.15
				Feldspar —Ground	sh. ton		8.00@9.00	Sulphate	"		.20@.21	Talc —N. C., 1st grade	sh. ton		13.75
				Flint Pebbles —Danish, Best	lg. ton		14.75	Oils —Black, reduced 29 gr.:				N. Y., Fibrous, best	"		10.20
				Fluorspar				25@30, cold test	gal.		.06 $\frac{1}{4}$ @.10 $\frac{1}{4}$	French, best	100 lbs.		1.25
				Am. lump, 1st grade	sh. ton		\$14.40	15, cold test	"		.10 $\frac{1}{4}$ @.11 $\frac{1}{4}$	Italian, best	"		1.62 $\frac{1}{2}$
				2d grade	"		13.90	Zero	"		.11 $\frac{1}{4}$ @.12 $\frac{1}{4}$	Tar —Regular	bbbl.		1.95
				Gravel and crushed, 1st gr.	"		13.40	Summer	"		.09 $\frac{1}{4}$ @.09 $\frac{1}{2}$	Oil barrels	"		3.65
				2d grade	"		12.40	Cylinder, dark steam ref.	"		.06 $\frac{1}{4}$ @.10 $\frac{1}{4}$	Tin —Crystals	lb.		.30@21 $\frac{1}{2}$
				Ground, 1st grade	"		17.90	Dark, filtered	"		.11 $\frac{1}{4}$ @.15 $\frac{1}{4}$	Oxide	"		.42